NOTICE! Prices in catalog are, in most cases, prices in effect long before the war. Consult revised price list sent with catalog before ordering.

CATALOG NO. 12

The William B. Duck Co.

ANYTHING ELECTRICAL

We Sell only Goods of Recognized Quality and Merit, and at Prices that will Save You Money

TOLEDO, OHIO, U. S. A.

Copyright 1919 by The Wm. B. Duck Co.

4 cars in ONE

THE UAJUSTIT CAR

YOU ADJUSTIT

4 cars in ONE

Adjusted to the Littlest Kiddy



4

Adjusted to the Littler Kiddy



CARS

Adjusted to the Little Kiddy



IN

Adjusted to the Little Man



ONE

Special Price $2.25

Shipping Wt. 7 lbs.

There is no *economy* in buying cheaply constructed cars to endanger the Kiddy's life.

There is no *satisfaction* in buying a car that the Kiddy grows out of in a little while.

There is only one car that is economical to buy and satisfactory to use, and that is the "UAJUSTIT"—four cars in one.

The Car That Satisfies the Growing Child

The "UAJUSTIT" Car is in a class by itself both as to *beauty* of *design* and *strength* of *construction.* It has Metal Bearings, Forged Steel Axles, Powerful Steering Post and Steel Truss, making it indestructible and fit for the roughest kind of usage.

The "Uajustit" is the Highest Grade Car Made

Yet it is the cheapest car on the market, for *it takes the place of Four Cars.*

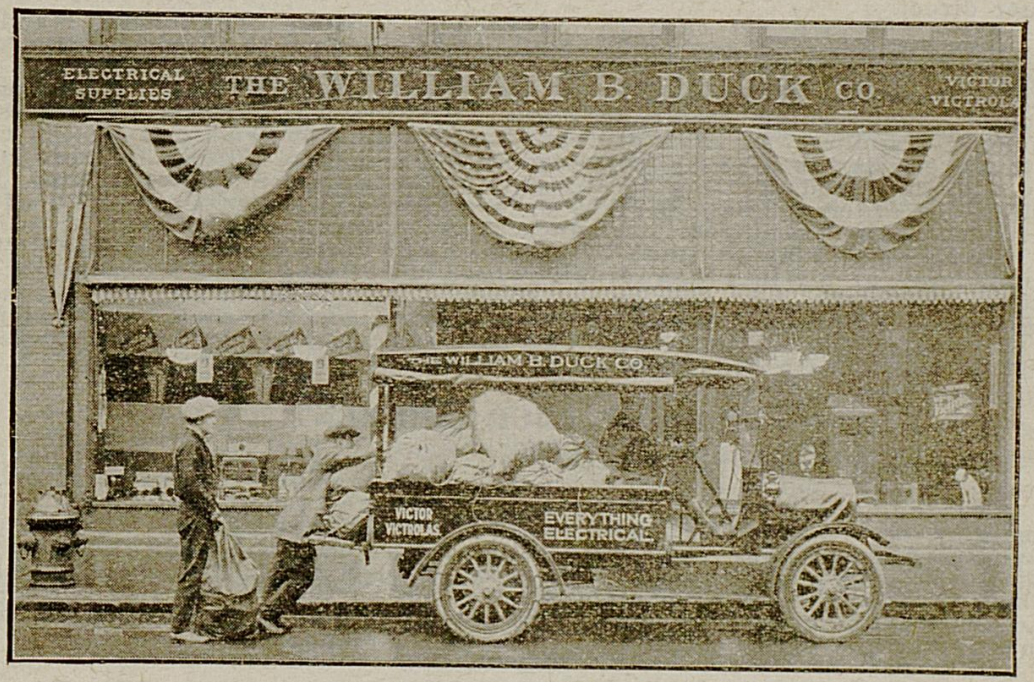
Special Price $2.25

Shipping Wt. 7 lbs.

THE
WILLIAM B. DUCK COMPANY

ANYTHING ELECTRICAL

WIRELESS INSTRUMENTS



15,000 of our catalogs ready for delivery to eager electrical and wireless enthusiasts in all parts of the world. This was one of seven consecutive shipments during the early part of November, 1915.

224-226 SUPERIOR STREET TOLEDO, OHI

THIS IS THE MOST IMPORTANT PAGE IN CATALOG.

Our Years of Experience Proves It; So Please Read Every Word on this Page Before Ordering.

HOW TO ORDER. OUR TERMS. WHAT MANY OLD PATRONS DO NOT KNOW.

We shall, as briefly as possible, crowd into this one page a great many pertinent suggestions and imperative requirements, which a large number of our patrons too often ignore.

Write your name and address plainly. Always give catalog page of the article you order and the number of catalog from which you order. We often receive orders from catalogs several years old. We try to keep an accurate record of all the business from each catalog. We also mail our latest catalog to persons ordering from an old catalog. You deprive yourself, therefore, of our latest literature when you fail to give us this information. No matter how often you order always give the number of catalog. Never say, "Send me your latest catalog," unless you state the number of the catalog you have. You may have the latest. When you suggest to your friend to write for our catalog, tell him to send 8c, as you did. We will not then be put to the trouble of so informing him. Do not write us for commission, special discounts, or for agency representation. We deal with the consumer direct. Do not give your order to some electrical or other concern, believing they will receive a discount. We allow no discounts to anyone. We have, wherever possible eliminated all middlemen's profits, giving you the benefit. Avoid delay and expense and order direct.

Our terms are net cash to everyone, regardless of financial standing, excepting educational and public institutions, because they seldom can remit cash in advance. Our low prices and the wide range and volume of our business and the large number of individual orders we receive absolutely prohibit our opening credit accounts with business houses, regardless of financial standing. In spite of these very explicit instructions we are compelled every day to return several orders for falure to conform to these rules. We will ship goods C. O. D. to any part of the United States or Canada, providing the order amounts to $5.00 or upwards, and at least one-third of the purchase price is remitted in advance as an evidence of good faith.

Remittances may be made by check or any form of Money Order. There is no delay at all in filling orders where uncertified checks are sent. We endeavor to make it as easy and as convenient as possible for our patrons to order their supplies from us. Nearly all other concerns hold your order up if certified checks are not sent. Two cent stamps are accepted on orders for $1.00 or less. Never send coin. It is unsafe and is sent at your risk.

INSURE YOUR SHIPMENT.

In ordering goods by Parcel Post, we earnestly recommend that you insure the shipment against loss or damage in transit. 5c insures shipments of the value of $5.00; 10c of the value of $15.00, and 15c of the value of $20.00. Insurance covers shipments to any postoffice in Canada and the United States, including Canal Zone, Hawaiian, Philippines, Porto Rico and Alaska. We assume no responsibility for goods sent by open mail; that is not insured. Wherever possible we recommend that goods be sent by express. We have had overwhelming evidence during the past year that express shipments move much faster and with less liability of loss or damage.

OUR GUARANTEE. READ IT.

We guarantee our goods to please you and completely satisfy you. If for any reason at all you are not fully satisfied with any article you may purchase from us, and it is not something of a special nature ordinarily not carried in stock by us, you are at liberty to return it to us, transportation charges prepaid, within three days after its receipt, and the full purchase price will be refunded.

We protect our patrons on all goods broken or damaged in express shipments, except bulbs, for which express companies will not be responsible, by making claims against the express company at our own expense, and immediately making duplicate shipment. (It is imperative, however, that any damage or loss be immediately reported to the express agent, and, if possible, have him certify the fact of damage on express receipt, which should be returned to us.) This is a great advantage which our patrons enjoy.

TO OUR PATRONS

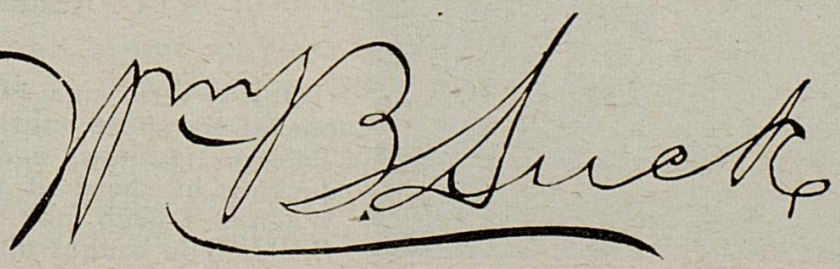
Our mail order business is generally conceded to be, and unquestionably is, the largest in its line in the United States. We have been able to build up a business of this magnitude only by selling the highest quality of goods obtainable, at prices usually considerably below the prices charged by any other concern for the **same quality of goods,** and by assuring our patrons absolute satisfaction, or refunding their money. We have but one policy. Either our patrons must be satisfied, or we are not satisfied. We sell no goods because they are cheap. **Quality always comes first, and then low prices.** The large line of goods in our catalog of standard reputation, shows the care we manifest in meeting our patrons' wants. We fully realize that the most trifling item of inferior quality, might justly lose us not only one, but many patrons, and our one thought, therefore, in the preparation of each succeeding edition of our catalog, has been to place before our patrons the very best quality of goods obtainable, at prices representing but a small margin of profit to us.

Another factor that makes it a pleasure for persons to deal with us is that they are assured of prompt service. 98% of our orders are filled within eight hours after they are received by us. We know how annoying delays are, and fully appreciate that from the moment an order is mailed, whether urgent or not, there is a natural desire to receive it in the shortest possible time.

We desire to call attention in particular to the wireless section of our catalog, which contains a larger and more complete line of high class wireless instruments than will be found in any other catalog published. In fact, this section of our catalog is several times larger than many wireless catalogs. We believe there is no wireless house in the United States that can begin to offer to its patrons such a large variety of wireless instruments of unquestionable worth.

We take this opportunity of thanking our patrons for their generous patronage, to all of whom we can confidently assure for the future, the same fair and courteous treatment that has been accorded to them in the past.

THE WILLIAM B. DUCK COMPANY,

Per 

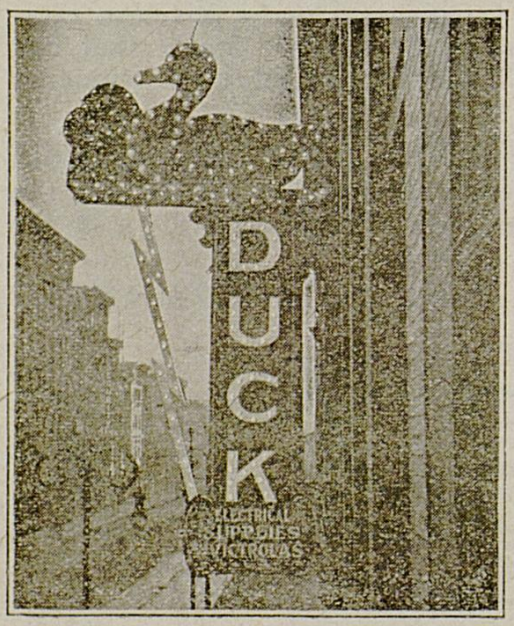
President

Some of Our Patrons

Our wireless and electrical goods are in use at over one thousand colleges, universities, public schools and other educational institutions throughout the United States.

The following list has been published in our catalog for over five years, and comprises less than 3 per cent. of our patrons among such institutions. It is fairly representative of all our patrons.

University of Michigan.....Ann Arbor, Mich.
Cornell University .....Ithaca, N. Y.
Purdue University .....Lafayette, Ind.
Depauw Uuniversity.....Greencastle, Ind.
Michigan Agricultural College.....E. Lansing, Mich.
Missouri Wesleyan College.....Cameron, Mo.
Rhode Island State College.....Kingston, R. I.
University of Pittsburgh.....Pittsburgh, Pa.
Meteorological & Seismological Observatory.....Cleveland, O.
Flathead County High School.....Kalispell, Mont.
Technical High School.....Harrisburg, Pa.
U. S. Hartford Naval Academy.....Annapolis, Md.
So. Dak. State School of Mines.....Rapid City, So. Dak.
Dodge Inst. of Telegraphy.....Valparaiso, Ind.
Milledgeville Telegraph School.....Milledgeville, Ga.
Manual Training School.....Indianapolis, Ind.
Milwaukee Wireless Telegraph School.....Milwaukee, Wis.
Juniata College ..Huntingdon, Pa.
William & Vashti College Aledo, Ill.
Creighton Universitv. Omaha, Neb.
University of North Dakota
University of Wisconsin
University of Minnesota
University of Kansas
University of Missouri



Our electric sign is considered to be one of the most novel and attractive in Toledo. It shows a duck in the water, ducking his head at periodic intervals. When in Toledo look for the sign of the Duck. You cannot miss it.

WIRELESS TELEGRAPH INSTRUMENTS

On the following pages will be found a complete line of wireless instruments for commercial and private installation.

We claim for this apparatus that it has absolutely no equal for the price, and that there is nothing better, regardless of price.

Every instrument is of proven worth, and absolutely guaranteed to do what is claimed for it. Success in wireless telegraphy means perfect harmony in all the instruments, and scientific exactness in the manufacture of **every part of every instrument.**

That many of these instruments are now being used by the United States Government, on the warships, and at many commercial stations throughout the country is conclusive proof of their worth and efficiency and absolutely dependable qualities.

Our prices are, we know, lower than the prices of any other concern selling wireless equipment of high and distinctive quality and worth. We invite comparison.

A discriminating judgment is a rare jewel. It is the distinguishing mark of the successful buyer and seller. It seldom is compelled to profit by misguided experience.

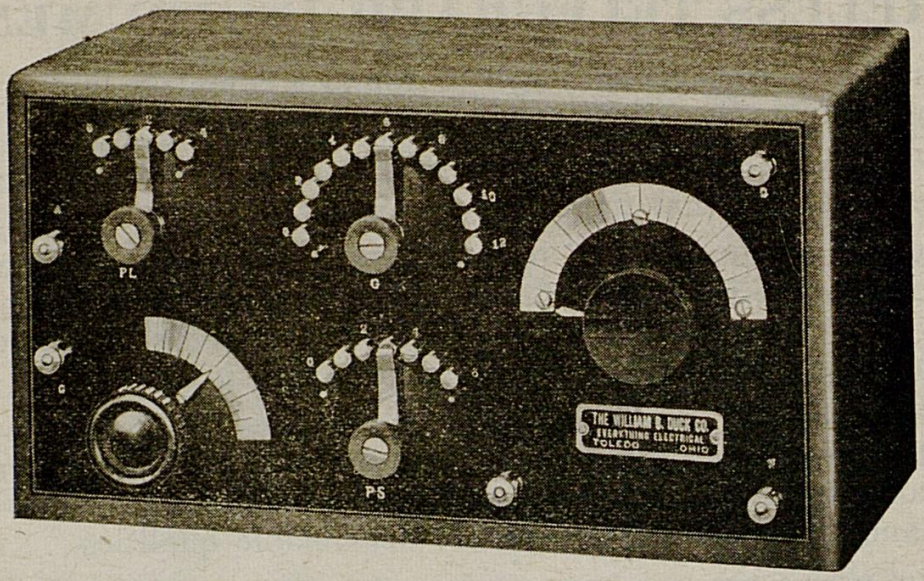
Do not be attracted by hollow, extravagant claims, with so called rock bottom prices. Some things are expensive at any price.

More than half of our patrons who purchased our high grade wireless apparatus during the past few years were forced to throw away the instruments first purchased by them. Profit by their experience and start in right.

We do not ask that you rely entirely on what we say of our instruments; talk to a few of your wireless friends, and listen to what they will tell you about them. Our patrons are our best advertisers. Our wireless equipments are in use by scores of industrial companies and scientific and educational institutions in the United States and foreign countries, which in itself abundantly testifies to the worth and efficiency of our instruments.

We guarantee all of our wireless instruments to be free from defects in material or construction, and against electrical breakdown, not due to misuse or abuse, and will make good any piece of apparatus having such defects, if returned to use, transportation charges prepaid, within one year from date of purchase. Our permission must be secured in advance, however, before any goods are returned.

SHORT WAVE REGENERATIVE SET.



This Short Wave Regenerative Set was developed for the reception of wave lengths from 150 to 570 meters. We know that it could not be better or more efficiently made. We have no hesitancy in saying that we do not believe it is possible to make one of these sets that will do more efficient work, and we know there is none on the market that is any better made. In our initial tests conducted in our laboratory and at the Scott High School here the results were amazing. Amateur stations from points as far distant as Texas, Louisiana, Wisconsin and other distant points came in with remarkable clearness and loudness. With a loading coil ocean liners and warships in all parts of the Atlantic Ocean were distinctly heard. This set with the other necessary receiving apparatus will increase the audibility of signals immeasurably and bring in thousands of stations that have heretofore been closed to you. It may be used both for damped and undamped waves.

The case measures 6¼x11¾x6¼". It has a beautiful hand rubbed mahogany finish. All connections are brought out directly to the polished Formica panel. Connections are soldered to copper lugs under machine screws. All metal parts are heavily plated and polished.

The antenna circuit is inductively coupled to the closed circuit and the coupling is variable by adjusting the large knurled knob. This is very important, for without an adjustable coupling, it is impossible to do the best long distance work. The adjustable coupling allows you to cut out static and to still further increase the selectivity of the set. In fact some of the best work done with this set has been done with an extremely loose coupling. Don't burden your station with a set having fixed coupling.

The primary circuit is adjustable by single turns by adjusting the two primary knobs. The grid inductance is adjustable by the 12 point switch and a special variable condenser is included in the circuit to give close tuning.

When connected to an Audio-Tron or other type of vacuum bulb detector and telephones this regenerative set makes a complete receiving set. It responds most efficiently to wave lengths from 150 to 570 weters. To make this particular set with a greater range would reduce its marvelous efficiency and short wave lengths.

Blueprint of connections is furnished showing the most approved Armstrong circuits. Extra binding posts are provided for an additional Armstrong circuit if desired.

No. 1812. Short Wave Regenerative Receiver for 150 to 570 meters, prepaid to any part of the United States or Canada_____**$28.50**
Shipping Wt. 8 lbs.

The W. B. Duck Co., Toledo, Ohio.
Dear Sirs:

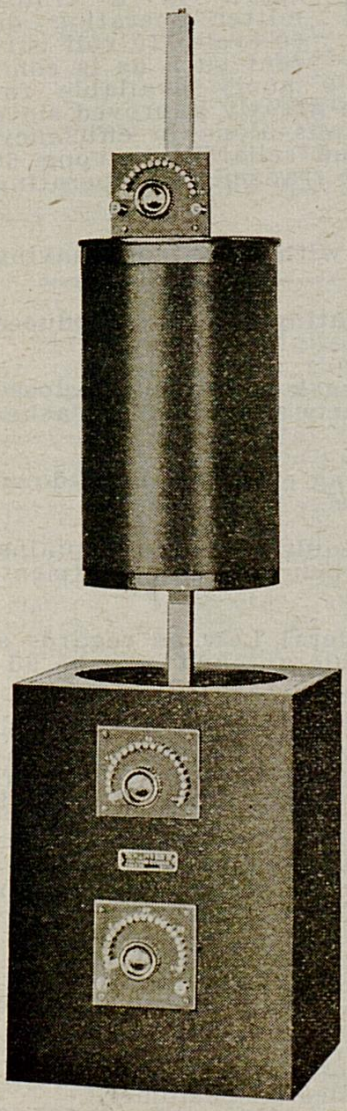
The regenerative set, No. 1812, purchased from you some time ago has certainly exceeded my fondest hopes. After testing other types of regenerative apparatus in our laboratory against your product, I can truthfully say that your set is superior in every way.

The adjustments are simple and easy to make. This fact alone should recommend it to the ordinary purchaser. The big surprise to me in my initial work with this set was the distinct advantage it possessed over several other sets I have used in the entire absence of capacity effect of the body. This, I consider one of its best features. The wave length adjustments, too, covers a wide range, 150-600 meters.

This set is now in use at our station and has met with the enthusiastic approval of all Scott operators who have seen and used it. Using this set instead of an ordinary audion, we hear stations never before heard and bring in others at least 75 per cent louder. I certainly can recommend this set unreservedly to the amateur field at large.

Yours truly, WILLIS K. WING, In charge Scott High Radio Sta.

TUNER FOR LONG WAVE LENGTHS.



This tuner is designed especially for use in receiving from the long wave length undamped transmitting stations in this country and European countries.

The stations in this country using long undamped waves have been the only means of communication between this country and Germany since cable connections have been cut. The government has equipped all of its important land stations with undamped apparatus and all battleships have equipment for receiving from these sets, in fact all commercial high power sets are using this system. The wave lengths of these stations vary from 3000 meters to 15,000 meters.

This tuner is of the best design, construction and finish throughout. It is designed for wave lengths from 2,000 to 15,000 meters.

The windings are of Silk Covered Wire, machine wound on substantial unshrinkable tubes. There can be no comparison in the advantages of silk covered enamel wire. The primary tube is 8 in. x 13 in. The secondary tube is 7 in. x 12 in. The inductance of the winding is varied by switch, all sliders being eliminated. The primary is varied in steps of two turns each and the secondary is controlled by a 15-point switch, giving very close tuning.

The advantages of vertical mounting are obvious and inspection of the cut will convince all that this is the ideal construction. The instrument occupies 10 inches square space on the operating table, while the old style requires three feet.

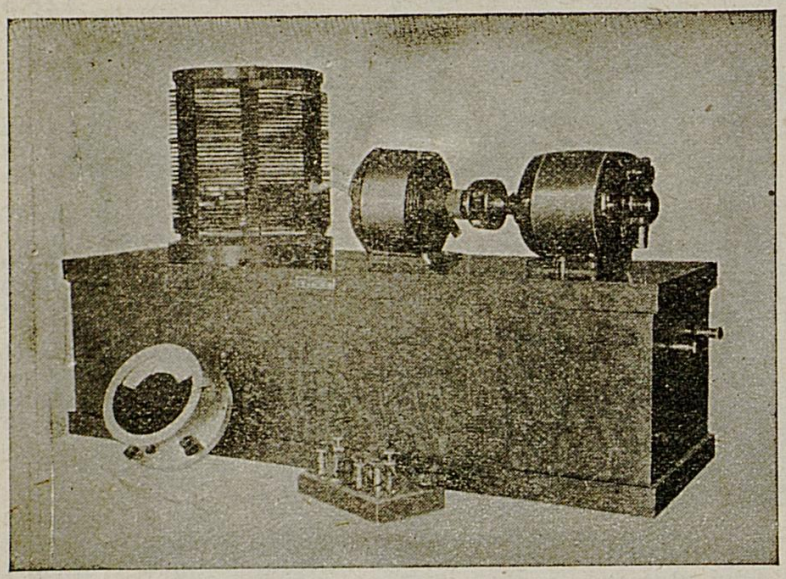
The secondary is counterbalanced and the touch of a finger moves it to any position. When raised to its extreme height the coupling between the primary and secondary is 8 inches, allowing very selective tuning. The counterbalance weight inside the square nickel-plated brass tube.

The case and all woodwork is finished in a rich hand rubbed mahogany finish. All metal parts nickel plated. All connections are mounted on the Bakelite panels.

This instrument is in a class by itself. Were our price determined by the comparative merits and advantages of all others that have come to our attention, $50.00 would not be a prohibitive price to ask for this instrument.

No. A1776 Turner for wave lengths from 2,000 to 15,000 meters_____$32.50
Shipping Wt., 30 lbs.

QUENCHED SPARK TRANSMITTER



½ K. W. Hytone Transmitting Sets

The advantages of the Quenched Spark transmitter are so well known as to hardly require mention even to the novice. Unfortunately, however, sets of the type used by the United States Navy and others are beyond the reach of the average user, as they require a special 500 cycle motor generator set for their operation, and previous to the introduction of our Hytone Rotary Quenched Spark Transmitter no one had been able to combine the advantages of the quenched spark in a transmitter operating on 60 cycle 110 volt current such as is commonly available for lighting and power purposes. This apparatus has been greatly improved since it was first introduced by us, and we believe it stands alone in efficiency, clearness of tone or pitch, quietness of operation, and reliability among 60 cycle transmitters, being approached only by the best transmitters operating on 500 cycle generators.

The efficiency is from 50 to 70 per cent when used with an antenna having a radiation resistance of 10 ohms.

The tone or pitch is a clear whistle, almost duplicating the tone produced by a 500 cycle generator.

The set is practically noiseless in operation, the spark is entirely enclosed and invisible. There is an entire absence of loud reports and blinding flashes common to all open spark gaps.

Reliability is inherent in these equipments, rendering electrical breakdown unknown, due to the extremely low potentials employed.

The adjustment of the apparatus is very simple, requiring only the tuning of the helix and the setting of the spark gap, which, when once in adjustment, does not require further attention.

This set conforms to all requirements of the Federal Law as regards a pure wave and damping, and when used with a suitable antenna may be adjusted to 200 meters.

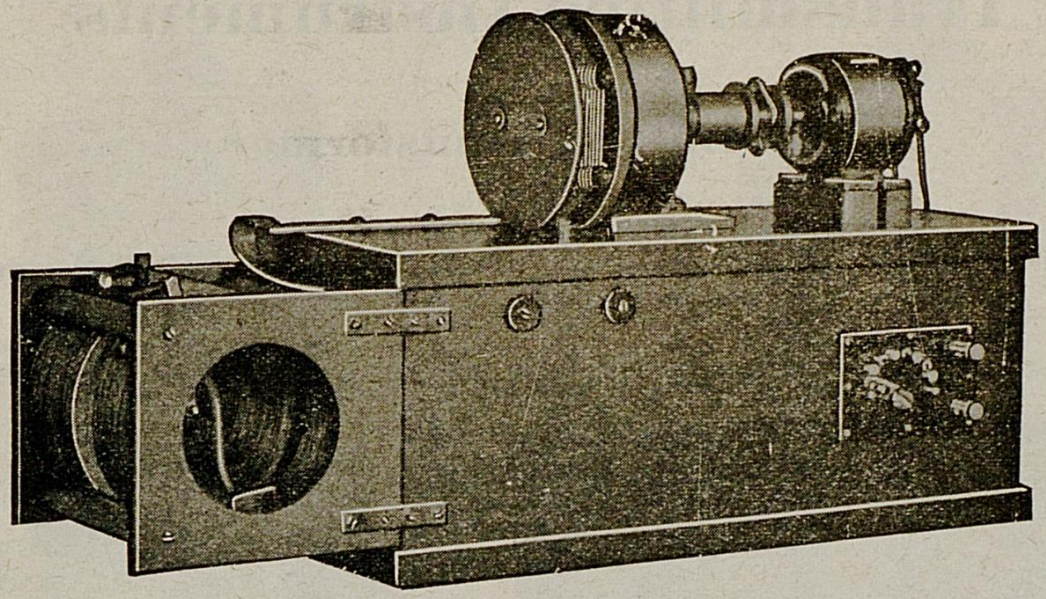
The set consists of Transformer, Rotary Quenched Spark Gap, Motor, Condenser, Helix, Key, Hot Wire Meter and Protective Device, the containing cabinet being of the finest quartered oak, highly finished, and with hinged cover, measuring 25 inches long, 10 inches wide, 9¾ inches high. Total height 19 inches.

We can offer this set with the utmost confidence to those who can appreciate high quality, and by reason of its efficiency it will accomplish greater distances than sets of higher power rating and of greater first cost.

Cat. No. W740. ½ K. W. Hytone Set complete as above, shipping weight 300 pounds ---------- $200.00

Cat. No. W741. ½ K. W. Hytone Gap, Motor and Transformer only, to be used with Condenser and Helix supplied by customer, and without mounting, shipping weight 150 pounds... 100.00

QUENCHED SPARK TRANSMITTER.

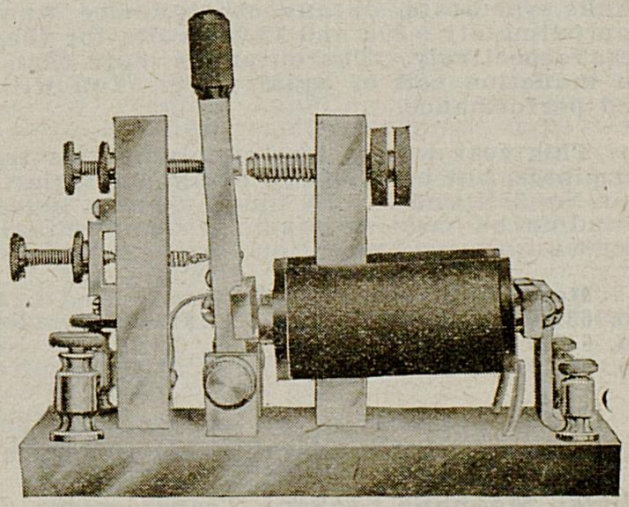


Cat. No. W771. 1 K. W. Hytone Transmitter consisting of same instruments as the ½ K. W. Set but mounted in a cabinet 38 inches long, 12 inches high, 12 inches wide, total height 20 inches, shipping weight 400 pounds.....$375.00

Cat. No. W772. 1 K. W. Hytone Gap, Motor and Transformer only, shipping weight 200 pounds..... 185.00

Note—Hytone Spark Gaps will positively not operate with transformers of any other type.

MAGNETIC RELAY KEY.



This key is designed for use in connection with the ordinary telegraph key where speeds up to thirty words per minute are desired. It may also be used in connection with vibroplex in order to obtain speed of thirty to forty words per minute. To the live amateur this key should find a hearty response.

The key consists of a set of electric magnets, as shown, which operate an armature which is attached to the key lever. The tension on the lever is adjustable by means of a spring and an adjustment screw. The spacing between the contact points is also adjustable by means of adjustment screws. The trunnions upon which the lever rests are extremely heavy. As shown in illustration the current from the lever is not conducted through the bearing, but is carried by a heavy conductor direct to the binding posts.

The base of the instrument is of natural color bakelite and all metal parts are of lacquered brass.

Dimensions of base 3½x5½x½ inches.

No. A7382 Magnetic Relay Key with No. 6 contacts .....$ 8.00
No. B7382 Magnetic Relay Key with ¼ in. contacts..... 9.50
No. C7382 Magnetic Relay Key with ⅜ in. contacts 11.00

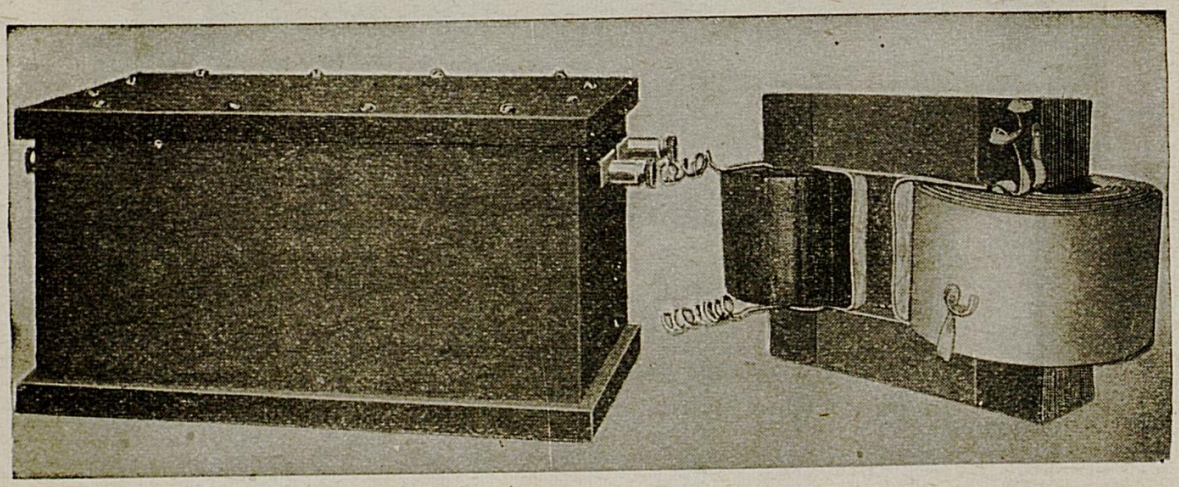
Shipping weight, 4 lbs.

Transmitting Instruments

The Blitzen Transformer

Mounted and Unmounted

Closed Core. Self-Controlling. High Efficiency. High Power Factor. Magnetic Leakage. A Year's Guarantee



The "Blitzen" Transformer is an innovation representing unequalled value made possible only by quantity of production. It is self-cotrolling and may be attached directly to any 110-volt, 60-volt circuit without the use of lamp banks, rheostats, or any other device whatsoever. Secondary potentials are approximately 9,000 and 13,000 volts for the ¼ K. W. and ½ K. W. Transform ers, respectively. The output is more than six times the energy derived from an induction coil of equal price. You will be proud, both of its appearance and performance.

This year we are also supplying this transformer unmounted and without terminals, but complete in every particular, at substantial reductions in price. Our No. 37X and No. 7X binding posts, listed elsewhere in this catalog, will be found to be very satisfactory for terminals. These attractive prices should merit an unusual reception for these excellent transformers.

Mounted Blitzen Transformer.		
No. 63X0	¼ K. W.	$15.00
No. 64X0	½ K. W.	22.00
No. 65X0	1 K. W.	36.00

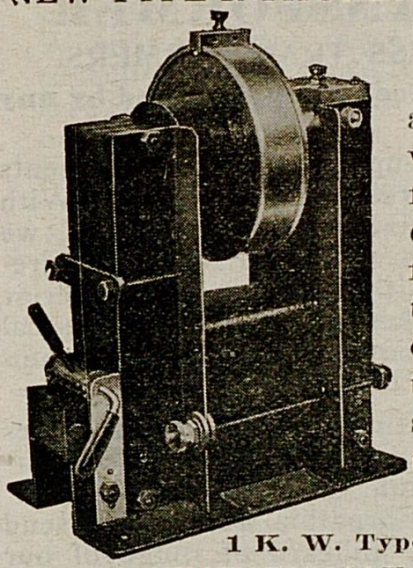
Unmounted Blitzen Transformer.		
No. A640	¼ K. W.	$12.00
No. A641	½ K. W.	18.00
No. A642	1 K. W.	30.00

Many persons prefer to assemble their own transformers, and at the same time save considerable. It is very easy to put the parts together.

Blitzen Magnetic Leakage Transformers. Closed Core. 110 Volts, 60 Cycles

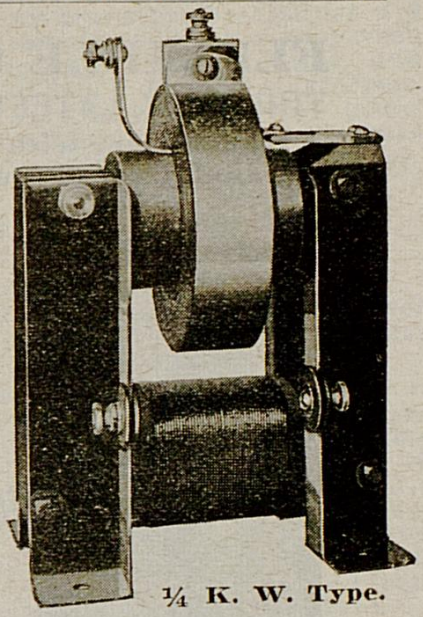
	¼ K.W.	½ K.W.	1 K.W.
Price of Core cut to size, Silicon Steel	$3.50	$4.50	$ 8.00
Price of Primary, wound and taped	4.60	5.20	9.00
Price of Secondary, wound and impregnated	7.00	8.00	14.00
Price of Mica Insulation	1.25	1.95	3.75
Price of Mahogany Case	4.00	4.50	6.00
Price of Terminals	.90	.90	1.10

NEW TYPE R THORDARSON FLEXIBLE TRANSFORMER



1 K. W. Type

Every live wireless amateur is familiar with the wondrous performances of the Thordarson wireless transformer. The manufacturers have lately put out a new design of this transformer with several improved features:



¼ K. W. Type.

MECHANICALLY

Elimination of all castings, springs and adjusting screws.
Pressed sheet steel and brass clamps used throughout.
25% reduction in weight.
Magnetic shunt circuit held rigidly in place.
Instant and simple means of regulation by a system of lever and eccentric cams.
Special mechanical shield for high tension coils.

MAGNETICALLY

Our new Tooth core construction used throughout. Minimum iron losses.
Shunt magnetic circuit opened by means of specially designed laminated tongue, moving in horizontal plane with noiseless operation at all positions.

ELECTRICALLY

25% greater efficiency.
10% greater capacity.
Wider range.
Special grounding terminal provided.
Elimination of all taping from primary and secondard coils.
Insulation compound of high dielectric strength used throughout.
Vacuum impregnation treatment of high tension coils.
Special folded layer insulation used in high tension coils.
Complete transformer oil and waterproof.
Special corona shield for high tension coils.
Position of primary and secondary coils reversed to allow more convenient handling of high voltage.
No high tension bushings or cables.

As in the older model, the type "R" is air cooled. The design is very liberal, the factor of safety high, the materials used are the best obtainable. In appearance the type "R" represents a very great improvement over any other type of wireless transformer on the market. Brass, steel and aluminum have been judiciously utilized, not only with the idea of making this design most efficient, but handsome as well. The essential feature of the "Thordarson" wireless transformer has always been its magnetic shunt control. This feature protects the transformers from all undue current surges, such as are present in operation.

The type "R" transformers are designed to be connected direct to source of alternating current. No impedance or choke coil is necessary.

Five standard 60 cycle sizes are stocked, as follows:

			TYPE "R"			Secondary	
K. W.	Height	Width	Length	Amperes	Weight	Voltage	Price
¼	9 in.	4½ in.	6 in.	1 to 6	13 lbs.	8,000	$12.00
½	9 in.	4½ in.	9 in.	1 to 6	28 lbs.	10,000	20.00
¾	10 in.	5 in.	10 in.	2 to 9	31 lbs.	10,000	25.00
1	14 in.	6 in.	12 in.	2½ to 14	46 lbs.	20,000	30.00
2½	18 in.	8 in.	14 in.	6 to 22	60 lbs.	20,000	60.00

Note: ¼ K. W. is very simliar to the larger Type R transformers, but has no adjustable magnetic sunt.

With our transformers we supply free a pair of high non-inductive resistances, which should be connected in shunt across the primary terminals as a prevention of inductive kick-backs in the primary circuit.

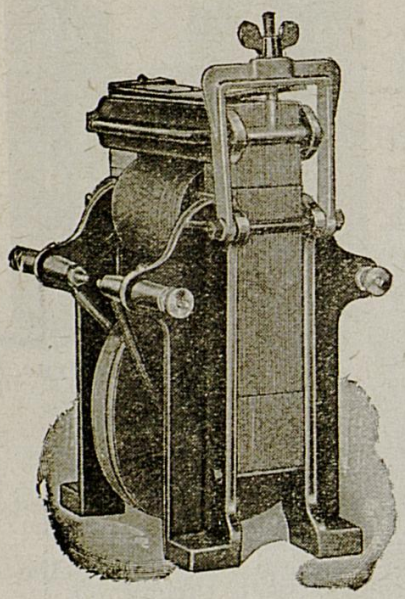
Other capacities and voltages made to order, extra.

Note: Prices on application on 500 cycle Wireless Transformers in capacities from 1 K. W. to 5 K. W.

FLEXIBLE STEP-UP TRANSFORMER

THE VERY LATEST VALUE IN WIRELESS TRANSFORMERS.

A transformer with a record of performances unapproached by any other transformer of four times the price.



Our flexible step-up transformer represents the last word in wireless transformers. With its new and exclusive advantages, it has, we believe, attained the maximum limits of wireless transmission, with a range so far superior to that of any other transformer of equal price, as to be without any semblance of competition.

Think of transmitting from 300 to 500 miles with a transformer costing only $20.00. During the recent Titanic disaster, the 2 K. W set on the steamer Carpathia was able to send but 150 miles. The unheard of range of our Flexible transformer is not the freak record of one experimenter. The first two of these transformers sold by us brought back the enthusiastic letters printed herewith. We were ourselves surprised as much as our patrons. Later investigation, however, has substantiated these wondrous and phenomenal results. We cannot, of course, guarantee such great ranges to every purchaser of this transformer, but we can unqualifiedly guarantee that there is no transformer on the market selling at anything like the price of this transformer, that will begin to measure up to it, in power, range and efficiency.

It will be noted that the maximum rating of these transformers is approximately ½ K. W., ¾ K. W. and 1 K. W. For instance, Type T-O has a range in amperes from 1 to 5 amperes, which means that it has a variable output of 110 to 660 watts, (110 volts, 5 amperes).

These transformers are perfect in every detail. They are constructed with a magnetic shunt and equipped with a regulating device to give instant adjustment.

No impedance coils or other resistances are necessary. They are designed to be connected to any alternating current circuit. Stock winding, 100 to 120 volts, 60 to 133 cycles. Special winding on request.

These transformers will make your wireless apparatus 200% more efficient, and will consume no more current than is absolutely

Read what some of our patrons think of this transformer:

Dear Sir:—

I received the Type H-2 transformer (Flexible) a good while back, but have been so busy that I have not had time to write you with regard to the excellent results I have obtained.

Your transformer is a jewel. All the amateurs are crazy over it. I have transmitted 294 miles with it already. I send to Galveston, Houston, Beaumont, Texas, every time I get ready. This may sound like a fish story but it is not.

I have a friend in Beaumont. His call is S. O. L. He came up to San Antonio last week and asked me if my call was J. C. R. I did not even know him until he told me his call was S. O. L. He said he heard me every fair night at 7:45. I told him he was right in regard to my call. I have heard him once. He has a 1½ K. W. He said that I came in so loud that he can sometimes hold the receiver four feet away and hear me.

required to produce the best results at the desired regulation. When you want more power or capacity, simply turn the thumb screw and you have it. It is not necessary to remove or loosen bolts or nuts.

The reason why the commercial wireless companies use an open core transformer is because it is a constant current device. We accomplish the same results with our Magnetic Shunt construction at a saving of more than 50% in cost, and at a much lower current consumption. When a constant current transformer is shortcircuited it does not pull an excessive amount of current. This is one of the many features we wish to emphasize in regard to our Flexible Transformer. When this transformer is shortcircuited or when it is charging condensers it does not consume any more power than the magnetic shunt is set for.

A suitable condenser must be used on the primary circuit to take care of the kick-back. We supply a special protective device for use with this transformer free. See othr protective devices elsewhere herein. See other letters in pages of testimonials.

I tested my transformer against a 2 K. W. transformer and mine surpassed it in amperage, voltage, output, and range. I call it a 2 K. W. transformer. I will see that each one of the members of aur club purchase one of these transformers from you. Yours truly,

JNO. RODRIGNEZ,

612 W. Evergreen St., San Antonio,

——— Texas.

Dear Sir:—

You may remember that I purchased from you, a month or two ago, a Flexible transformer.

I received it all O. K. and found it to be entirely satisfactory in every respect. It is very convenient to be able to adjust the capacity as you want it. I have run it for long periods on a Tesla Transformer and it does not heat up to any extent. The rating in watts is from 200 to 1000. It is really a 1 K. W. transformer. I am able to send from 400 to 500 miles with it at night. I found this to be a fact by calling he boats which gave their location. Gainesville is about 100 miles from the east coast, at the nearest point. I may be able to send further as I intend to increase the height of my aerial.

On the whole, I am very well pleased with my purchase. Yours truly,

L. COLES,

Gainesville, Fla."

These transformers are air cooled. They are assembled in a heavy black enameled cast iron frame, the shunt yoke adjustment is cast brass. The primary and secondary taps on type T-1 and 2 are brought out separate on each side of the transformer. The secondary terminals are polished hard rubber, with brass core arranged so that they may be easily adjusted; either side of the primary or secondary may be grounded as the primary and secondary windings are thoroughly insulated from each other.

Dimensions and Price

No.	Type	L'gth	Width	H'ght	Net Weight	Regulation in amperes	Secondary Voltage	Price
63X0	T-0	8"	6"	12"	34 lbs.	1 to 5	5,000 V	$15.00
63X1	T-1	10"	7"	13"	39 lbs.	2 to 8	10,000 V	20.00
63X2	T-2	12"	8"	14"	59½ lbs.	2½ to 12	20,000 V	25.00

Note.—With these transformers we furnish free high non-inductive resistances, connected in shunt across the primary terminals as a prevention of inductive kick backs in the primary circuit. Extra protective devices at $1.00 per pair.

We can supply above transformers wound for 220 V., 60 cycles, or any other special winding on alternating current, at slight additional cost.

The new Type R Thordarson may be substituted in any of the following sets by paying the difference, if any, in price.

TRANSMITTING SET No. B6004

Note.—The various instruments in these sets are described on pages immediately following.

For use on 110-volt, 60-cycles, alternating current only.

Range 75 to 150 miles, using four-wire aerial 100 feet in length and 60 feet above earth.

No. 63X0	Type T-0 Flexible Transformer, with protective device	$15.00
No. 63X01	Sayville Rotary Gap	12.00
No. A6052	½-K.W. High Potential Glass Plate Condenser	13.00
No. A395	Commercial Type Oscillation Transformer	13.50
No. 60X80	Boston Key	6.50
No. A143	Precision Hot Wire Meter	11.00
	Special price complete set	$66.50

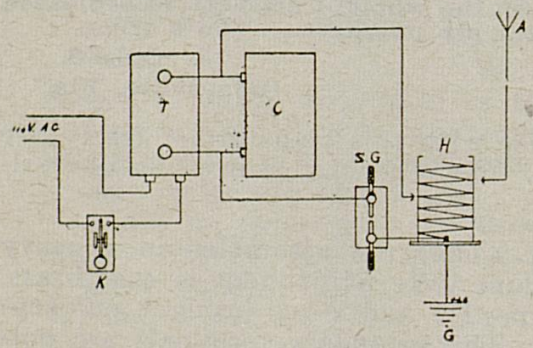
Note.—A suitable protective device must be used on the primary circuit to take care of kick-backs. See directions in connection with description of transformer herein.

TRANSMITTING SET No. A6009

For use on 110-volt, 60-cycles, alternating current only.

Range 75 to 200 miles, using four-wire aerial 100 feet in length, and 60 feet above earth.

(See some of the letters from our patrons concerning the wondrous range of the flexible transformer on pages 13 and 49-56.)



No. 63X1	Type T-I ¾ K. W. Flexible Transformer with special protective device	$20.00
No. A1732	Type C Sayville Rotary Gap	17.50
No. A6053	1 K.W. High Potential Glass Plate Condenser of variable capacity..	27.50
No. A395	Commercial Type Oscillation Transformer..	13.50
No. 60X80	Boston Key	6.50
No. A143	Precision Hot Wire Meter	11.00
	Special price, complete outfit	$85.00

Note:—Any single item in above set may be omitted at cost price, if desired. A suitable protective device must be used on the primary circuit to take care of kickbacks. See directions in connection with description of transformer on page 15.

For complete list of Antenna material, see page 78.

TRANSMITTING SET No. A6010

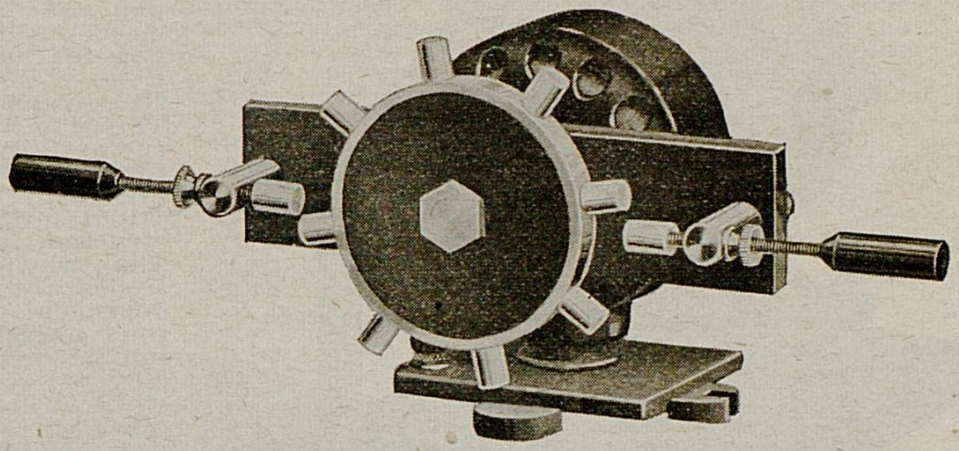
For use on 110-volt, 60-cycles, alternating current only.

Range 100 to 400 miles, using four or six-wire aerial, 100 to 125 feet in length, and 60 to 75 feet above earth.

No. 63X2	Type T-2 1-K.W. Flexible Transformer, with special protective device	$25.00
No. A1732	Type C Sayville Rotary Gap	17.50
No. A6053	**1 K. W. High Potential Glass Plate Condenser, of variable capacity**	27.50
No. A395	Commercial Type Oscillation Transformer	13.50
No. 60X81	Boston Key	7.75
No. A144	Precision Hot Wire Meter	12.00
	Special price complete outfit	$90.00

Note:—Any single item in above set may be omitted, if desired. Diagram of connections same as for Set No. A6009.

SAYVILLE ROTARY SPARK GAP
(Former Name, "Halcun")



1 K. W. Rotary.

The rotating spark gap is rapidly becoming a necessity to the amateur who desires to keep his station up to the latest in the wireless art. Now that the amateur is limited in power it is essential that he use those devices that give the maximum sending distance. It is a well known scientific fact that signals generated from the standard 60-cycle current do not affect the ear nearly as intensely as signals of higher frequency. Lord Raleigh and many others have found that the intensity of signals was increased ten times by doubling the frequency. Thus, theoretically, it is possible to increase the range ten times by merely doubling the frequency.

Our Sayville Rotary has been designed to give a spark frequency of 500 a second; but by the use of a small rheostat the frequency may be varied at will. The Sayville Rotary has been constructed with the utmost care along the latest scientific lines. The size and spacing of the electrodes, the speed of the motor, etc., have been given the most careful attention. Some rotaries on the market use a fiber or hard rubber disc, and while rubber may show a high dielectric strength when new, it rapidly breaks down when in use, due to the liberation of sulphur by action of ozone generated by the spark. The disc of our Sayville Rotary is composed of a special impregnated asbestos compound which has a higher service insulation than vulcanized rubber. This is an important feature, as it obviates the possibility of high frequency surge jumping to the motor shaft and kicking back to the motor winding thereby burning it out. The revolving and stationary electrodes are made of zinc, which experience has shown is the best metal for spark gaps. Rubber insulating handles are provided so that the gap may be adjusted with safety while in operation.

This instrument is guaranteed to operate with perfect satisfaction up to 1 K. W.; we have, however, used our smallest rotary on extended runs on 3 K. W. without appreciable arcing or jumping over. We guarantee our rotary to give a high musical note, to be absolutely free from heating or arcing or any mechanical defects when used at their rated capacities. The **revolving disc is 4 inches in diameter. Not for use on spark coils.**

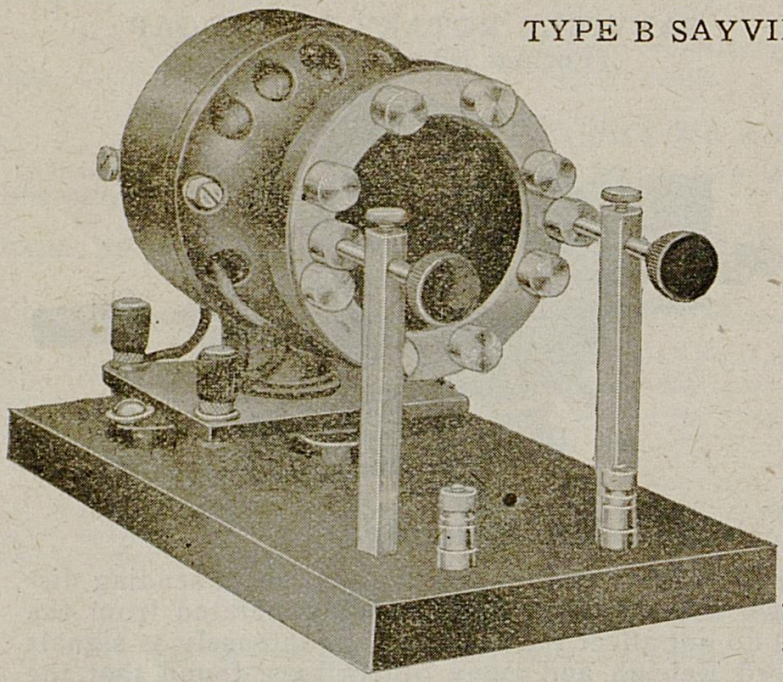
No. 63X01 Rotary operated on 110-V. A. C. or D. C. May be used up to 1 Kilowatt. Price.....$12.00

No. 63X02 Rotary operated on 4 dry cells. Price..... 7.50

Complete Rotary Wheel, $2.90; Rubber Supports for stationary studs, $1.00.
Extra movable Zinc Studs, each 13c; stationary Electrodes, complete, each, 50c.

Stationary Electrodes without rubber handles and thumb nuts, each, 25c.

TYPE B SAYVILLE ROTARY GAP.



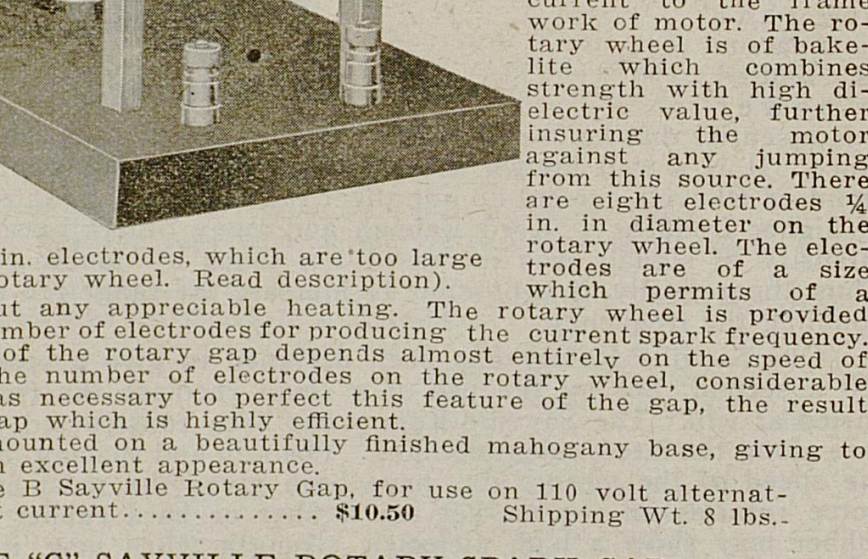
(Cut shows ½ in. electrodes, which are too large for size of rotary wheel. Read description).

This new type rotary gap was designed to meet the demand for a gap for use in connection with the larger size transmitting sets. This gap has been used successfully on transformers up to three kilowatt. We wish to call attention to the construction of this gap. The stationary electrodes are mounted independent of the motor, thus preveniting jumping of high frequency current to the frame work of motor. The rotary wheel is of bakelite which combines strength with high dielectric value, further insuring the motor against any jumping from this source. There are eight electrodes ¼ in. in diameter on the rotary wheel. The electrodes are of a size which permits of a heavy arc without any appreciable heating. The rotary wheel is provided with the right number of electrodes for producing the current spark frequency. As the efficiency of the rotary gap depends almost entirely on the speed of the motor, and the number of electrodes on the rotary wheel, considerable experimenting was necessary to perfect this feature of the gap, the result being a rotary gap which is highly efficient.

The gap is mounted on a beautifully finished mahogany base, giving to the instrument an excellent appearance.

No. A37X88 Type B Sayville Rotary Gap, for use on 110 volt alternating or direct current..... **$10.50** Shipping Wt. 8 lbs.

TYPE "C" SAYVILLE ROTARY SPARK GAP



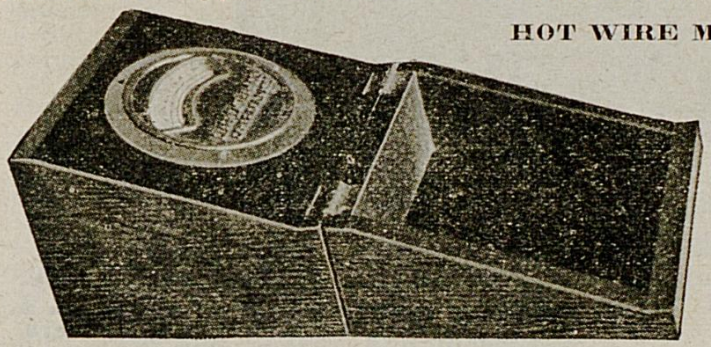
The rotary wheel is of ½ inch black Bakelite Dilecto 5¼ inches in diameter. The use of bakelite for the disc gives the strength and high insulating qualities necessary in a good gap. To further protect the motor, none of the holes are drilled entirely through the bakelite disc. The heavy cast brass flange is fastened to the rear of the disc with six countersunk brass screws. On the front side a heavy brass plate is screwed to the disc. This plate and the bakelite are accurately drilled and tapped for the eight copper electrodes.

The stationary and revolving electrodes are of ½ inch round copper accurately machined. The revolving electrodes are ⅜ inch long and the stationary electrodes are ⅝ inch long.

The use of copper for the electrodes and the unusual size of the electrodes make this gap much more efficient than any other gap of this type on the market. The copper conducts the heat away from the sparking surfaces. All the advanced and eminent radio engineers concede that the ideal electrodes for rotary gaps for high power transformers should be made of a metal that is a good conductor of heat, which also necessarily means quick cooling properties,—combined with a large sparking surface, thus giving a marked quenching to the spark discharge, permitting of fine tuning and insuring a sharp wave with good carrying qualities. All the late commercial rotary gaps have the electrodes of copper.

This gap has a universal motor for use on 110 volt direct or alternating current. Motor enameled black; baklite highly polished; all other metal parts highly polished and lacquered. Mounted on a heavy mahogany finished base 7x12 inches, with screws for fastening. The best rotary on the market for stations up to 3 K. W.

No. A1732. Type C Sayville Rotary Spark Gap, 17.50. Shipping weight, 9 lbs.



HOT WIRE MILLIAMMETER.

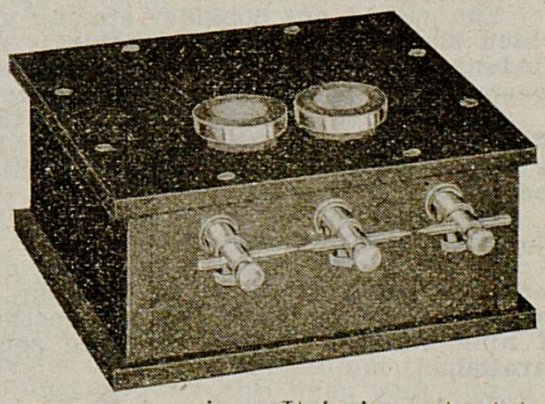
These hot wire instruments are arranged for flush mounting on panels or cabinets, and are calibrated with extreme care for accuracy. We have produced an entirely new design which insures permanency of zero adjustment even under great temperature changes and severe abuse. The meter shaft runs in highest grade jewels and is controlled by a hair spring as used in the best magnetic instruments. The movement is so constructed and mounted that distortion of the case cannot alter the adjustment or accuracy of the instrument. The instrument case is entirely of brass, finished in black enamel in the recessed portion of the face. The instrument proper occupies a space 13/16" deep and 2" in diameter, the flange being 2½" in diameter. The instrument is arranged for back connection, and where front connection is desired it is furnished mounted in an oak box with hinged cover with binding posts, the box measuring 3½" square by 2¾" high. Resistance approximately 2 ohms. Aside from its general high quality and accuracy, the permanency of the zero point will recommend the instrument to all who have had experience with meters of this class. While a zero adjustment is provided on the front of the case, its use will seldom if ever be required.

No. W802 Hot Wire Milliammeter for flush mounting—Scale 0-500 or 0-1000 M. A. 9.50

No. W803 Same as W802, but scale reading 0-350 M. A. 9.50

For either meter mounted in polished dark finish oak box with binding posts, add $2.50.

PROTECTIVE DEVICE



All wireless transformer manufacturers strongly advise the use of some kind of protective device to protect the low voltage windings of the transformers from inductive effects, surges and "kick backs"

This device is excelled by none and guarantees you protection, both of your own apparatus and of any other apparatus on the same line.

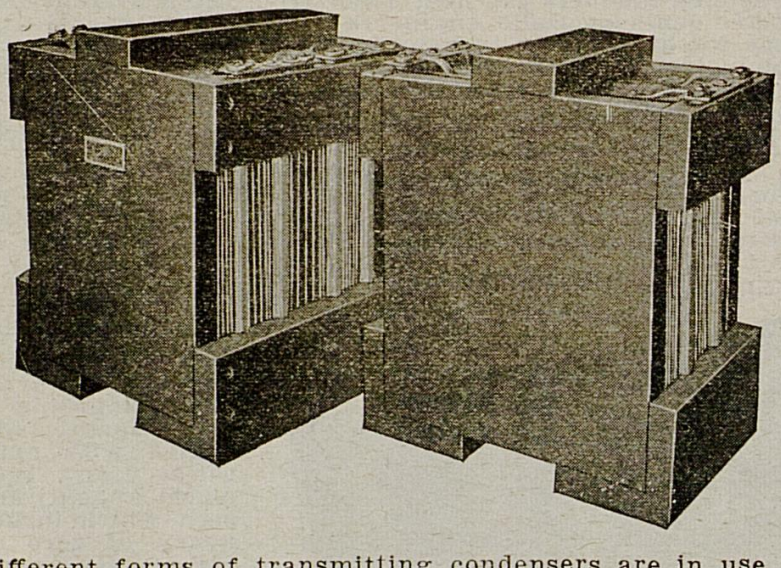
In some sections where the amateurs have trouble with the power companies it can be traced directly to some amateur who did not use a suitable protective device and through inductive effects of "kick-back" burned out the company's meters. This protective device has the approval of the light and power companies. It is important to bear this in mind in purchasing such a device.

In designing this device we have followed the best practice of the large commercial companies. There is no better protective device made.

Specifications: Two 2 Mfd. condensers in metal cases; two 6 ampere plug fuses and a double needle point spark gap all complete in a handsome mahogany finished case with binding posts for the line wires and the earth lead. Over all sizes of case 6"x6"x2¾".

No. A1776 Protective Device ..... $4.50. Shipping weight, 3 lbs.

IMPROVED TYPE HIGH POTENTIAL CONDENSER.



Many different forms of transmitting condensers are in use, but we believe the glass plate type, sold by us during the past six years, without a single important constructional change, has proven its worth above all others.

This year, however, the form of mounting has been greatly improved, although the condenser still retains the fundamental characteristics which have given such preeminent satisfaction.

These sections are built of the first selected glass, coated with foil on both sides by a special process which insures close adhesion of the metal to the glass.

A sufficient number of plates are assembled together to form a unit of .01 M. F. (¼ K. W. .005 M. F.), with a wooden slab in the center which projects on all sides. These projecting edges slide in grooves in the rack forming a convenient mounting, readily accessible and with sections easily removable.

The sections when assembled are boiled for a considerable time in a non-hygroscopic compound with which they become thoroughly impregnated, thus preventing brushing at the edges with its attendant loss of power.

A condenser acts merely as a storage tank for the energy derived from your transformer which is rapidly filled and emptied as sparks occur at the spark gap.

You would not consider storing valuable liquids in a leaky vessel or one which slopped over, and yet this is exactly what occurs with most types of condensers. The most evident signs of leakage are heating and (if the condenser is transparent), brushing or spraying at the edges.

Owing to a rearrangement of the glass and mounting, we are able to offer these condensers in a greatly improved form at a material reduction in cost, without sacrificing the quality or reliability for which they have become noted.

The ¼ K. W., ½ K W. and 1 K. W. have a capacity of .01 M. F. to permit the use of a 200-meter wave length.

The ¼ K .W condenser consists of two of the improved type sections connected in parallel, the ½ K. W. four of the improved type sections connected two sets in series, each set two sections in parallel, and the 1 K. W. consists of nine sections connected three sets in series, each set three sections in parallel.

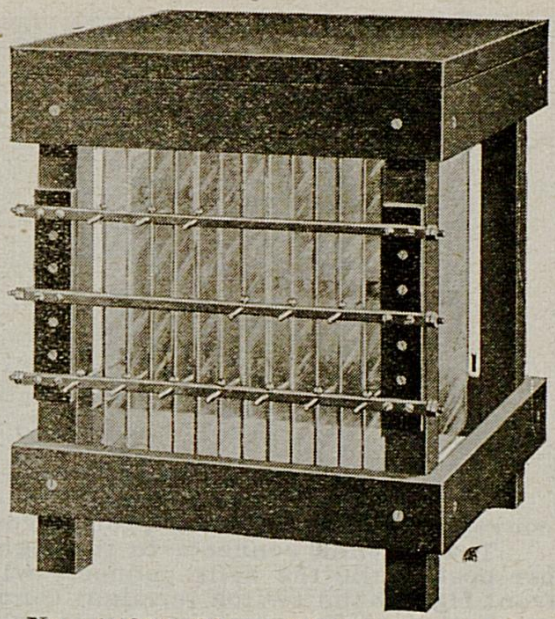
Condensers larger than 1 K. W. have a capacity of .03 M. F. unless otherwise specified, and have a series multiple connection.

All racks are dull black finish.

No. A6051	¼ K. W. Condenser, complete in rack	$8.00
No. A6052—	½ K. W. Condenser complete in rack	13.00
No. A6053—1	K. W. Condenser complete in rack	27.50
No. A6100—2	K. W. Condenser complete in rack	55.00

NEW MODEL IX GLASS PLATE CONDENSER

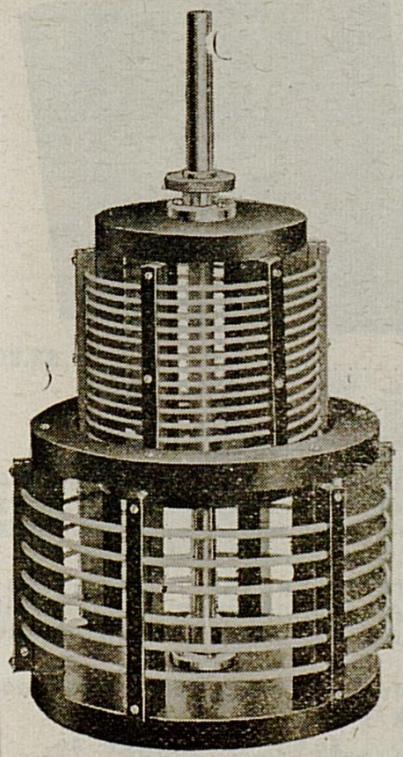
This Condenser consists of the highest quality photograph plates, 14 in. x 11 in., admittedly the best glass for condenser purposes, coated on both sides with tinfoil 8 in. x 8 in., mounted in a wooden rack. The plates are mounted in grooves in the rack ⅝ inch apart. The condenser rack is of wood, being finished in highly polished mahogany, giving to the whole instrument a rich appearance. Any desired capacity may be obtained with this condenser. It is designed for use in connection with rotary spark gaps. It is possible with this condenser to make adjustments so that a pure musical note can be obtained from the rotary gap. Adjustments can be made so accurate as to entirely eliminate the coarse sounding note so prevalent when most other types of condensers are used. Absolute resonance can be obtained between the gap and the condenser; that is, the capacity of the condenser can be so adjusted as to have the charge and discharge from the condenser completely in resonance with spark break at the various points on the rotary gap. There is no other type of condenser on which such close adjustments can be obtained. Another important feature is that the plates are not sealed in with compound, being easily accessible in case a plate should be punctured. All metal parts carrying current mounted on polished hard rubber. This condenser is furnished in two sizes, one-half and one kilowatt.



No. A1923 Glass Plate Condenser.

No. A1923 ½-K.W. New Model IX Glass Plate Condenser.....$11.50
No. A1924 1-K.W. New Model IX Glass Plate Condenser..... 18.00

COMMERCIAL TYPE OSCILLATION TRANSFORMER



This instrument is one of the late products of our engineering department, being designed after careful study and investigation. The secondary coil consists of twelve turns of No. 8 aluminum wire wound in helical form on a wooden frame 6½ inches in diameter. The primary coil consists of seven turns of No. 4 aluminum wire wound in helical form on a wooden frame 12 inches in diameter. All wood parts are finished in mahogany, while the current carrying parts are well insulated from the frame by Bakelite strips. The mutual inductance can be varied over a wide range by simply loosening up the large knurled brass wheel attached to the frame of the secondary coil. This permits the sliding up or down of the secondary on a brass pillar which is securely fastened to the base of the primary by means of a flange.

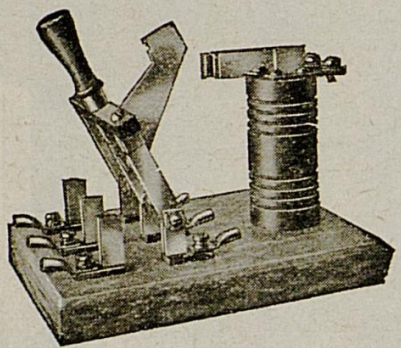
This oscillation transformer has just the right amount of inductance on the open and closed current sides to permit a range of periods well above and also below 200 meters.

To obtain the maximum efficiency we recommend the use of this transformer. Made particularly for ½-K.W. and 1-K.W. installations.

No. A395 Commercial Type Oscillation Transformer $13.50

Shipping weight, 12 lbs.

ANTENNA SWITCH.



When thrown to upward or receiving position this switch disconnects the antenna from the helix, at the same time connecting it to the tuning coil of the receiving set and open-circuiting the source of current supply, so that damage to the receiving instruments through accidental pressure of the key is impossible. When thrown down to the sending position, the antenna is disconnected from the receiving set and connected to the sending helix, the current supply circuit is closed and the receiving coil is short-circuited and grounded.

This switch is built in several sizes for use on various powers and is mounted on a polished dove marble base. The post which carries the high potential terminals is of hard rubber. This switch will be found of great convenience and will fully protect your receiving instruments.

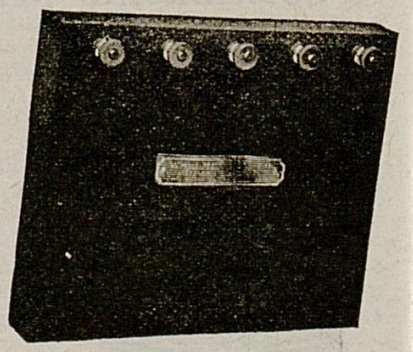
The antenna connects to the right-hand binding post at top of hard rubber post, while the helix connects with other or left-hand binding post. The front right-hand switch terminal connects both to the ground wire and ground connection of the receiving tuner, while the right-hand rear switch terminal is for connection to antenna connection of the receiving tuner.

One of the line wires run direct to the primary of the transformer while the other runs to the front left-hand binding post of the switch, and the rear left-hand binding post of the switch connects to the remaining binding post of the transformer.

No. 70X05 1 K. W. Antenna Switch ..... $ 7.50
No. 70X06 2 K. W. Antenna Switch 10.00

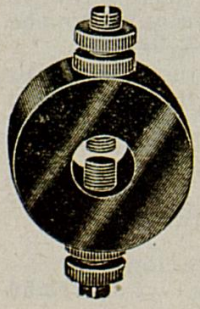
ANTENNA SERIES CONDENSER No. A487

For use with long antennae, for the reduction of the natural period to 200 meters or less. It is a moulded section, adjustable in capacity. Should be used in SERIES with the antenna. When the closed circuit is 200 meters or less and it is desired, to put the open circuit in resonance, capacities should be changed until the reading on a hot wire meter shows maximum radiation. The changes of capacity are made by connecting binding post as marked. The use of this condenser solves the problem of the large antenna, permitting its retention for receiving, and making possible maximum radiation on low waves. Over-all size, 6½x6½x1 inches.



No. A487 Antenna Seres Condenser..... $3.30

Shipping weight, 2½ lbs.



2 POINT ANCHOR GAP.

By suitably connecting this gap in the ground circuit of a transmitting set, receiving may be done through the secondary of the oscillation transformer, and the use of an antenna switch for changing from sending to receiving is avoided.

This gap is also useful for protecting the receiving instruments from damage by electrical storms, in which case it is connected directly between ground and aerial wires of the receiving set.

Small anchor gap constructed entirely of nickeled brass and hard rubber and fitted with binding posts.

Price..... $0.60 Postage 4c

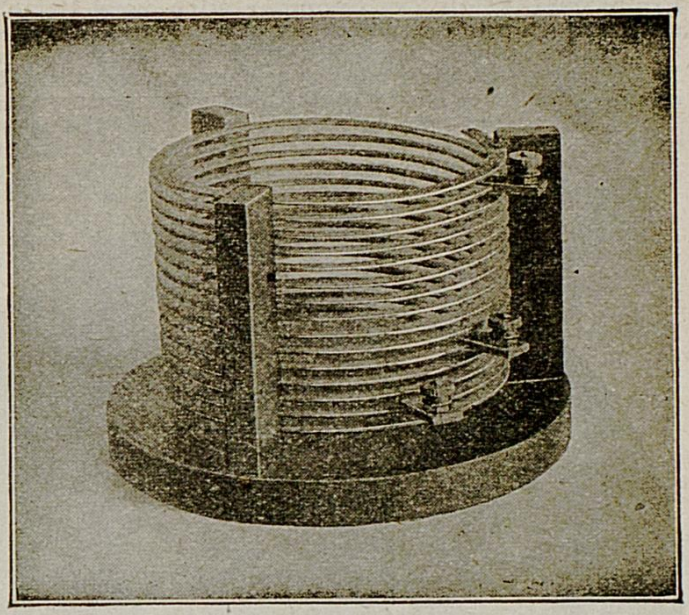
BLITZEN HELICES.

This helix is the one employed in our well-known Blitzen transmitting sets, is moderate in price, simple and rugged in construction, as well as unique in employing edgewise-wound copper strip. Base is of highly finished mahogany, while supports are of hard rubber. Three clips are provided, so that varying degrees of coupling may be used.

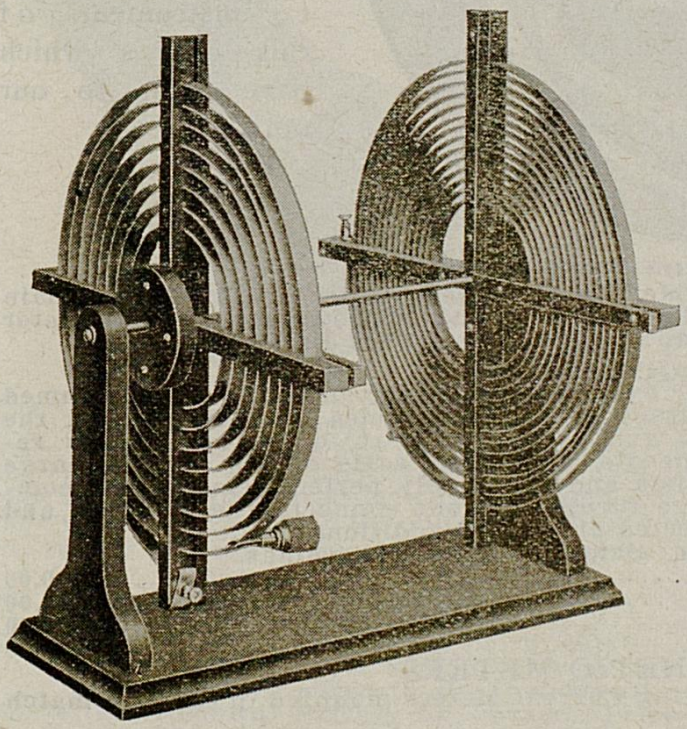
90X00 Blitzen Helix, ¼ K. W. ..... $ 5.00

90X01 Blitzen Helix, ½ K. W. 12.00

90X02 Blitzen Helix, 1 K. W. 12.00



OSCILLATION TRANSFORMER



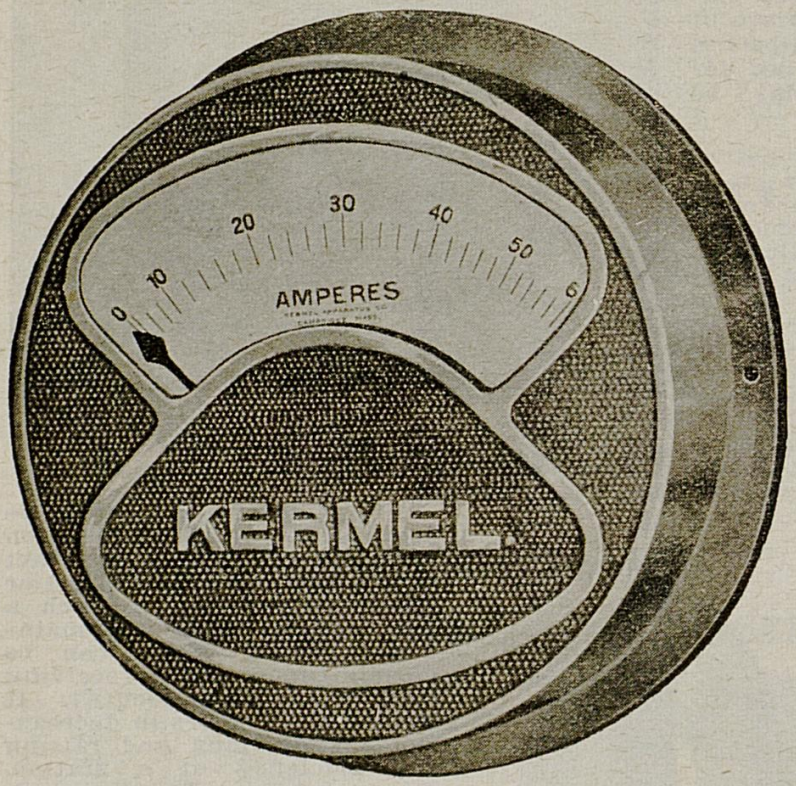
An important and exclusive feature of this Oscillation Transformer lies in the fact that it permits either direct or inductive coupling in such a degree that a pure, well maintained wave, which can be closely tuned at the receiving station, is easily secured. It will work wonders in decreasing the damping and raising the efficiency of a station. Every portion of both windings is accessible to the clips so that the variation of inductance is gradual, thus insuring absolute resonance between the two circuits and permitting the radiation of a greater amount of energy from the aerial, instead of wasting it in heat at the spark gap. The range of a station using one of these oscillation transformers is not only greatly increased, but the wave made pure so that interference is largely eliminated. The primary and secondary windings are heavy ribbon wound spirally in specially slotted frames. The coupling is variable by a sliding movement of the secondary coil. The woodwork is all furnished in dark, mahogany, nicely polished. All metal fittings are brass. The instrument is of very pleasing appearance and may be set either on the operating bench or mounted on the wall. Its use is recommended in every amateur station because interference with naval and commercial stations may thereby be avoided.

No. A7628 Oscillation Transformer up to 1 K. W. capacity..... $5.75

PARTS FOR OSCILLATION TRANSFORMER No. A7628.

This set of complete parts will enable any experimenter to build a high grade oscillation Transformer with very little labor. It is merely necessary to stain and varnish the woodwork and assemble the parts in order to complete the instrument. Each set is accompanied by a large blue print drawing with full directions, and consists of one hardwood base 16″ x 6″ x ¾″, two hardwood standards, two hardwood hubs, four slotted cross bars, four plain cross bars, three dozen screws, one 18 ft. coil heavy brass ribbon, one 30 ft. coil secondary ribbon, one brass tie rod and nuts, binding posts, etc., complete.

No. A280 Oscillation Transformer Parts.....$4.35



HOT WIRE METERS

These Hot Wire Meters are high-grade instruments designed for use on both low and high frequency currents and constructed especially to overcome the faults common to instruments of this class which have come to our notice.

CONSTRUCTION

Cases are cast iron in dull black finish, raised portion bright copper, plain glass cover, black figures on white dial, zero scale adjustment, 5 ampere meter $5\frac{5}{16}$ inches diameter, 10 and 15 ampere meters $7\frac{7}{16}$ inches diameter.

ADVANTAGES

The advantages of this meter over those generally offered may be summed up in unusual permanency, accuracy on all frequencies by proportioning the inductance of the shunt circuit, and expanding wire, quick action, low resistance, high damping of the needle, wide open scale of 160 degrees, large overload capacity, jeweled bearings and practically perfect temperature compensation. These instruments are furnished front connected as standard and can also be furnished back connected at a small additional cost.

Weight 6 pounds. Shipping weight 12 pounds.

Cat. No. W647. 0-5 amperes.....$10.00
Cat. No. W648. 0-10 amperes..... 11.00
Cat. No. W649. 0-15 amperes..... 12.00

MAGNETIC METERS

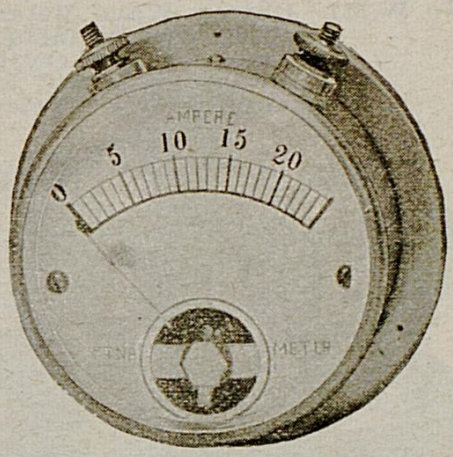
We can also furnish Alternating Current Meters mounted in cases to match the above as follows:

Ammeters

Cat. No. K5 0-5 amperes $15.50
Cat. No. K10 0-10 amperes 15.50
Cat. No. K24 0-24 amperes 15.50

Voltmeters

Cat. No. K75 0-75 volts $16.50
Cat. No. K150 0-150 volts 16.75
Cat. No. K300 0-300 volts 20.50

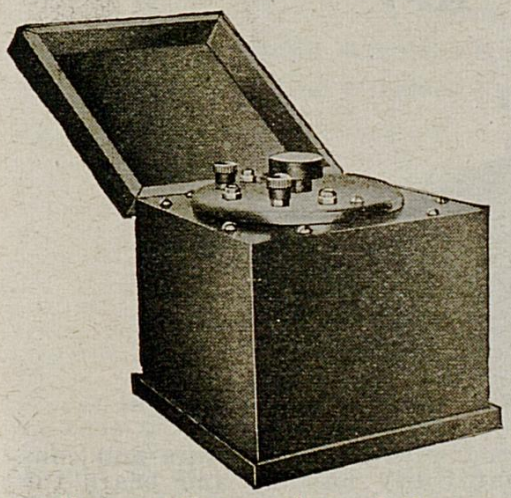


The intelligent use of a hot wire ammeter for radiation readings is urgently recommended. Without such a measuring device, the real operating efficiency of a station will be unknown, and the tuning of the transmitter will be mere guess work. The instruments offered herewith are thoroughly reliable, well constructed, and handsomely finished, and will prove of great value to any experimenter. We recommend the No. 470 for use with small induction coil sets, No. 471 for larger coil sets and transformers up to ¼ K. W. For safety and best results, No. 472 should be used with powers in excess of those mentioned. For use with wavemeters, we recommend No. 473, a special extra sensitive 0-5 instrument.

Detail: Three sizes offered, 0-.5, 0-5 and 0-10 amperes; smaller sizes have nickelled metal front with quadrant aperture for scale; No. 472, as illustrated, has heavy bevelled plate glass front; all sizes adjustable to zero reading. Nos. 470 and 471 measure three inches in diameter and No. 472, 4 inches. Shipping weight, Nos. 470 and 471, 1¼ lbs.; Nos. 472 and 473, ½ lbs.

No. 470	Hot Wire Ammeter, 0-.5 amperes	$ 5.00
No. 471	Hot Wire Ammeter, 0-5 amperes	5.00
No. 472	Hot Wire Ammeter, 0-10 amperes	10.00
No. 473	Hot Wire Ammeter, 0-.5 amperes, special	10.00

THE BLITZEN WAVE METER



"The Blitzen" Wave Meter shown above is an accurate instrument designed for rapidly ascertaining the wave length, not only of your own transmitter, but also of any incoming signals. It consists of a Blitzen rotary variable condenser mounted in a finely finished mahogany cabinet having a hinged cover. In this cover is mounted the inductance coil cleverly concealed from sight. The cover folds back, exposing all connections to view and placing the coil and condenser in a convenient position for operation.

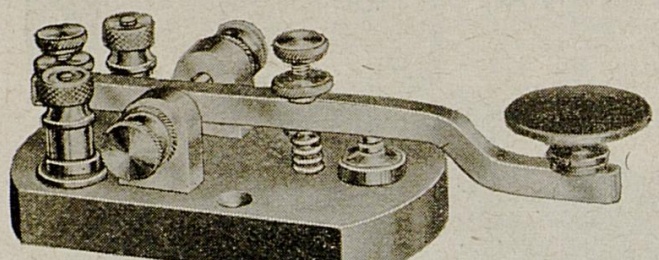
Full directions for use and a calibration curve sheet are furnished with each instrument. This meter is accurate to within three per cent, which is sufficient for all ordinary purposes.

When furnished with buzzer and battery the wave meter emits oscillations of known wave length, this wave length depending on the setting of the meter in accordance with the calibration curve furnished. When so used it provides a source of test signals of any desired wave length from which a receiving set may be calibrated or any other tests may be made. When furnished without detector or telephones the instrument may be used in connection with any high grade 2,000-ohm head set and any type of crystal detector the purchaser may have at hand.

No. W 633	Blitzen Wave Meter with curves and directions; for 150 to 650 meters. Price	$ 7.50
No. W 634	Blitzen Wave Meter with curves and directions; for 150 to 2,000 meters. Price	9.50
No. W 635	Blitzen Wave Meter with curves and directions; for 150 to 2,000 meters, with high frequency buzzer and battery completely wired to the instrument. Price	12.50
No. W 703	Renewal Battery for buzzer. Price	.30
No. W 704	Blitzen Wave Meter with curves and directions; for 150 to 2,000 meters, with high frequency buzzer and battery completely wired to instrument, including a single 1,000-ohm telephone receiver and cord, and a crystal detector for use either for measuring wave lengths or for producing an oscillating test circuit of known frequency or wave length. Price	17.00

No. W 727 Blitzen Wave Meter with curves and directions; for 150 to 2,000 meters, including a single 1,000-ohm telephone receiver and cord and crystal detector for use as a complete portable wave meter but without buzzer and battery for producing oscillations. Price 12.50

Wireless Keys



STANDARD WIRELESS KEY.

The cut shows our new model extra heavy key for Wireless Telegraphy. This key has an auxiliary conductor for leading heavy currents to the lever. It is provided with large, hardened contact points fitted in removable holders to facilitate renewal.

Handsomely finished in Gold Lacquer.

No. 9X85 Price, with No. 6 coin silver contact points $3.50

Postage, 11c.

Extra Silver Contacts. 65c per pair, prepaid.

A98X5 Standard Key, with ¼-inch coin silver contacts $4.25
B98X5 Standard Key, with ⅜-inch coin silver contacts 5.00

Note.—Silver contacts for No. A98X5, $1.00; for B98X5, $1.50.

The "Boston" Key



The "Boston" Wireless Key is manufactured with contact points and conductors adapted to sets of all powers, is beautifully finished and bears the stamp of quality at every point.

All metal parts except the steel pins of the center bearings are of solid brass, nickel plated; the button is of genuine hard rubber, and the whole is mounted on a polished Italian dove marble base 3½ inches by 6 inches, combining a high degree of insulation and solid stability with a pleasing appearance.

The action of the lever is resilient, preventing fatigue, and the contacts are of silver of large diameter, in every case about double the size required for the power at which they are rated.

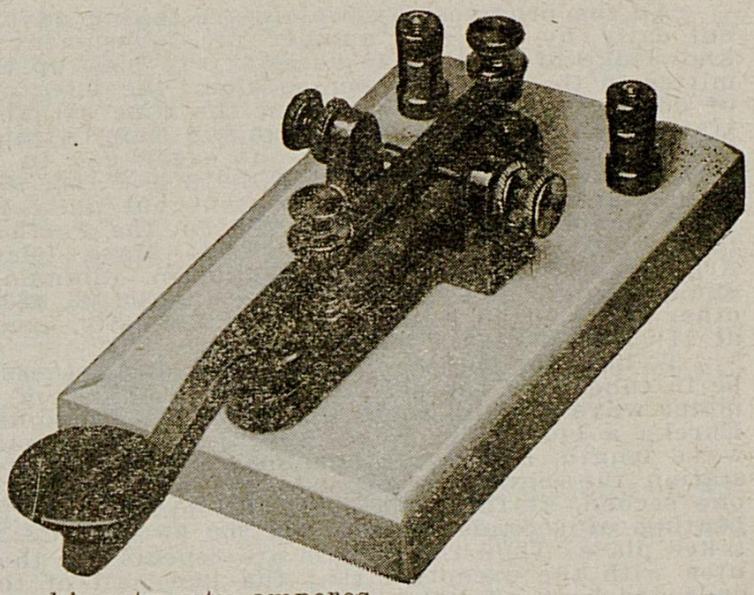
As shown in the illustration, the current from the lever is not conducted through the bearings, but is carried by a heavy conductor direct to the binding-post base.

This key is constructed exclusively for wireless use, is unusually attractive, and a number have been purchased from us by the foremost wireless company in the country for use in their stations.

Your order will prove to you that this key is better made and more attractive than any offered for general use.

No. 60X80 "Boston" Key for use on currents up to 10 amperes ..... $ 6.50
No. 60X81 "Boston" Key for use on currents up to 20 amperes 7.75
No. 60X82 "Boston" Key for use on currents up to 30 amperes 9.00
No. 60X83 "Boston" Key for use on currents up to 50 amperes 12.50

THE OVERLAND WIRELESS KEY.



A strictly high class transmitting key at a price within the reach of every amateur. This key is designed along the lines of commercial type keys, being provided with a long lever which makes the action of the key easy, thus preventing fatigue.

The base of the key is of white marble and all metal parts are of brass. The contacts are coin silver. The key lever is provided with set screws and trunnions, so that any desired adjustment may be obtained.

This key is furnished in three sizes, viz., No. 6 contacts, capable of breaking five amperes; ¼ inch contacts, capable of breaking ten amperes; and ⅜ inch contacts, capable of breaking twenty amperes.

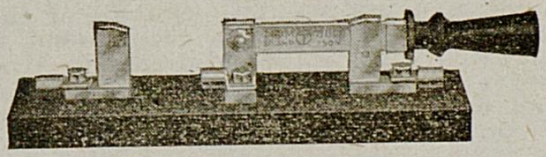
Size of base of key, 3 in. x 5 in.

No. A1642 Overland Key, with No. 6 coin silver contacts.....$4.75
Shipping Weight, 3 lbs.

No. A1643 Overland Wireless Key, with ¼-inch coin silver contacts..... 5.25

No. 1644 Overland Wireless Key, with ⅜-inch coin silver contacts..... 6.75

GROUND SWITCH



It is advisable to always have a separate ground for the antenna, so that in case of lightning there can be no possible injury to the instruments. This ground wire should be connected to the antenna at all times when the station is not in operation, through a standard single pole double throw switch of suitable capacity. The switch should be connected with a copper wire not smaller than No. 4.

We list two standard 250-volt Trumbull slate base switches of 100-ampere and 60-ampere capacity, respectively. We recommend these switches as unexcelled by any manufactured for the above purpose.

No. A3742 60-ampere S. P. D. T. Slate Base Knife Switch.....$1.75
Shipping weight, 3 lbs.

No. A3744 100-ampere S. P. D. T. Slate Base Knife Switch..... 3.35
Shipping weight, 5 lbs.

600 VOLT GROUND SWITCH.

A ground switch for mounting outside the house or building for protection of aerial against lightning. The base of the switch is of asbestos wood and will not absorb moisture. This switch is 600 volt, 100 amperes capacity, of standard Trumbull manufacture, and is approved by the Board of Fire Underwriters.

No. 8726 100 ampere 600 volt, S. P. D. T. Ground Switch.....$3.90
Shipping weight, 6 lbs.

WIRELESS TIME SERVICE

All the progressive jewelers are taking advantage of the time being sent out daily by a great number of Government Naval Radio Stations. No knowledge of wireless is necessary to pick up the time. The time is transmitted in the same manner as along the telegraph lines; that is by a series of dots. On the Atlantic Coast the time signals are sent out by the naval stations at Arlington, Key West and New Orleans. The signals from Arlington and Key West are sent out every day in the year twice a day, from 11:55 until noon and from 9:55 to 10:00 P. M., 75th meridian time. The time signals from New Orleans are sent out daily including Sundays and holidays, commencing at 11:55 A. M. On the Pacific Coast the time is sent out through the naval radio station at Mare Island, Eureka, San Diego, Pt. Arguello and North Head, Washington. Signals from Mare Island are sent out every day at 11:55 A. M. and 9:55 P. M., 120th meridian time. From all other stations the signals are sent out daily, excepting Sundays and holidays, at 11:55 A. M., 120th meridian time.

To hear the signals with greatest distinctness the receiving circuit should be in tune with the sending station. Arlington and Mare Island use a 2500 meter wave length; North Head and San Diego use a 2000 meter wave length, Eureka a 1400 meter wave length, Key West and New Orleans a 1000 meter wave length, and Port Arguello a 750 meter wave length. At the Arlington station the signals or seconds are beat off for 29 seconds with a pause of one second, at the division of the minute into halves. At 9:55½ P. M. the beating of seconds is repeated for 25 seconds when a pause of 5 seconds takes place. Then the signals are repeated in the same manner for five minutes with the exception that the last half of the last minute only 20 seconds are beat off, then a pause of 10 seconds elapses when one long dash is made indicating 12 noon or 10 P. M., which is followed by the signals N A A Va. At 10:00 P. M. the metrological information is sent out following these time signals. Also obstruction notices from hydrographic office are sent out following time signals. We presume that the same method is used with the other stations, but at this writing we have no positive information.

No license from the government is necessary to install and operate a receiving set, and the cost of installing one is relatively small.

In addition to the receiving set, it is necessary to have the material for the antenna. Elsewhere in our catalog we give complete instructions for erecting an aerial. It is a very simple matter to build one if the instructions are followed. Elsewhere herein is a list of antenna and other material necessary for a complete sending and receiving station. Not all of this material, however, is necessary for a receiving station. We recommend the use of a ground switch and antenna switch with all receiving and transmitting sets. The ground switch will serve to protect the instruments from danger in case of a lightning storm, and will also serve as a protection to the building itself from lightning We recommend the ground switch listed on preceding page. The lead-in wire should be securely soldered to the center terminal and the ground and aerial wires to the other two terminals. A wire must also be run from the ground terminal to the ground terminals of the antenna switch so that when the receiving set is in use, there will be an aerial and ground connection. It will, therefore, be observed that there will be two ground wires running to the ground terminal of the ground switch; one direct to the ground connection and the other to the ground terminal of the antena switch. We recommend the purchase of the Amateur's Wireless Handy Book listed in this catalog, and which sells for 25c. It gives a great many diagrams for connecting various combinations of instruments. Upon request we will also mail a special pamphlet prepared for the particular use of jewelers and laymen giving a great many hints on the installation of a wireless set and the particular sets to use in various localities.

The following list of Naval stations is here given for the information of our patrons:

Call Letters	Name of Station
NAB	Portland, Me.
NAC	Portsmouth, N. H.
NAD	Boston, Mass.
NAE	Cape Cod, Mass.
NLA	Nantucket Shoals Light Ship.
NAF	Newport, R. I.
NAG	Fire Island, N. Y.
NAH	New York, N. Y.
NAQ	Jupiter, Fla.
NAR	Key West, Fla.
NAS	Pensacola, Fla.
NAT	New Orleans, La.
NAU	San Juan, P. R.
NAW	Guantanamo, Cuba.
NAX	Colon, Isthmian Canal Zone.
NAY	Porto Bello, Panama

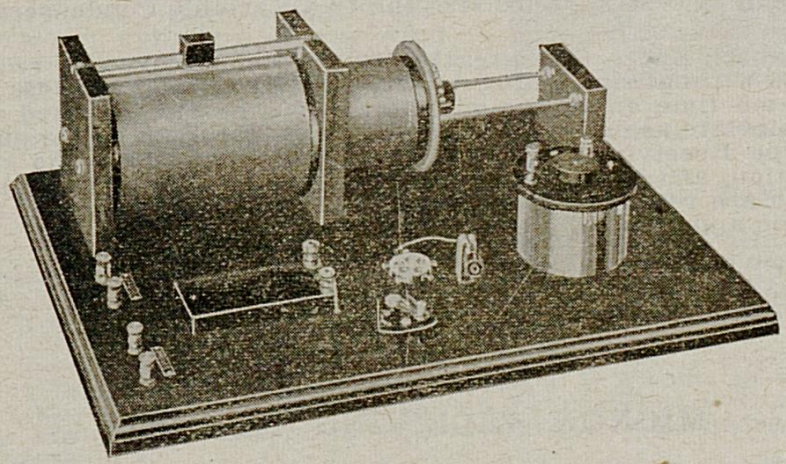
NEW MOUNTED RECEIVING SETS

The receiving sets following are made with particular reference to tuning in with stations using long wave lengths, such as Arlington, Key West, Sayville, etc. Jewelers will find them particularly simple in operation and efficient in performance, though they are not made particularly for use by jewelers. Any of the sets will tune with wave lentghs up to 4,000 meters without a loading coil.

The instruments are all beautifully finished and neatly mounted. The base is beautifully finished in mahogany. All the wiring is concealed in slotted grooves underneath the base, an item of more or less expense in construction and which can be appreciated by the experienced experimenter in wireless. Etched brass name plates are provided at all terminals showing the various connections.

All the sets are wonderful values and have already met with an enthusiastic reception. (See testimonials on the first few sets on pages devoted to testimonials.)

ARLINGTON RECEIVING SET No. R40



This set comprises our No. 1091 Arlington Receiving Transformer, No. A512 Detector Stand, No. W735 Blitzen Rotary Variable Condenser and No. 77X81 Fixed Condenser.

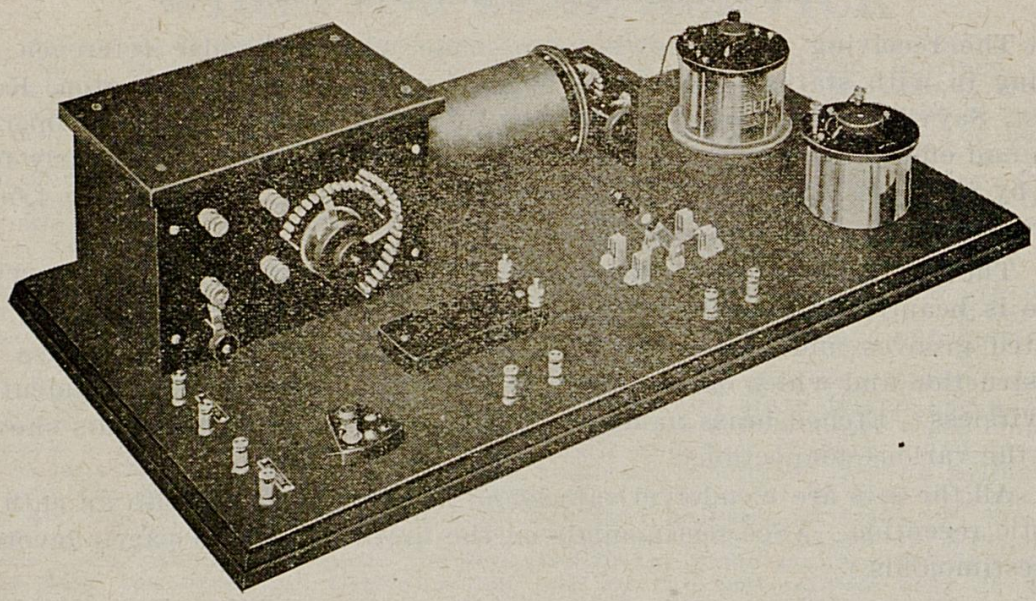
The Arlington Transformer and No. A512 Detector Stand are described at length in our catalog. We have never sold any detector that has met with such an enthusiastic reception as this detector during the brief time it has been on the market. This Blitzen Variable Condenser supplied with this set has for many years enjoyed a justly deserved popularity for its excellent workmanship and efficiency. (Cut shows old type Blitzen Variable Condenser.)

This Receiving Set, with an efficient 2,000-ohm head set, will nicely pick up Arlington, Sayville and Key West from all points within a distance of 1,500 miles.

Arlington Receiving Set No. R40.....$17.50

Dimensions, 15 in. x 20 in.

No. R41 RECEIVING SET



This set, at prices quoted, comprises our Navy Type Receiving Transformer, Fixed Condenser, and No. W735 and W774 Blitzen Rotary Variable Condensers. Catalog prices will prevail for the two detectors desired therewith. Connections provide for Audion and any type of Crystal Detector.

This set can also be supplied less the two Variable Condensers, at a reduction of $9.00.

To the experimenter that greatly desires to increase the receiving range of his station without discarding practically all of his wireless instruments, and at the same time enjoy the advantage of a neatly mounted set, no wiser or more appropriate selection could be made. There can be no question about the Navy Type Receiving Transformer greatly increasing the range of any receiving station, and attention is directed to a few of the enthusiastic testimonials which are reproduced on pages 49 to 56 herein. The set must be seen and used to be appreciated.

No. R41 Receiving Set, as described $35.50
No. R41 Receiving Set, less Variable Condensers 26.50

Dimensions, 27 in. x 15 in.

MIGNON RECEIVING CABINETS.

Mignon Receiving Sets have won an enviable reputation for their masterful performance and excellent workmanship. These sets are complete ready for use with either mineral or Audion Detectors. The open or primary and closed or secondary circuits are of such capacities, regulated by a systematic switching arrangement, that a strong resonance effect is attained with ease.

Remarkable selectivity is effected by their standard duplex tuning system of two ring-type couplers in the RC cabinets and a Mignon Rotary Loose Coupler in conjunction with a Rigid Vario Coupler in all the RLC cabinets. The latter type is especially designed and constructed for the reduction of static interference which is accomplished by various combinations of opposing sets of oval and ring-type coils. Oval coils are used in all loose couplers which are wound 45 degrees diagonal to the axis. The loose coupler secondary consists of ten sections terminating into an eleven-ring armature, a corresponding number of light phosphor bronze brushes

affording the connections with the eleven-point rotary switch on front panel of cabinet.

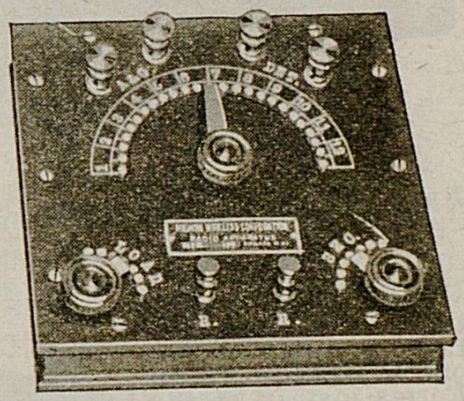
Severe tests before shipments are made, using a 60-foot long and 35-foot high single covered iron wire inside aerial, assuring long wave-length efficiency. Full instructions for operating are furnished.

These cabinet sets in connection with DeForest Audion-Detectors attained the long distance record on board the Lackawanna Express Trains No. 3 and No. 6 between Hoboken, N. J., and Buffalo, N. Y., February 21, 1914, keeping up an uninterrupted intercommunication with the various stations along the line. This was done under the direct supervision of Mr. L. B. Foley, Superintendent of Telegraph, Telephone and Wireless of the D. L. & W. R. R., No. 90 West Street, New York.

The wood work is quartered oak, in mission finish, all name-plates and dials have brass raised characters on black background. Extra large binding-posts as well as contact points; hard rubber knobs. All metal parts are of gold-lacquered brass.

The RC1 occupies but little space, and is especially designed for Jewelers' time service. The wave length capacity is 3,500 meters. The wiring consists of two ring-shaped coils, 5½ inches in diameter, one containing the primary and secondary windings of No. 32 double silk covered copper wire, which are laced into one unit. The second, or loading coils of No. 24 double silk covered wire, is placed inductively to the Primary-Secondary Coil. Both coils are stationary. No forms or cylinders of any kind are used; the total wiring is laced with No. 6 waxed cable sewing thread and is self-supporting.

No. RC1—Receiving Set, less Detector..**$10.00**



Size 8x8x1¾ inches.

42 West 72nd Street, New York, N. Y.

Gentlemen:—

I am glad to tell you of the receipt of the "RW3" and the "RLC5" in good condition. I can only give you the most enthusiastic possible reports as to their performance. I have a rather small Aerial, though fairly high (about 100 ft.) but the results surpass by a great deal my old set with a much larger Aerial.

The "RW3" is simply astonishing. Without an Amplifier I hear, I suppose, every Arc station that is at all known—O U I and P O Z come in very strong and readable at any time they may happen to be sending; with a chemical amplifier I have brought in both of them loud enough to be heard through a horn all over the room.

As to the Domestic Arc stations, they are incredibly loud—excuse these rather rambling words of praise, but I mean it all and am much obliged for you sending the instruments so promptly. The "RLC5" is the best spark tuner I have yet seen and as you may gather from my remarks, I am more than satisfied.

Wishing you continuous success, I am,

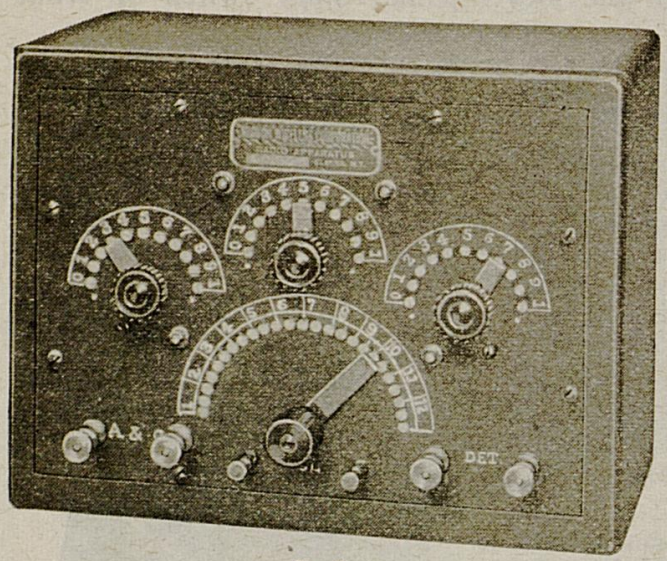
Faithfully yours,

ARTHUR ALEXANDER.

Mr. Arthur L. Kent, (Kent Co.), Binghamton, N. Y., copied Nauen, Germany, with his "RW3" on an Aerial of 80 ft. length, 30 ft. height, and about 5 ft lead-in, (reported to us September 27th by phone, and through the leading newspapers).

Mr. A. F. Holzl, Ex-Radio Electrician (First Class) U. S. N., formerly Navy Yard, Brooklyn, N. Y., who signed "CG" while there, conducted several extensive tests with the "MIGNON UNDAMPED WAVERS" and proclaims same unparalleled in all respects.

The leading Universities and electric manufacturers are rapidly installing MIGNON APPARATUS; such as the University of Vermont, Burlington, Vt., and the General Electric Comany, Schenectady, N. Y.



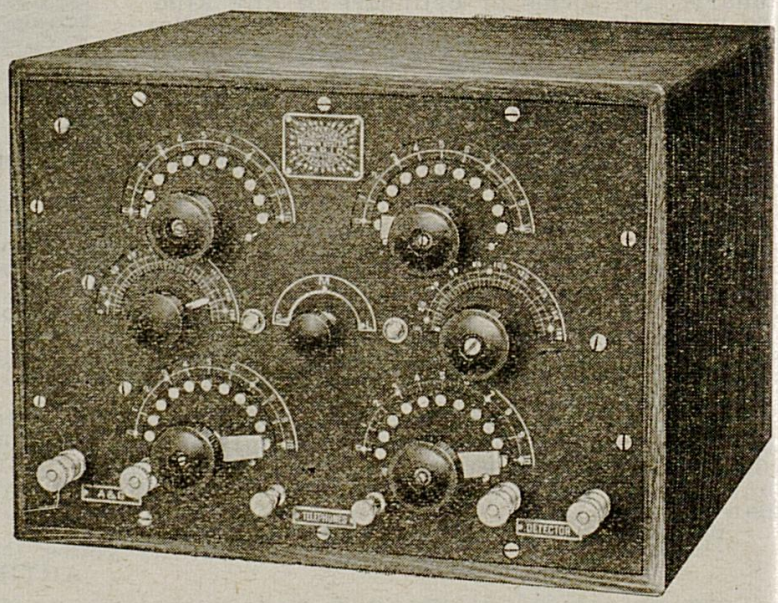
R C 2
Size 12½x9½x6 inches.

This instrument is equipped with duplex vario-coupler. Two separate hard-wood rings, 7 inches in diameter, are employed, each containing primary and secondary windings. These rings are stationary and placed inductively to each other. Both primaries as well as both secondaries are connected in series and are of equal capacities.

The first primary has fourteen (14) more terminals than the second one, permitting a more gradual and most accurate tuning. Both coils are wound with No. 32 double silk covered copper wire.

The combination of the duplex vario-coupler equals the variation of the ordinary loose coupler and wonderful results have been obtained with this type of apparatus. Wave length capacity 6,500 meters.

No. RC2 Receiving Set, less Detector $25.00

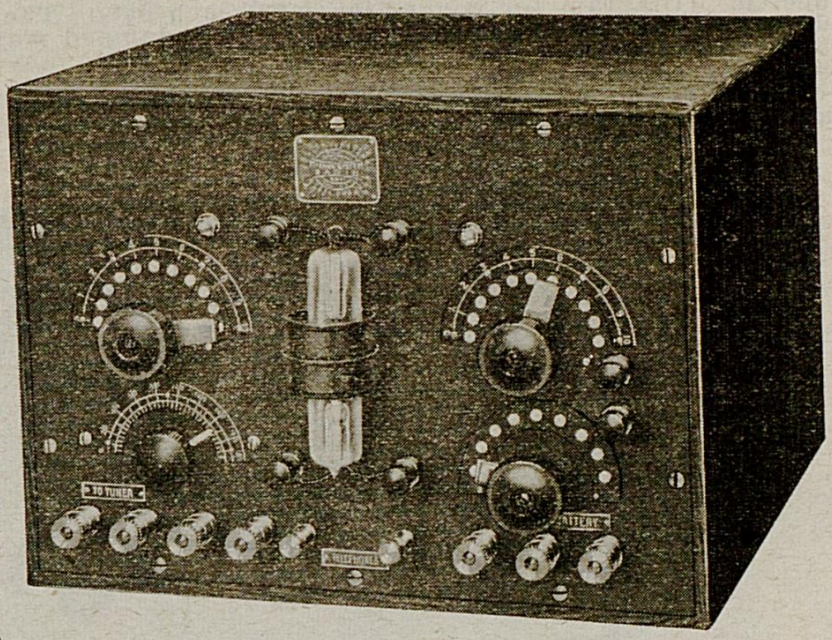


This cabinet contains the Mignon-Loose Coupler, wound on laminated Drum Forms instead of the ordinary pasteboard tube-type, an improvement that has greatly increased the efficiency of the coupler, which is of special construction for the reduction of static interference. A large loading inductance, regulated by an 11-point switch, is connected in the open or primary circuit.

The Master Switch constitutes another feature in this cabinet, which changes the wave-length capacities of the set, by the simple turn of a small and neatly designed, three position, rotary switch, which, when on "S" (short) places a 43 plate rotary variable condenser in series with the primary circuit. When on "M" (medium) disconnects condenser entirely, and when on "L" (long) connects same in shunt with the secondary coils.

The R L C 5 is equipped with six terminal posts, for the connections of Aerial, Ground, Telephones and Detector, which are marked accordingly by engraved name plates. This cabinet is rapidly becoming a favorite with the leading wireless operators in the United States as well as abroad. Wave length capacity 9,000 meters.

No. R L C 5 Receiving Set, less detector $45.00



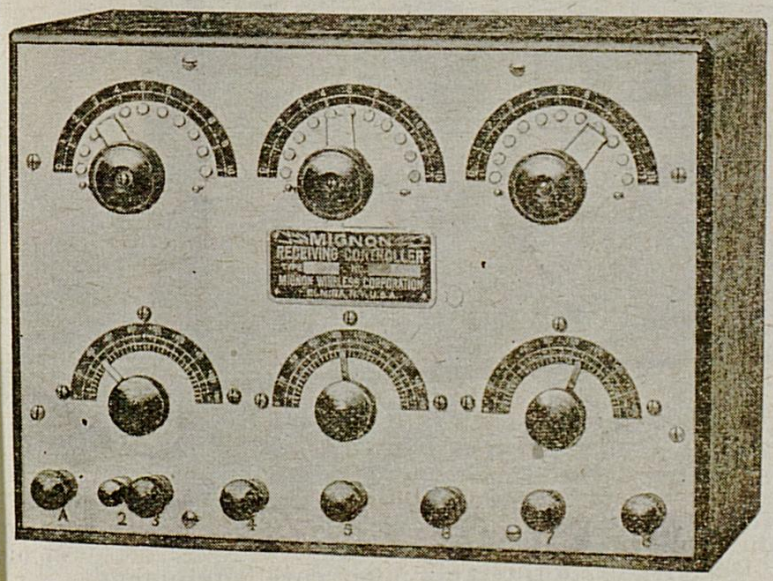
The R B D 8 is the last word in Radio Signal Detectors, equipped with the Electron Audio Bulb and is wired according to the Circuit Specification of the Mignon Undamped Wave System, including the Auto-Transformer encircling the bulb. The R B D 5 is one of the most efficient detectors manufactured and more than doubles the efficiency of any Radio Receiving Station. This cabinet contains 12 3-cell flashlight batteries, controlled by our nine terminal SILENT switch, one small fixed condenser, one 2 M. F. fixed condenser and one 43-plate rotary variable condenser. Duplex Rheostat for minute adjustment of Filament current by two 11-terminal switches and six Terminal Posts for the connections of Telephones, a Six Volt battery and Tuner. In addition to these are five more posts, the latter to be used only when in conjunction with the Mignon Undamped Wave System, fully described on the following pages. A marvel of efficiency.

No. R B D 8 Detector $35.00

MIGNON ADJUSTABLE DISC CORE UNDAMPED WAVE RECEIVERS

The Last Word in Radio Engineering

These R W types (latest Mignon invention) embrace a new field in Radio Engineering. These late types introduce adjustable special metal disc cores, heretofore considered absolutely impossible. These new undamped wave receivers are the most efficient apparatus constructed at the present time. The circuits are new. The most important features are the rigid Triple Coils and the relative position of same. All Arc Stations, including European, come in sharp and clear, and will positively not be affected by the nearness of the operator's hand or body. The tuning is surprisingly simple and any child will learn to bring in signals with extreme ease. (Instructions accompany each cabinet).

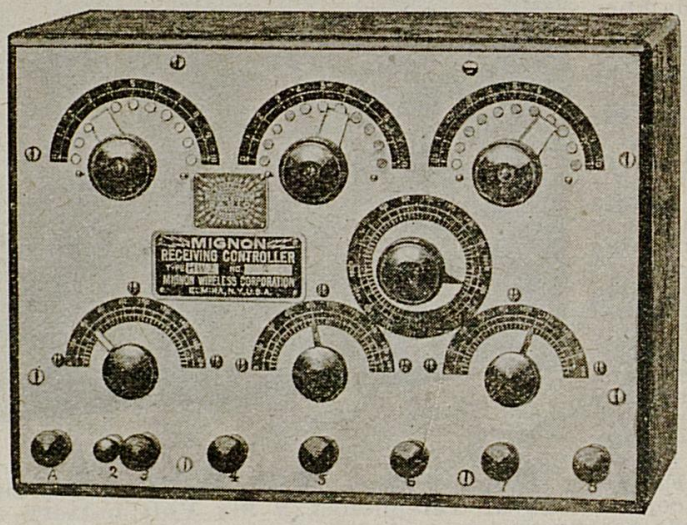


R. W. 1

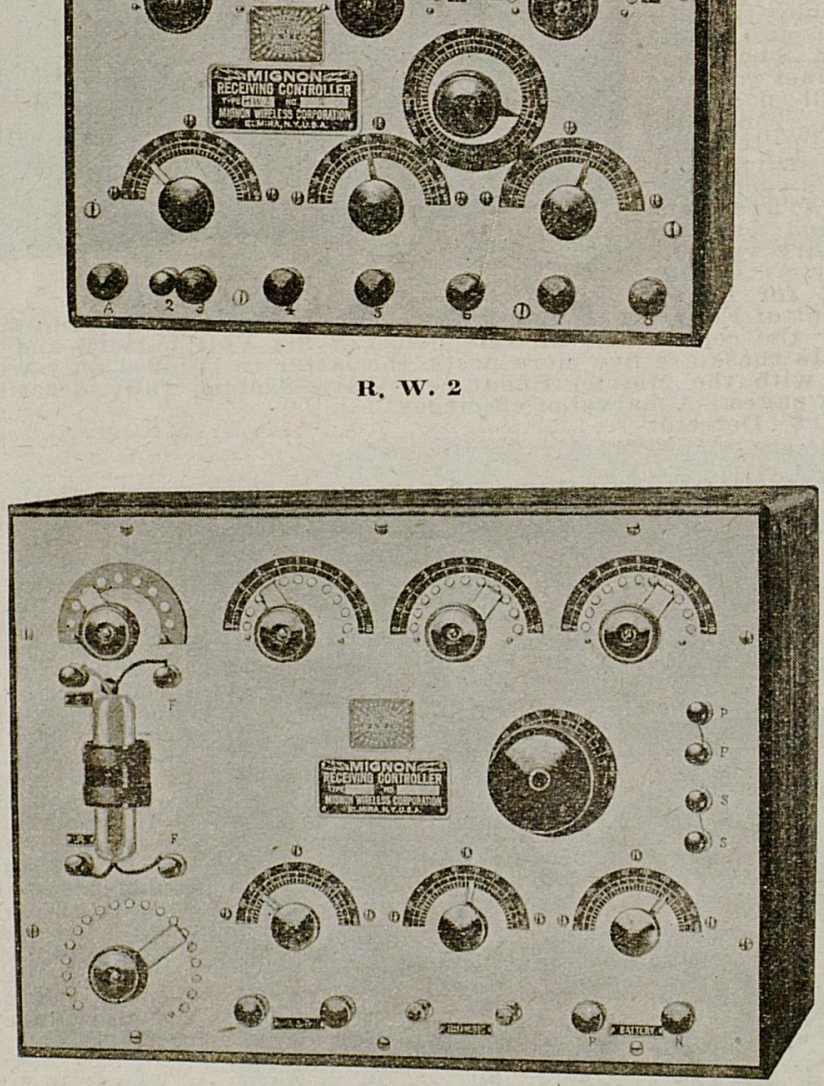
The R W 1 and R W 2 can be operated in conjunction with "RBD8" only.

These cabinets are especially equipped for the Mignon Undamped Wave Circuit. If the reception of damped waves is desired, any type coupler can be con-

nected. (Diagram for connection with each set). The connection of coupler does not interfere with the reception of undamped waves, and we guarantee that these sets are far superior in efficiency to any other existing outfit, without regard to price. The circuits as well as the construction of these cabinets are protected and infringements will be prosecuted. Our usual guarantee of satisfaction or money back accompanies these sets.



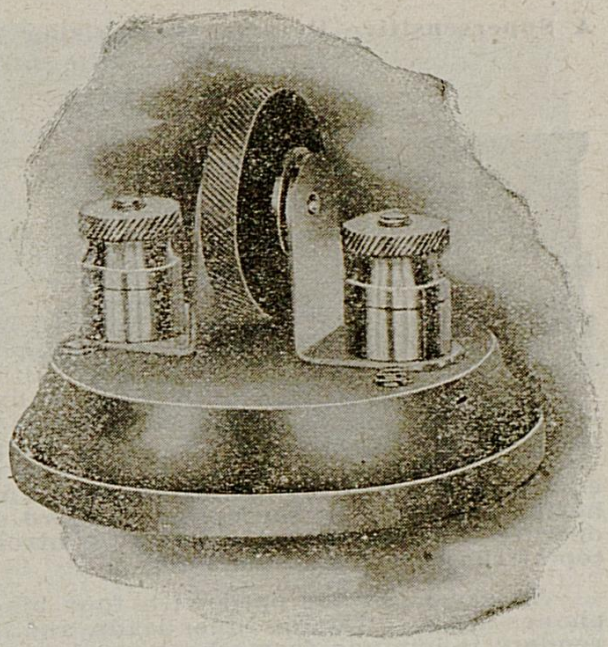
R. W. 2



R. W. 3

R W 1	(No core equipment) 12½x9½x6"	$ 50.00
R W 2	(Equipped with adjustable disc core) 12½x9½x6"	65.00
R W 3	Complete with R B D 8 circuit, adjustable disc core equipment and four extra coupler terminals for damped wave reception, 16x12x12"	100.00

CRYSTALOI DETECTOR



Dimensions, 2¼ in. x 1⅞ in.

The Crystaloi Detector, the invention of Eugene T. Turney, marks one of the greatest achievements in ultra-sensitive and permanent adjustment detectors of the last year.

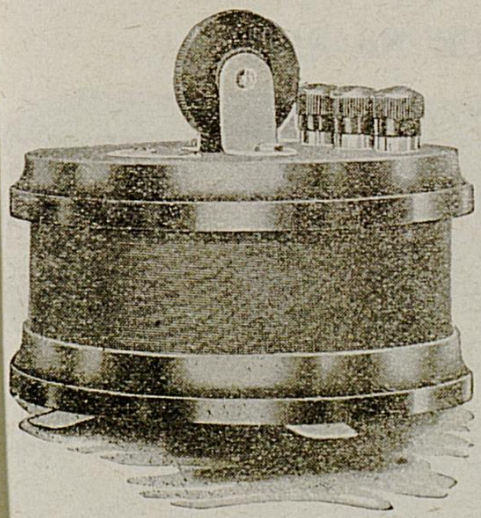
The Crystaloi is a radical departure from any of the well known types of detectors which depend on a metallic point in contact with an extremely minute portion of a sensitive mineral. The principle of the Crystaloi is exactly opposite from that of any other detector, inasmuch as instead of a fine point of metal coming in contact with a minute portion of a sensitive mineral, the Crystaloi is constructed in such a way that a comparatively large surface of a very sensitive mineral is brought in contact with a great many points of a very light, finely divided alloy which becomes a conductor only when traversed by high frequency oscillations. This arrangement renders the receiving apparatus remarkably free from static and other interferences, which makes it an ideal summer detector, and is wonderfully sensitive. There is nothing to get out of order with this detector and it should last indefinitely.

To operate the Crystaloi Detector it is only necessary to put the Crystaloi in circuit with a buzzer, and while holding the key down, rotate the cylinder until the signals are loudest in the ear phones, at which time you are ready to receive anything that is in the air. The Crystaloi requires no battery or potentiometer and is ever ready to serve you under all conditions. Extremely light contacts and many of them, together with large radiating surfaces, afford great stability combined with sensitivity, and inasmuch as the sensitive elements are thoroughly protected from all external influences, it is apparent that the Crystaloi is an ideal detector.

Type T-0 Crystaloi Detector.....$3.50

Shipping weight, 10 oz.

TYPE AA CRYSTALOI DETECTOR



Dimensions, 4 in .x 3½ in.

This new type of Crystaloi Detector is provided with specially wound stepped-up cohering inductance which causes the alloy to cohere more closely, thereby reducing the internal resistance of the detector about 25 per cent, which makes it just that much more sensitive. This is really a wonderful improvement as it makes it possible to hear much weaker signals, which naturally increases your distance.

It is an extremely handsome as well as valuable instrument. The base and top are of hard rubber composition. The coils are wound with a bright and pleasing shade of green silk covered copper wire. It is provided with three binding posts with bases of a silver alloy which prevents corroding and will not tarnish. The brackets that support the cylinder are of the same material. It is also provided with specially designed anti-shock feet, which render it immune from all vibration, thereby causing it t o hold its adjustment.

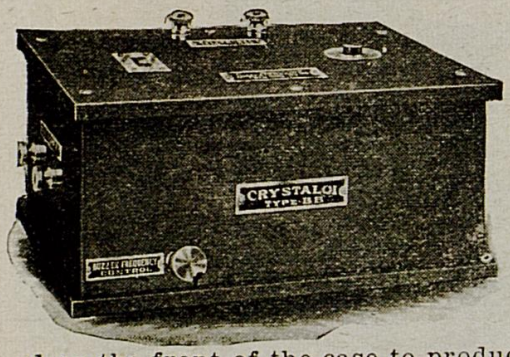
Type AA Crystaloi Detector.....$6.00

Shipping weight, 1½ lbs.

Read testimonials on pages 49-56.

CRYSTALOI DETECTOR, TYPE BB.

A Supersensitive Detector Comprising Every Accessory and Refinement in a Single Unit.



In the type BB the manufacturers have embodied in a single unit every element necessary to rectify into audibility the very weakest wireless signals.

This type BB consists of a highly finished African mahogany case in which is located a supersensitive Crystaloi cylinder of which the periphery protrudes through the top, making it accessible for rotating to secure the finest adjustment. A coehering inductance especially calculated and calibrated to the supersensitive cylinder. A fixed condenser with the exact capacity for this particular cylinder. A specially wound Buzzer of which the frequency is controlled by a knurled screw head mounted on the front of the case to produce a note that is best suited to assist in cohering the alloy in the cylinder. Two of the highest grade dry batteries to operate the Buzzer and a Buzzer control button which protrudes through the top of the case for accessibility.

This case is equipped with four binding posts, two of which are for the phones and two for the tuner leads, and is provided with anti-shock feet which renders it immune from shocks and jars.

The specially wound Buzzer has an adjustable frequency range of 1,000 to 2,000, which can be regulated to your liking.

With this carefully designed and calibrated instrument you have but to set it on the table, connect your phones and leads from your tuning coil, and you are permanently and thoroughly equipped to engage in the most serious wireless work of the present day. Of course Variable Condensers can be added if desired.

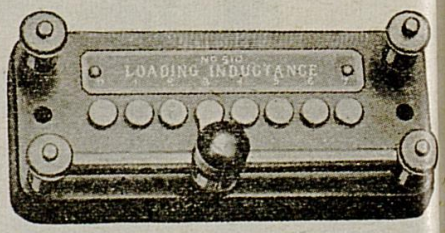
The fact that every part of this apparatus is designed, built and calibrated to work with each other makes it a sensitive piece of wireless mechanism that cannot be duplicated.

Dimensions, 7½x5½x3½ inches high.

Type BB Crystaloi Detector.....$12.00

Shipping weight, 3 lbs.

LOADING INDUCTANCE No. A510



The average antenna and primary of a receiving transformer do not posesss sufficient inductance for the correct tuning of waves exceeding 1500 meters in length. It becomes necessary therefore, in order to properly tune to waves of greater length, to have additional inductance for the primary circuit.

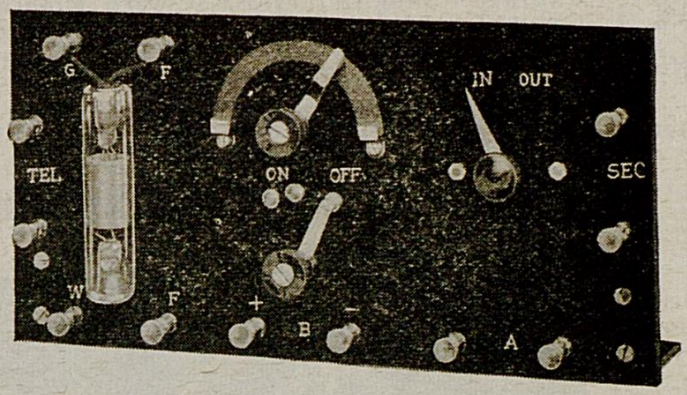
The instrument shown here is a compact and an easily operated inductance for this purpose. It is contained in a hard rubber composition base, provided with 8 contact points, each step of the seven active points representing approximately 400 meters. In connection with any of our receiving transformers except the Junior, this instrument will permit the correct tuning of waves up to 4000 meters in length with an antenna of 150 or more feet.

Over-all size, 4½x2x1½ inches.

No. A510 Loading Inductance $3.25

Shipping weight, 12 oz.

No. 1 PANEL DETECTOR SET.



This instrument represents the most sensitive type of detector known to wireless. The panel is of one quarter inch Formica, 5½x11 in., highly polished, equipped with angle brackets and screws for table mounting. The wiring is securely fastened to the rear of panel. This type of detector can be easily incorporated into a panel receiving set without disturbing any connections. The "B" battery control consists of a semi-circular graphite potentiometer of very high resistance which permits of fractional cell adjustment and long battery life. With a graphite potentiometer there is no scratching noise in making adjustments. The potentiometer switch arm is equipped with a special carbon contact button, which will not wear out the graphite resistance. Filament control is by means of a rheostat mounted on the rear of the panel and operated by the "Out and In" knob on the front of panel. The rheostat arm has a phosphor bronze spring contact which insures smooth, easy and positive control. The "On and Off" switch is of the instrument type. It not only opens the filament circuit, but also disconnects the "B" battery from the potentiometer, insuring long life for the "B" battery. All the wiring is on the back of the panel, with rubber covered wire soldered to lugs under brass machine screws. The knobs are of hard rubber of a very pleasing design. All metal parts are of brass, heavily nickel plated and polished. The binding posts are plainly labeled in white on the panel.

Tests conducted by us, as well as the voluntary expressions of thousands of amateurs throughout the country, conclusively demonstrate the superiority of the bulbs supplied with these sets, described at length elsewhere in this catalog, over any other types of tubular bulbs yet developed.

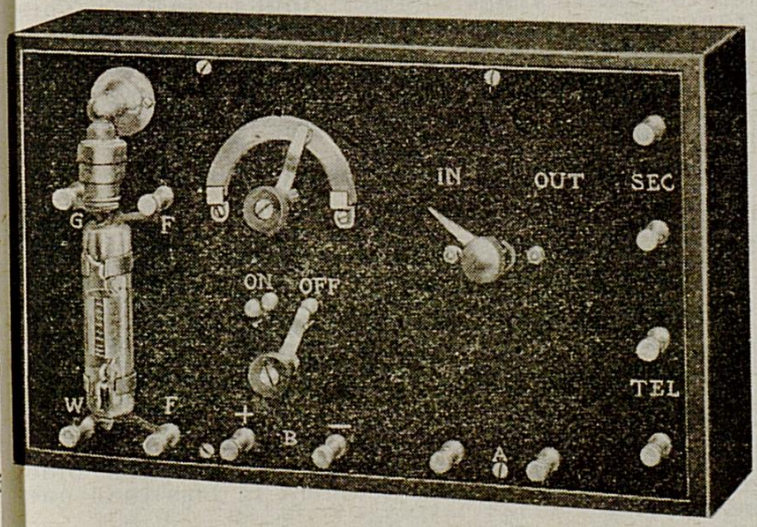
This instrument is unquestionably the finest detector of its type on the market regardless of price and at the attractive price we have placed upon it, it is clearly beyond competition.

No. 1 Panel Detector Set with Audio Tron bulb $12.75
No. 1 Panel Set only, less bulb 8.00

Shipping weight of any of the above sets, 7 lbs.

Note—We can supply 10 (we recommend 12) No. 531 French battery, the best type on the market, at 36c each; regular price 45c. These batteries must be used with detector and are not supplied therewith. This special price is for lots of ten or more.

No. 2 CABINET PANEL DETECTOR SET.



Our No. 2 Cabinet Panel Detector Set has a highly polished Formica panel 7¼x13 in. The case has a beautiful mahogany finish, hand rubbed. It is sufficiently deep to permit of the "B" battery being placed inside the cabinet and connections to the binding posts therein or the external binding posts when the "B" battery is placed outside the cabinet. A bracket and adapter are provided to hold the bulb. All other constructional features are the same as in No. 1 Panel Set described above.

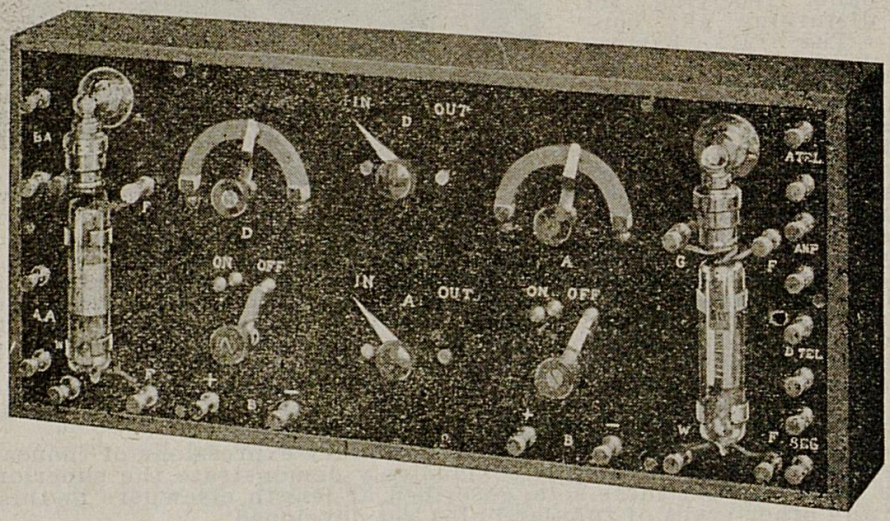
In both finish and performance we can unhesitatingly guarantee this set to be excelled by none manu-

factured at any price, and at the particularly attractive price we have placed upon it we are sure that it will meet with a generous reception among those who desire the best.

No. 2 Cabinet Panel Detector Set with Electron Audio bulb **$22.50**
No. 2 Cabinet Panel Detector Set with Audio Tron bulb and equipped with 12 French batteries **27.50**
No. 2 Cabinet Panel Detector Set, less bulb **17.50**

Note—Above prices are less batteries. See note under No. 1 Panel Detector Set for number and price of batteries.

No. 3 DETECTOR AND AMPLIFIER SET.



The panel is of highly polished Formica, 7½x17⅝ in., mounted in a hand rubbed mahogany finished case. The amplifying transformer is mounted in the cabinet and flexible leads connect it with the panel. This transformer is of the latest design and gives a maximum efficiency.

By a unique arrangement of connections the detector and amplifier can be used separately; the detector simply as a detector and the amplifier to amplify signals received from the crystal or other type of detector, or for experimental purposes. When the detector and amplifier are to be used together the binding posts labeled D TEL are connected to the binding posts labeled AMP., with flexible cords provided with instrument. When the amplifier is used alone, connect to binding posts labeled AMP. and telephone to binding posts labeled A TEL.

The great advantages and wondrous results obtainable with an amplifier are well known to all advanced amateurs. With an amplifier the strength of signals is increased at least ten to twenty times their original intensity. This instrument will increase the range of your receiving apparatus immeasurably. Far distant stations that would otherwise be closed to you are clearly heard when it is placed in the circuit.

We guarantee this set to be excelled by none on the market. In both construction and design no detail has been overlooked. We have placed a price upon it that is particularly attractive.

No. 3 Detector and Amplifying Set equipped with two Audio Tron, Tubes **$52.50**
Above set equipped with 20 high voltage batteries **65.00**

Shipping weight, 15 lbs.

MAKE YOUR OWN DETECTORS AND AMPLIFIERS.

Many experimenters prefer to make their own wireless instruments. Our extensive line of raw material listed elsewhere in this catalog makes it possible to build almost any wireless instrument. We have made it particularly simple to make any of the above detector sets or the detector and amplifier, by supplying all the parts, ready for assembling, together with blue print, making it possible to complete the finished instrument in less than one evening and be picking up the stations.

PARTS FOR No. 1 PANEL DETECTOR SET

1		Panel Highly polished Formica ¼x5½x11 in. drilled, edges finished	$2.75
1	No. A444	Graphite Potentiometer	1.00
1	No. A7383	Potentiometer Switch Arm	.50
1	No. 5001	Switch Arm	.50
12	No. 33X	Binding Posts	.96
3	No. M324	Switch Contacts	.12
1		Grid Condenser not mounted (sold only on orders for complete set of these parts)	.10
2	No. 126	Potentiometer Clips	.10
1	No. B1453	Rheostat for back mounting, including knob and pointer	1.00
2		Angle Brackets drilled	.30
22		Brass Screws	.15
		Rubber covered wire for connections	.15
1		Blueprint of connections	.10
		Complete set of parts No. 1 Panel Detector Set	6.50

Shipping weight, 7 lbs.

Note—The type of bulb and flashlight batteries are left to the choice of purchaser.

Any of the above parts, excepting unmounted grid condenser, may be purchased separately in connection with an order of 50 cents or more.

PARTS FOR No. 2 PANEL DETECTOR SET.

1		Panel highly polished Formica ¼x7½x13 inches, drilled, edges finished	$4.00
1	No. A444	Graphite Potentiometer	1.00
1	No. A7383	Potentiometer Switch Arm	.50
1	No. 5001	Switch Arm	.50
1	No. B1453	Rheostat for mounting	1.00
12	No. 33X	Binding Posts	.96
3	No. M324	Switch Contacts	.12
1		Grid Condenser, not mounted (sold only on orders for complete set of these parts)	
2	No. 126	Potentiometer Clips	.10
28		Brass Screws	.20
		Rubber covered wire for connections	.15
1	No. 68X5	Nickel plated Bracket Tube	.35
1	No. 53X33	Nickel Plated Socket	.30
1	No. 311	Adapter	.40
1		Birch Mahogany Case, beautifully finished and handrubbed	3.00
		Blueprint of connections	.10
		Complete set of parts for No. 2 Panel Detector Set	$11.50

Note—The type of bulb and flashlight batteries are left to the choice of purchaser.

Any of the above parts, excepting unmounted grid condenser, may be purchased separately in connection with an order of 50 cents or more.

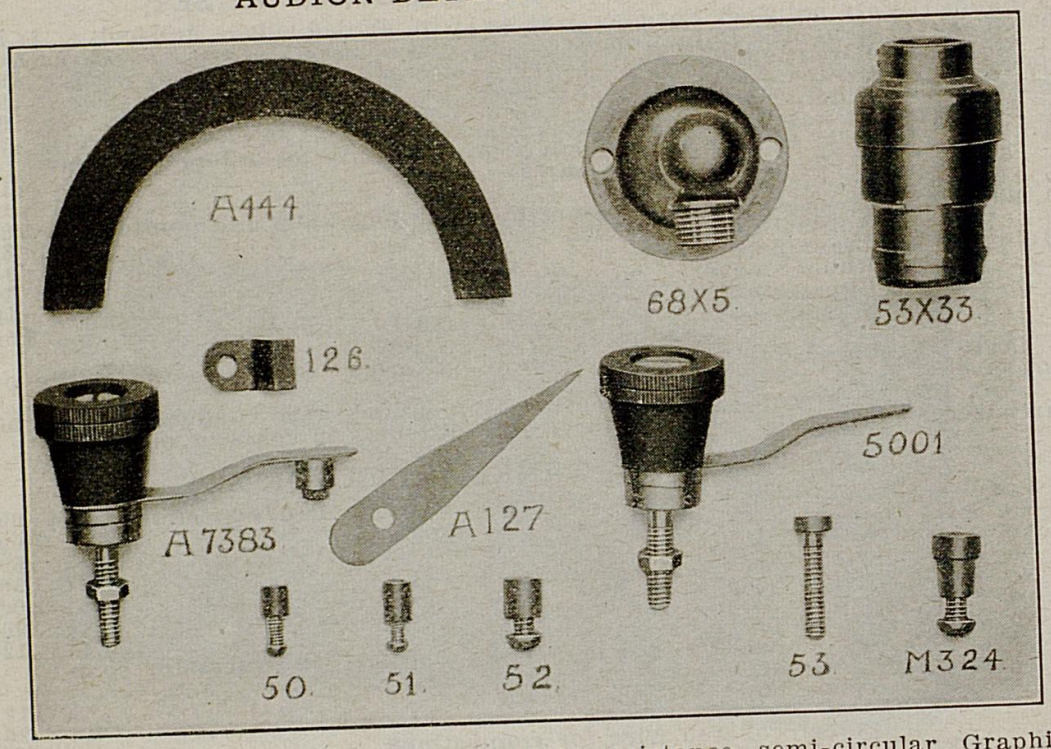
PARTS FOR No. 3 PANEL DETECTOR AND AMPLIFIER SET.

1		Panel highly polished Formica ¼x7½x17⅝ inches, drilled edges finished	$ 7.50
	No. A7349	Amplifying Transformer Coil	9.00
2	No. A444	Graphite Potentiometers	2.00
2	No. A7383	Potentiometer Switch Arms	1.00
2	No. 5001	Switch Arms	1.00
2	No. B1453	Rheostats for back mounting	2.00
24	No. 33X	Binding Posts	1.92
6	No. M324	Switch Contacts	.24
2		Grid Condensers, not mounted (sold only on orders for complete set of these parts)	
4	No. 126	Potentiometer Clips	.20
42		Brass Screws	.35
		Rubber covered wire	.25
2	No. 68X5	Nickel Plated Bracket Tubes	.70
2	No. 53X33	Nickel Plated Sockets	.60
2	No. 311	Adapters	.80
1		Birch Mahogany Case, beautifully finished and hand rubbed	3.00
1		Blue print of connections	.50
		Complete set of parts for No. 3 Panel Detector and Amplifier Set	$26.25

Note—The type of bulb and flashlight batteries are left to the choice of purchaser.

Any of the above parts, excepting unmounted grid condenser, may be purchased separately in connection with an order of 50 cents or more.

AUDION DETECTOR PARTS.



Graphite Potentiometer. This high resistance semi-circular Graphite Potentiometer for the regulation of the high voltage of "B" Battery in all Audion Circuitts gives fractional cell variation, a closer regulation than is obtainable with any switching arrangement. 3 inch diameter, ⅜ inch wide, ¼ inch thick.

No. A444 Graphite Potentiometer $1.00
Postage 4 cents.

Potentiometer Switch Arm. This contact was designed especially for use with graphite potentiometers. The spring brass arm is provided with a genuine hard rubber knob and a special graphite contact that will not wear away the potentiometer sector.

All metal parts are brass, nickel plated and polished; knob hard rubber.

No. A7383 Potentiometer switch arm, knob and contact complete..... $0.50
Postage 4 cents.

Potentiometer Clips. These clips are made of phosphor bronze and are designed to hold the potentiometer and make contact with each end. Nickel plated and polished. Drilled for No. 6 screws.

No. 126 Potentiometer Clips, per pair..... $0.10
Postage 2 cents.

Switch Arm, Knob and mounting complete. Made to match the potentiometer set. Arm is of spring brass. Knob polished hard rubber. We strongly recommend this switch for general use. It is of high grade construction throughout.

No. 5001 Switch Arm, Knob and mounting complete..... $0.50
Postage 4 cents.

Nickel Plated Bracket Tube. Made especially for use with all kinds of Audions. Threaded standard for socket.

No. 68X5 Nickel plated Bracket Tube extends 1 inch, each..... $0.35
Postage 3 cents.

Nickel Plated Candelabra Keyless Socket. Standard threaded for bracket tube. Used to hold the round audion bulbs, or with an adapter, to hold any of the tubular bulbs.

No. 53X33 Candelabra Keyless Socket, nickel plated, each..... $0.30
Postage 3 cents.

Switch Contacts. Nickel plated. (Not sold except with an order of other goods amounting to at least 50 cents.)

No. 50 $\frac{3}{16}$ x $\frac{3}{16}$ Switch contacts taped for No. 2 screws, each..... $0.03
No. 51 $\frac{3}{16}$ x ¼ Switch contacts taped for No. 2 screws, each..... .03

No. 52 ¼x¼ Switch contacts taped for No. 6 screws, each..... .03
No. 53 ¼x⅛ Switch contacts with No. 8 shank ¾ in. long, each..... .03
No. M324 $\frac{5}{16}$x$\frac{5}{32}$ Brass switch contacts with ¼ in. shank ¼ in. long, each .06
Postage extra.

No. M325 $\frac{5}{16}$x$\frac{5}{32}$ Switch contacts, nickel plated, round head, with ¼ in. shank ..... .06

Rheostat Pointer. Phosphor Bronze pointer 1½ in. long drilled for No. 8 screw nickel plated.

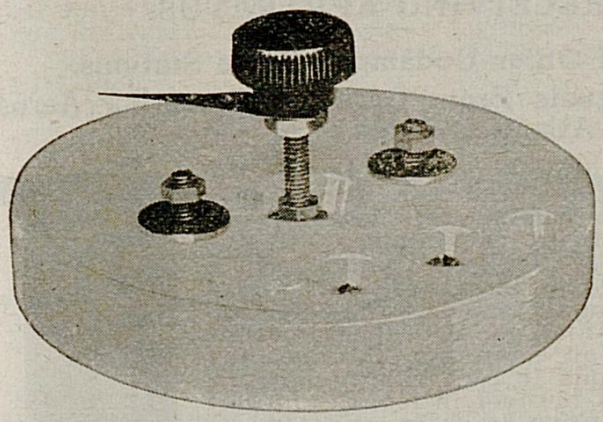
No. A127 Rheostat pointer drilled and nickel plated, each.....$0.05
Postage 2 cents.

Rheostat for mounting on rear of panel. Our popular 11 ohm porcelain base rheostat equipped with back mounting, with No. A127 pointer and No. 810 Electrose Knob and lock nut.

No. B1453 Pheostat, resistance 11 ohms with pointer, knob complete, each $1.00
Shipping Weight, 12 ounces.

No. 19--Rubber covered wire for wiring. 10 ft. coil No. 19 R. C. Wire....$0.20
Shipping weight 1 lb.

BACK MOUNTED RHEOSTAT.



This rheostat is designed for use with home-made Audion panel detector sets. It is used on all our panel detector sets listed in catalog. The construction is the same as No. A453. The resistance element comprises 185 turns of German Silver Wire on a grooved fibre form. The grooved fiber form on these rheostats absolutely prevents the loosening of the wire and the turns coming in contact with one another. This is an exclusive feature with our rheostat. On all other rheostats that have thus far come to our attention the fibre form is not grooved thus permitting of the wires to become loose and to come in contact with one another. Our method of construction absolutely prevents short circuiting of turns and insures the maintenance of the resistance. The element is mounted in a glazed white porcelain base. The clear white quality of porcelain does not show in the cut. The contact arm has a phosphor bronze spring contact insuring smooth easy movement.

No. B1453 11 Ohm Rheostat, complete with knob, lock nut, pointer, bolts, washers and nuts for fastening. Carrying capacity 2 amperes $1.00

Shipping Wt. 12 oz.

TABULAR BULB ADAPTER.

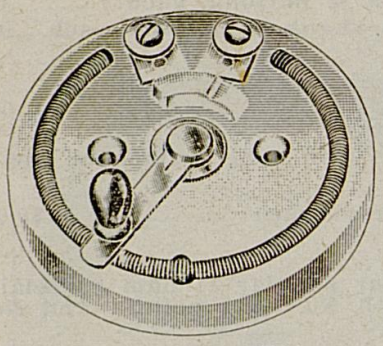


This adapter is of the best possible construction. The back support is of substantial hard brass fitted with a standard candelabra lamp base at the top. Two phosphor bronze spring clips are attached to the support, the clips being of spring phosphor bronze and of the correct shape to firmly hold the bulb in place. The entire adapter is finely nickel-plated.

The adapter previously sold by us, was not of our manufacture, and was made throughout of thin soft brass, with no springy qualities and soon became unfit to hold the bulb.

No. 311 Tubular Bulb Adapter, prepaid..40c

MINIATURE RHEOSTATS



These rheostats are mounted on porcelain bases, with all metal parts heavily nickel-plated and polished. The resistance coil of each of these rheostats has about 185 turns of wire and as the change of resistance is by single turns, very fine adjustment is possible.

Made in 2 resistances, 11 ohms and 2½ ohms.

The 11 ohm rheostat is for use in regulating the filament voltage on audion detectors, speed of small motors, voltage of small lamps, etc.

No. A453 Miniature Rheostat 11 ohms resistance, current capacity 2 amperes.....$0.58

Shipping weight, 12 oz.

The 2½ ohm rheostat is made especially for use in Audion detector circuits. In all circuits it must be used in series with one of our No. A453 Rheostats. This arrangement permits of an exceedingly fine regulation of voltage. All advanced experimenters recognize the necessity of having the fillament at its critical voltage to get maximum results.

No. A354—Miniature Rheostat, 2½ ohms resistance, current capacity 6 amperes $0.56

Diameter of each rheostat 3⅝ inches, ¾ inch thick.

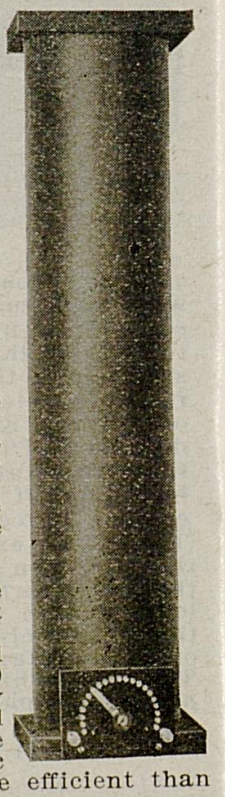
Shipping weight, 12 ounces.

Note—For rheostat for back mounting in making home-made audion detectors, refer to Parts for Audion Detector in index.

UNDAMPED WAVE RECEIVING APPARATUS.

For Receiving From Arc and Other Undamped Wave Stations.

Hear the Flute-Like Wireless Signals From Germany Careering Across the Atlantic.



The use of undamped wave sending apparatus by all the new long distance commercial stations and the exceedingly large number of government stations using this type of apparatus, have created a widespread interest among all live wireless amateurs. These stations practically all operate on a wave length of 6,000 meters or over. To hear these stations to advantage considerable care must be manifested in the selection of your undamped wave apparatus and as well in the other instruments comprising the set. You have but to hear the flute like voice of one of these stations to own this apparatus. With an aerial all the way from 30 to 100 feet in length and but 20 to 40 feet above a dwelling, stations in Ohio and Illinois have been able to pick up the arc stations in Germany. In fact a party living in Chicago easily picks up Sayville and Tuckerton, using the top wire of a barbed wire fence as an aerial. He has also used the lower wire as a ground but the results are not as good as when a better ground is used. The impression prevails among many amateurs that a high and long aerial are necessary to pick up these arc stations, whereas just the reverse is the case. The arc stations in this country may be picked up with almost any kind of an aerial. Stations in the interior of the country should, of course, use first class apparatus and have the aerial as long and high as possible. The apparatus employed and the length and height of the antenna will govern to a very large extent in stations in the interior being able to hear the stations in the foreign countries.

This apparatus is designed to be used with any of the various vacuum detector-oscillators on the market. The best types will be found listed in this catalog.

These inductance loading coils will load any antenna and loose coupler that have a combined wave length of 3,000 meters up to 15,000 meters,—a longer wave length than is now in use. The coils are all wound with white single silk covered wire, on special tubes. It will be observed that we do not use enameled wire. Also that there is no dye, varnish or shellac on the windings. These features alone make these coils more efficient than any other on the market

Hand rubbed mahogany finished ends 6½ inches square cap the 28 inch tube on each end. The winding is covered with black leatherette paper.

The variation of inductance is by means of a 20 point instrument type switch mounted on ¼ inch bakelite, with hard rubber knob and nickel plated binding posts. All connections are soldered.

These inductances are wound with No. 22 Single Silk Wire for loading the primary circuit and with No. 28 Single Silk Wire for loading the secondary circuit and for tuning the wing circut.

When a large loose coupler having a range up to 15,000 meters is used only one inductance coil is necessary,—No. 528, for tuning the wing circuit of the Audion Detector.

We strongly recommend the use of these coils. They are of the best design and are beautifully finished throughout.

No. 528 Inductance coil, 28 in. long; heads 6½ x 6½ in. wound with No. 28 Single Silk Wire for secondary loading coil and for tuning the wing circuit, each $8.75

Shipping weight 10 pounds.

No. 1526 Inductance Coil, 28 in. long; heads 6½ x 6½ in., wound with No. 20 Single Silk Wire for primary loading coil, each.....$8.75

Shipping weight 10 pounds.

No. 1520. Set of three coils, 2 No. 528 and one No. 1526.....$25.00

MICA DIELECTRIC GRID CONDENSER.



This condenser is of exactly the correct capacity for use in series with the grid of the Audion detector in any circuit. A condenser of greater or less capacity is not only undesirable but is prectically useless, simply because the capacity must be exact to intensify to any degree the clearness and audibility of the signals. It is well known and established that mica superior to any other dielectric for condenser purposes.

The condenser is enclosed in a genuine mahogany hand rubbed case ½x2½-inch.

No. 1023 Mica Dielectric Grid Condenser.....$0.60

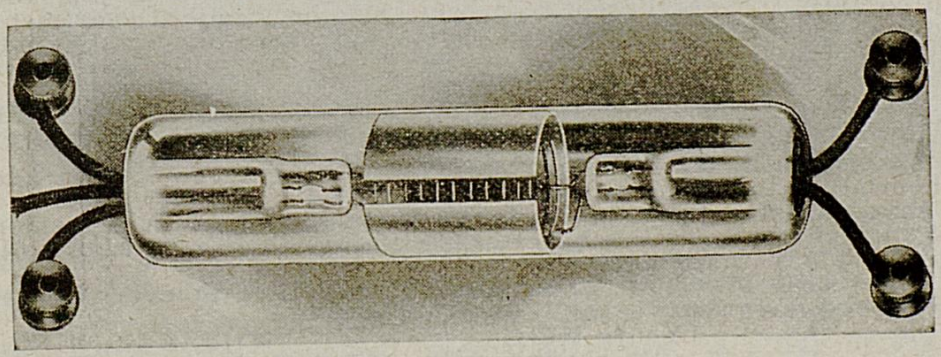
Shipping Weight, 4 ounces.

AUDIO TRON OR ELECTRON AUDIO BULB.

DETECTOR, AMPLIFIER, OSCILLATOR

The Audio Tron and Electron Audio are the latest development in detectors of extreme sensitiveness. Comparative tests within the last six months—not ancient tests which are valueless in view of the rapid development in radio telegraphy—prove that these bulbs are at least 100% more sensitive than any other detector—without exception.

The Audio Tron and Electron Audio are of the pure electron discharge type. They differ from the audion, and other detectors, in that they depend for their sensitiveness and operation on the emission of negative electrons from an incandescent tungsten filament and not on the ionization of a gaseous medium. This electron stream from the hot cathode to the cold plate anode, which acts



as a carrier for the B battery current, is varied by and in accordance with the impressed potential on the spiral grid, thus producing the amplified or relayed signals in the receiver. The plate is in intimate contact with the glass tube, thus assuring a cold anode at all times with resulting maximum efficiency and sensitiveness.

The grid and plate both completely surround the stream line filament, taking maximum advantage of the electron discharge from the filament, which is at the axis of the cylindrical grid and plate, resulting in uniform spacing at all points.

The grid of copper and the plate of aluminum are electropositive to each other and to the wire drawn tungsten filament, thus taking fullest advantage of this feature in the rectifying action.

The life of the AudioTron and Electron are exceptionally long, due to the absence of any loops in the filaments. Lead-in wires at opposite ends of the tube entirely eliminate destruction due to Edison effects.

The use of large grid and plate surfaces allows the use of two to three times the customary filament current with the corresponding increase in electron discharge and resulting in greater efficiency.

The AudioTron and Electron are the most sensitive form of detector, amplifier or oscillator. The one type tube is suitable for all three uses. These tubes have been used and tested for nearly a year on the Pacific Coast in amateur and commercial stations with wonderful results. Readable signals from a distance of 8,000 miles have been received with average sized aerials.

While these detectors are more sensitive than most two or three step amplifiers, they can and have been used as a two step amplifier for extreme distances. Their extreme sensitiveness will never require the use of a three step amplifier.

As an oscillator the detectors are incomparable. Using amplified Armstrong circuits, signals from European stations have been read on the Pacific Coast (over 8,000 miles) even in the day time with average sized aerials.

THE AUDIO TRON OR ELECTRON AUDIO TUBE (DOUBLE FILAMENT), $5.00.

Postage prepaid in the U. S. A. and Canada

All bulbs are carefully tested before shipment, are guaranteed sensitive and to arrive in good condition. When ordering specify whether AudioTron or Electron Audio is desired and whether it is to be used as a detector of spark of damped stations or as an oscillator for undamped wave reception. Damped wave detectors are also amplifiers. Combination tubes can be furnished at no additional cost.

READ WHAT SOME USERS OF THESE BULBS SAY:

Scranton, Pa., 11/19/15.

"I cannot say too much in favor of the AudioTron since the results which it gave were far better than any I have ever been able to secure by the use of an —— bulb. As an example of its sensitiveness and oscillating powers, I will say that by using the bulb alone I can receive OUI (Eilvese) very clearly in daylight. My aerial is only 200 feet long. I can hear a spark station KET (Bolinas, Calif.) between 5 o'clock and 7:30 p. m."

New York, 11/3/15.

"I don't mind telling you that the the AudioTron is the best bulb I have ever used. I tried it out right away and found it much more sensitive than a —— bulb, which I thought was pretty good."

"I am writing to tell you how well pleased we are with the Electron-Audio bulbs recently purchased from you by the Radio Department here.

"Before purchase, we tested these bulbs against other makes and found the Electron-Audio superior in every respect. I can truthfully recommend this bulb as the most efficient on the market.

"Yours truly, "J. GARDNER LEACH,
"Radio Dept., Scott High."

"The Electron-Audio bulbs purchased from you a few weeks ago have proven themselves the most sensitive bulbs that I have ever used.

"We have used the bulbs for undamped wave work, with Armstrong circuits, and they prove to be much better oscillators than a bulb of a different make, which we have used heretofore.

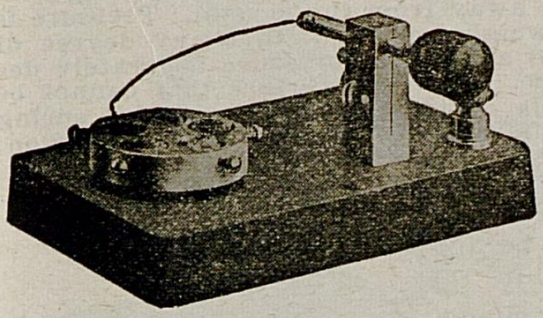
"The Electron-Audio bulb is a thoroly fine article in every respect and I can recommend it unreservedly.

"Yours truly, "WILLIS K. WING,
"In charge of Scott High Radio Station, 8 Z. L."

Seattle, Wn., 11/15/15.

"Your AudioTron has been tested and is the best bulb I have ever used regardless of make or price. The strength of signal from spark stations was from 50% to 150% stronger than on the other bulbs. As an amplifier or as an oscillator it is far ahead of everything else. The stability and strength of oscillation is greater and it operates with a minimum of secondary inductance much lower than other bulbs. Using only one bulb loud day signals were received from WSL, WGG, NAA, NAT, NBA, KHX and many nearer stations. Night signals include POZ and OUI."

TURRET CUP DETECTOR.



A cat whisker detector—low in price—of pleasing design and easily adjusted. The turret cup detector is mounted on a composition base, nickel plated throughout. It is arranged so that five separate crystals can be brought consecutively into service, this feature making it really five detectors mounted on one base, doing away with the inconvenience of switching separate detectors into circuit. Every portion of each crystal can be reached either by rotating the multiple cup or by moving the sliding shaft.

This detector can be furnished with a fixed condenser in base or not, as desired.

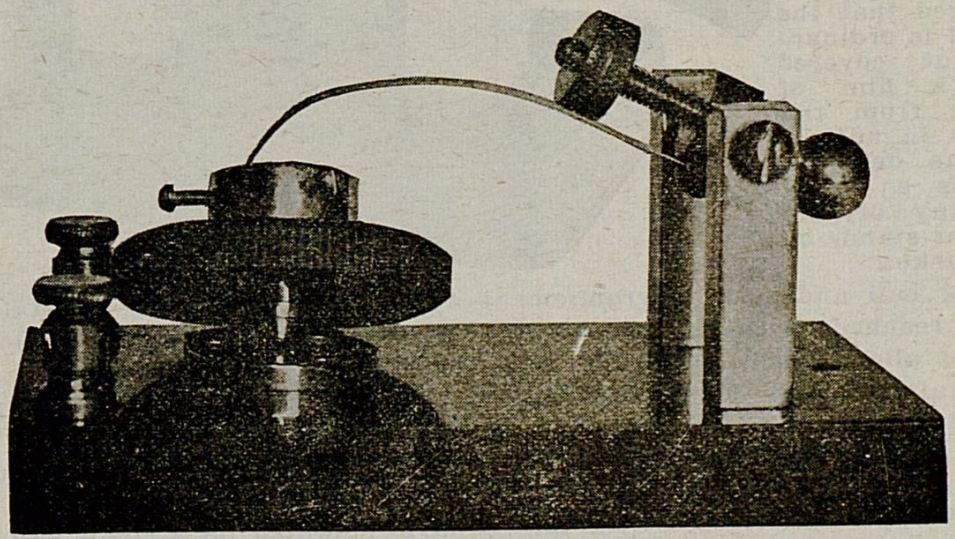
No. A512 Without condenser in base, shipping weight 8 oz..... $1.90

No. A512CC With condenser in base, shipping weight 8 oz..... 2.40

Note.—See raw material section for phosphor bronze wire for Cat Whisker Detectors.

TYPE "G" CAT WHISKER DETECTOR.

Formerly Sold at $5.00. Now only $2.50.



Galena as a sensitive detector mineral is well known among all amateurs. For the best results Galena requires a very light contact made by means of a fine point. The detector shown above is one of the most practical and sensitive detector stands that has ever been put on the market. It is intended for advanced experimenters and commercial work. A study of the half tone will reveal the many exceptionally excellent features of this detector.

The cup is mounted on a hard rubber disk with knurled edges. This disk in turn sits on a ball and socket joint having a universal motion in all directions. The mineral is clamped in the cup by three screws. It can be moved around with greatest ease by means of the knurled rubber disk allowing any portion of the mineral to be brought under the contact spring. The

contact is made by means of a long thin spring shaped to a needle point which is essential for extreme sensitiveness. This spring is mounted on trunions and is counterpoised by the ball weight so that when the moving weight is screwed down the point is raised entirely away from the crystal. Pressure is placed on the contact by screwing the weight outward; thus any degree of tension can be obtained, and the required amount of pressure accurately determined. It will always remain the same. This is a feature that cannot be obtained from any detector which depends on the tension of a coiled spring as the daily temperature changes will affect a spring due to its expansion; but the force of gravity always remains the same.

All metal parts are of brass, heavily nickel plated, mounted on composition base.

The merits of this detector can only be appreciated after a trial

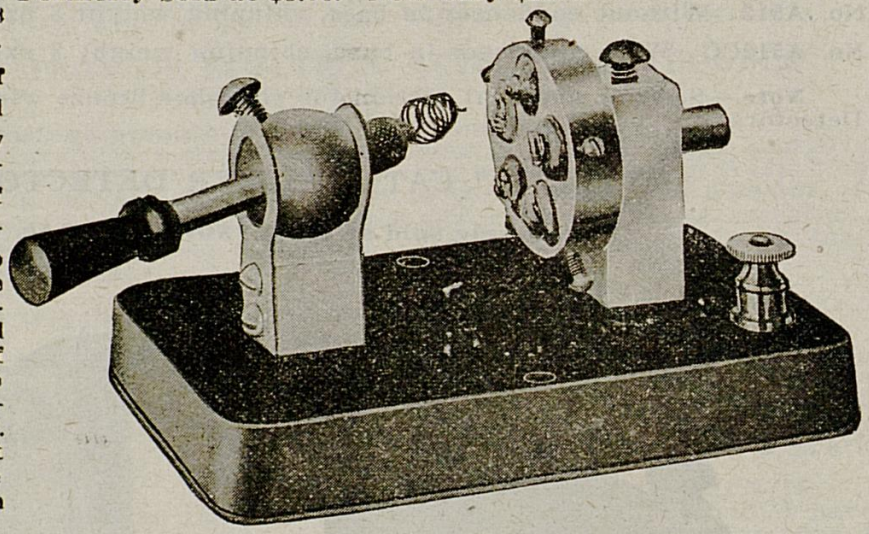
No patented mineral is supplied with it.

No. B670 Type "G" Cat Whisker Detector Stand.....$2.50
Shipping weight, 1 lb.

TYPE "B" UNIVERSAL DETECTOR STAND.

Formerly Sold at $5.00. Now only $2.50.

The Type B Universal Detector stand is of the horizontal type, preferred by many experimenters on account of its ease of manipulation. It is so arranged that the crystal is ordinarily not covered with a film of grease from the fingers in adjusting the detector. This is a defect in many of the detector stands on the market.



The ball and socket arrangement allows any of the six crystals to be readily reached by the contact point. The mounting of the crystals in separate cups allows ready changing of the crystals. This is a distinctive feature not obtained when the crystals are all molded in a single solid cup. The chuck is arranged to hold either a spiral spring or a needle point. We can also supply crystal cups to be screwed on the rod in place of the chuck, in which a mineral can be mounted for double crystal combination.

The Type B Universal Detector Stand is mounted on a composition base. The metal parts are finished in polished nickel. No crystals are furnished with this stand.

No. A862 Type "B" Universal Detector Stand.....$2.50
Shipping weight, 12 oz.

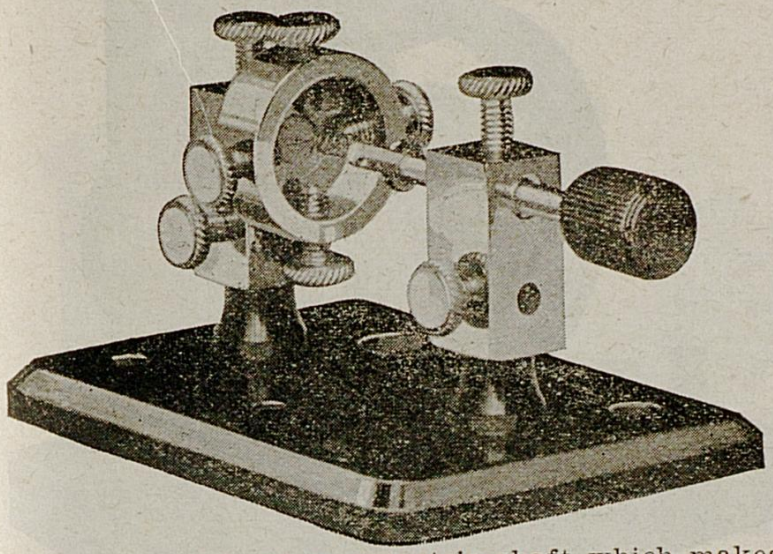
LOW TEMPERATURE ALLOY

Melts below the temperature of boiling water. Used for mounting crystals. High temperatures destroy the sensitiveness of a mineral or crystal.

No. A1999 Low Temperature Alloy, per ounce.....$0.45

No. A6325 Mineral Set, per set (two zincite, one bornite and one copper pyrite) .(Postage 2c).....50

OUR No. 1915 DETECTOR STAND.

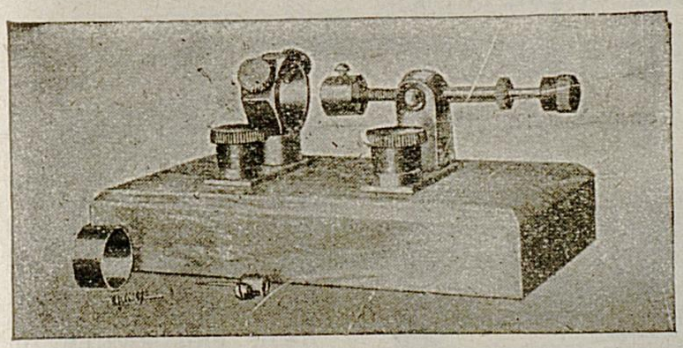


Oue No. 1915 Detector is one of the neatest and most serviceable detectors we have ever sold.

The standards of one-half inch metal, heavily nickel-plated,are mounted on a hard rubber composition base. The crystal cup is equipped with four set screws for holding the crystal in place. The cup is adjustable and revolves on a plain shank which extends through its supporting standard. A set screw is provided at the top of the standard to hold the cup and shank rigid when adjustment is obtained. The contact for the crystal is a fine phosphor bronze spring mounted on an eccentric shaft which makes possible positive contact with any portion of the crystal. The shaft which holds the contact springs is adjustable and extends through a hole in one standard. The shaft is fitted with a knurled hard rubber knob. The shaft is easily made rigid after adjustment is obtained by means of the set screw on the top of its standard. Holes, with set screws, are provided at the bottom of the standards for connecting lead wires to detector. All the metal parts are heavily nickel-plated.

No. 1915. Detector Stand.....$1.50. Shipping weight, 9 oz.

NEW UNIVERSAL FERRON DETECTOR.



The Ferron Detector is so well known among experimenters that extended comment on its merits is unnecessary. It has been listed in our catalog for five years. This crystal is one of the most sensitive yet discovered for the reception of wireless signals. The instrument is sold **with** and **without** the Ferron crystal. The crystals are carefully tested for sensitiveness. Any crystal may, with fusible alloy, listed elsewhere herein, be mounted in the cup. All parts of the metal in the cup may be reached by the contact point which is held by a ball and socket joint, providing a neat and convenient means of adjustment. Suitable pressure is given by a fine coiled spring, the tension of which may be varied by sliding the sleeve in and out of the ball. The base is of beautiful Holland Blue marble 3 x 5½ in., giving great stability. All metal parts are brass, nickel plated.

No. A150 Universal Detector Stand, complete with all parts shown in the illustration $3.25

Additional stationary cups to fit holder, each..... .15
Fusible metal, per ounce ..... .30

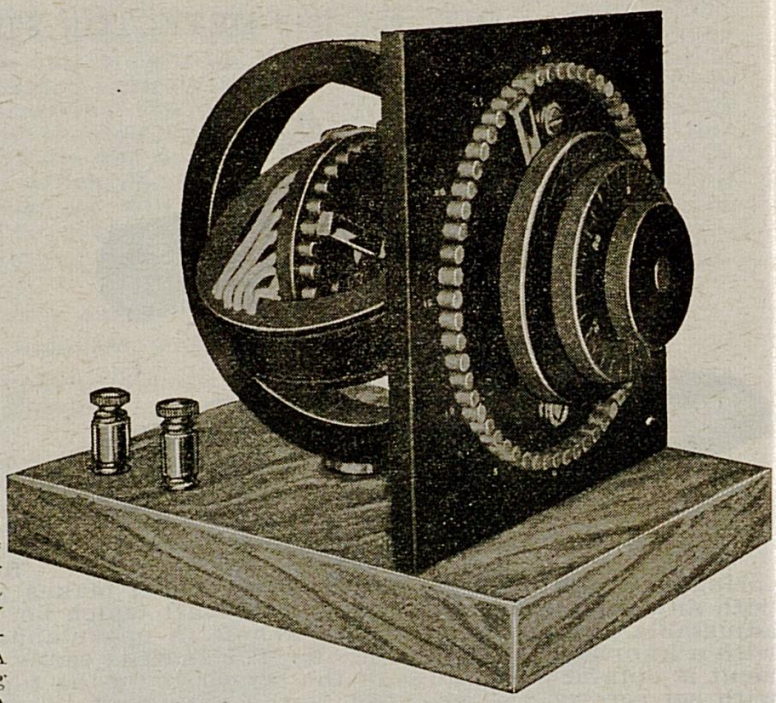
Shipping weight, 3 lbs.

No. A6054 "Universal" Type Ferron Detector, complete with Ferron Crystal $5.00

Shipping weight, 3 lbs.

Type D Receiving Transformer De Luxe

Improved Type



The materials in this receiving transformer are the finest that the markets supply, genuine hard rubber, marble base, metal parts of brass heavily nickeled and double silk covered wire.

Primary and secondary coils are wound in slotted hard rubber concentric rings rotating one within the other to vary the coupling. The inductance of the primary is varied by a sixty point rotary switch of the edgewise instrument type. A similar switch having thirty points varies the inductance of the secondary with a movement of remarkable smoothness.

With an antenna of normal proportions the tuner will respond to all wave lengths between 200 and 2000 meters.

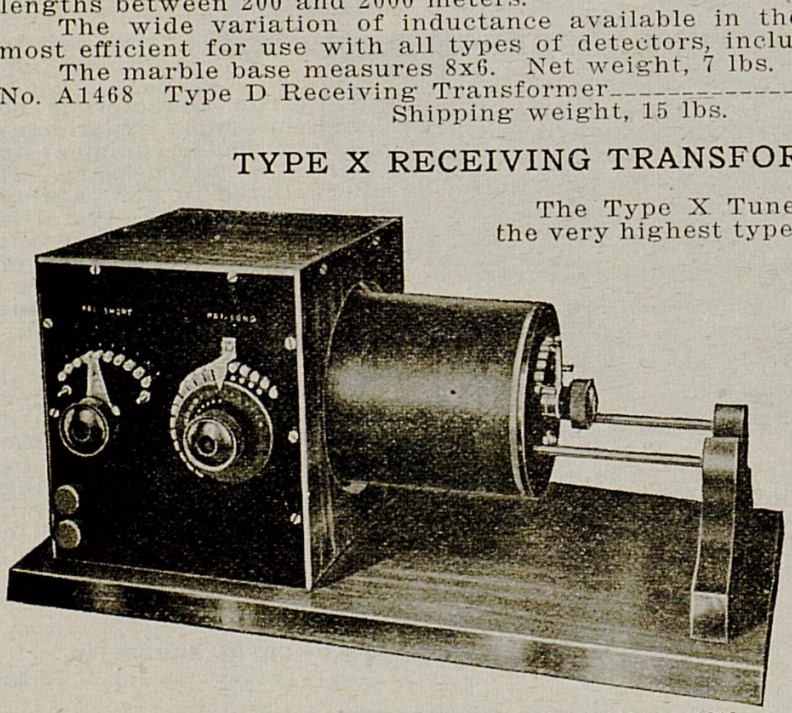
The wide variation of inductance available in the secondary renders it most efficient for use with all types of detectors, including the Audion.

The marble base measures 8x6. Net weight, 7 lbs.

No. A1468 Type D Receiving Transformer.....**$25.00**

Shipping weight, 15 lbs.

TYPE X RECEIVING TRANSFORMER.

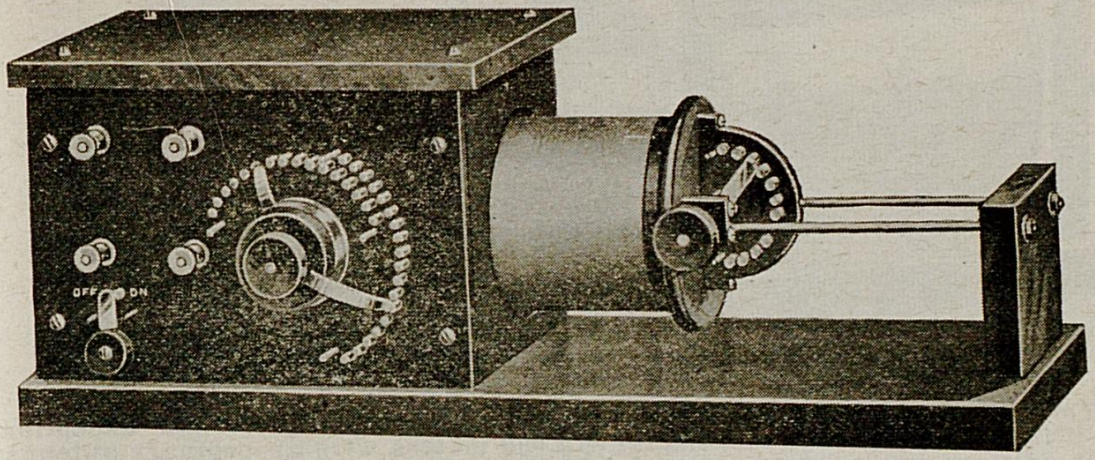


Cut Shows Old Type, Improved Type Ready About May 1, 1919.

The Type X Tuner is an instrument of the very highest type. Standard practice in design is followed in its construction, but with a degree of attention to detail and finish not met with in other instruments of this kind. The most unusual feature is the dead end switch on the primary which divides the primary into small groups of a few turns each and only connects into circuit such number of groups as are required. The first group is still further divided by the 10-point plain switch for close adjustment. The Tuner is constructed of highly finished mahogany with a bakelite panel front. The secondary is provided with a 10-point switch for adjustment. This Tuner will respond to wave lengths up to 3000 meters with an average amateur antenna and, on account of the dead end switch above referred to, is also very efficient on the shorter waves in common use. This is an exceptional instrument of entirely new design and we recommend it to those discriminating purchasers who desire the very best in a tuner of this type.

Cat. No. W773. Type X Tuner, shipping weight, 12 pounds.....**$25.00**

NAVY TYPE RECEIVING TRANSFORMER.



This instrument is the height of perfection in receiving transformers. Its many excellent points can be seen from the following description:

The face of the cabinet is of hard rubber upon which are mounted the primary and secondary binding posts, the compound primary switch and the low wave length switch. The primary and secondary inductances are wound on laminated non-shrinkable tubes specially treated with a moisture-proof compound. The interpolating system of primary winding insures positive contact and prevents short circuiting of turns, thus increasing the efficiency of this instrument 100 per cent. over those of other designs. All metal surfaces are **triple silver** plated, thus furnishing the highest possible conductive path for the weak impulses.

The primary is wound with green double silk insulated wire and is split up into two sections, the sections being connected by the small low wave length switch on the Hard Rubber face. With the switch placed on the point marked Off, waves up to 1,000 meters in length can be received; with the switch placed on the point marked On, waves up to 4,000 meters can be received. This method of tuning eliminates to a great extent the dead end effect so prominent in other receiving transformers.

The secondary is wound with green silk insulated wire on a non-shrinkable tube of special design. The secondary inductance is varied by means of a 12-point rubber encased switch of special design. Direct leads are brought from the secondary coil terminals to the binding posts on the face of the cabinet, thus making positive connection direct to the balance of receiving instruments. No sliding contacts are used.

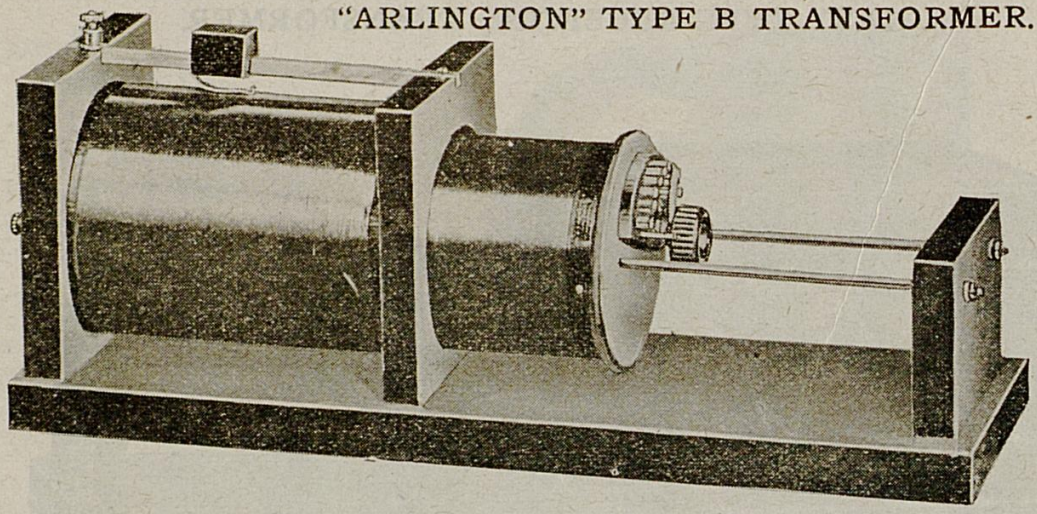
The ratio of inductance in this transformer permits of very selective tuning. It reduces interference to a negligible quantity.

All wooden parts are mahogany finished, thus giving to the instruments a strictly high class appearance.

Size of base, 18½ inches by 6¼ inches, height 7 inches.

Model 5AA Navy Type Receiving Transformer (former price $23.00)____**$19.75**

"ARLINGTON" TYPE B TRANSFORMER.



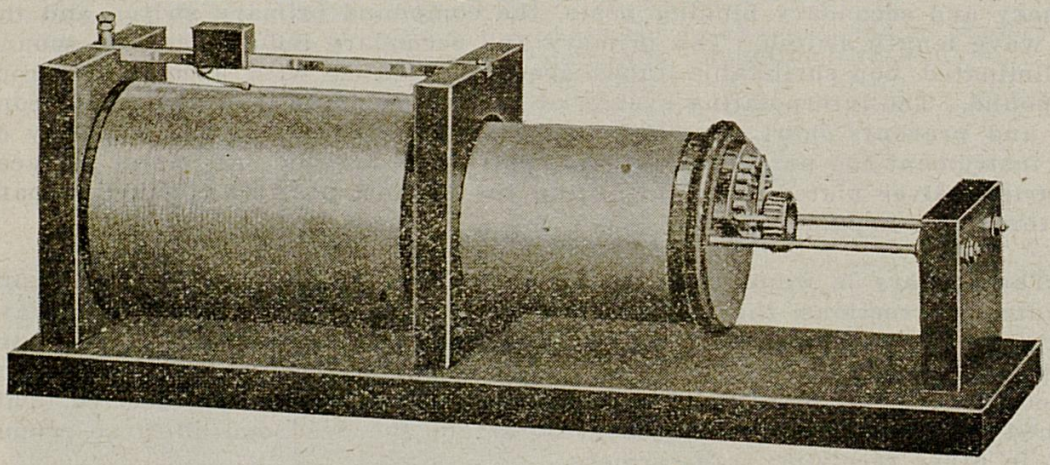
This transformer is exactly like the "Arlington" transformer excepting that it is wound for wave lengths up to 3,000 meters with an ordinary antenna, is not quite so large, and is wound with enameled wire. All other constructional features are identically the same. It will respond exceptionally clear to Key West, Arlington and Sayville. This transformer is a big value.

Size of base, 16½ inches by 5¼ inches.

No. A1092 "Arlington" Type B Transformer.....$7.85

Shipping weight, 10 lbs.

"ARLINGTON" RECEIVING TRANSFORMER.



Our "Arlington" Receiving Transformer has been brought out to meet the growing demand for a first class receiving transformer for tuning in with the big wireless stations,—Key West, Arlington, and Sayville,—without a loading coil. This transformer has the same wave length as our Navy, and with the wave length in the antenna, will tune in with stations using wave lengths up to about 4,000 meters.

The windings of both primary and secondary are of silk covered wire. The primary slider operates with the greatest ease and is so constructed that it permits of contact with a single turn. On account of the exceptionally loose coupling available, two primary sliders are unnecessary with this instrument.

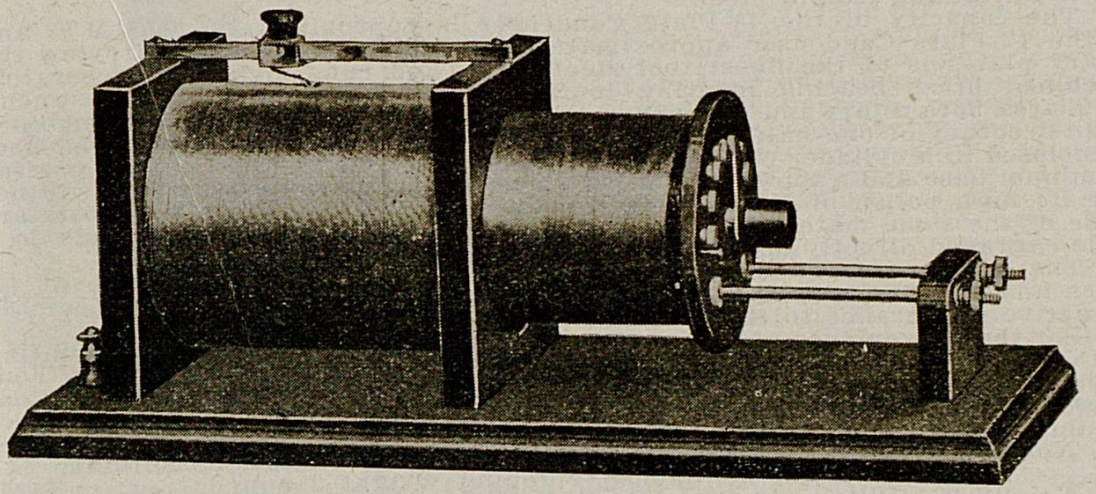
The secondary inductance is varied by a 10-point switch, mounted on a polished insulating block, from which the current is carried, by stranded conductors, to the binding posts on left-hand primary support. There are no loose contacts against carrier rods to become corroded and thereby decrease its efficiency.

The transformer is handsomely finished in mahogany and lacquered brass. Size of base, 18½ inches by 6 inches.

No. A1091 Arlington Receiving Transformer.....$9.00

Shipping weight, 12 lbs.

No. A7721 RECEIVING TRANSFORMER.



No. A 7721.

(See testimonials on pages 49-56.)

This instrument has earned the enthusiastic praise of experimenters by its splendid appearance and its excellent service in hundreds of stations throughout the country. The primary winding is bare copper wire wound on a non-shrinking tube four inches in diameter. The secondary winding is green silk covered wire. The coupling is varied by movements of the secondary on two horizontal rods. The primary variation is by means of a smooth working slider and the secondary variation secured by an eightpoint switch, thus making it possible to secure a much finer adjustment than is possible with many receiving transformers. It will tune to approximately 1500 to 1800 meters with a good aerial without a loading coil.

The woodwork is finished in dark mahogany, highly polished. All metal fittings are brass, polished and lacquered. The adustment knobs are hard rubber composition.

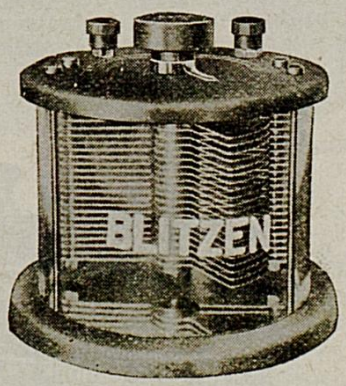
This transformer has always heretofore sold for $9.00. With this substantial reduction in price we have no doubt that it will meet with popular approval.

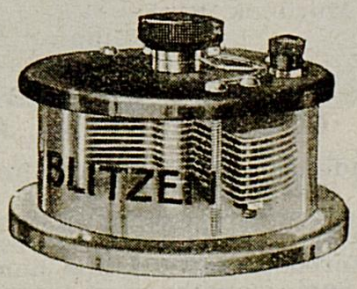
Size of base, 6x15x¾ inches. Weight of instrument, 4 lbs.

No. A7721 Receiving Transformer ---------- $6.00

Shipping weight, 10 lbs.

THE NEW BLITZEN ROTARY VARIABLE CONDENSER.





Don't chase the small amount of energy in a weak signal away from your tuner, telephones and detector with a Condenser that leaks and is otherwise inefficient.

Fifty of these Condensers were recently sold to the United States Navy Department. Uncle Sam does not buy poor instruments for his battleships, and the purchase of these Condensers by him is in itself a testimonial to their high excellence.

These Condensers are made in two sizes having 43 and 17 plates, respectively, accurately punched with hardened dies. Beware of condensers with plates containing iron or steel.

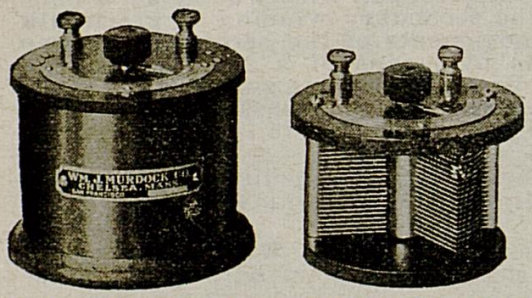
The capacity of the 43-Plate Condenser is approximately .0008 M.F. and of the 17-Plate Condenser approximately .0003 M.F. The shaft carrying the rotary plates is of the finest tool steel made, and runs in a long, accurately machined brass bearing insuring long life and permanency of adjustment. All plates, both rotary and stationary, are spaced with brass separators machined to an accuracy of one-half of one thousandth of an inch. The entire Condenser is enclosed in a cylinder of the clearest and toughest flint glass with a pressed aluminum base and a top of special moulded insulating material which will not lose its high polish or its soft black color. The knob and binding posts are made of the same material as the top, while the aluminum pointer reads on a scale engraved directly on the top.

The glass case renders the mechanism of the Condenser visible at all times and the fine workmanship thus exposed to view lends an exceedingly attractive appearance to the instrument.

For the convenience of those wishing to purchase Condensers for mounting in their own cabinets or sets we are now supplying this Condenser without glass case or bottom, but otherwise complete, and when so supplied the Condenser will fit in a round hole 3 5/16 inches in diameter and requires a space 2½ inches deep.

Cat. No. W735. Blitzen 43-Plate Condenser, 4¼ inches across base, total height 3¾ inches, shipping weight 2 pounds..... $4.50
Cat. No. W736. Blitzen 43-Plate Condenser without glass case or base.. 4.00
Cat. No. W774. Blitzen 17-Plate Condenser, 4¼ inches across base, total height 2⅝ inches, shipping weight 2 pounds..... 3.50
Cat. No. W775. Blitzen 17-Plate Condenser without glass case or base, shipping weight 2 pounds..... 3.00

MURDOCK VARIABLE CONDENSER NO. A366.



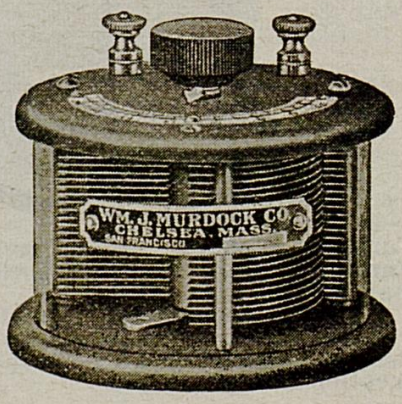
This condenser has been brought out to meet the demand for an efficient, low priced, high class condenser for amateur use. It goes without saying that both with regard to material, workmanship and performance, it will measure up to a standard that cannot be excelled for the price.

In manufacturing this condenser, attractiveness in appearance was not overlooked in the studied efforts for singular efficiency. A glance at the cut reveals its attractive appearance; **a trial only can demonstrate its all around efficiency and merit.**

As indicated in the illustration, the condenser proper is built up of semi-circular metal vanes, 43 in number, 21 movable and 22 stationary. The total capacity is .001 mfd. The condenser proper is attached to a circular black polished hard rubber composition top, provided with 180 degree scale, knurled knob handle, arrow indicator, and nickeled binding posts. The container is a one-piece black polished hard rubber composition cylinder, provided with screw holes in the base extension for attaching to the operating table or to a panel. The cylindrical casing is oil-tight and the use of a good grade of insulating oil will increase the maximum capacity to .005 mfd.

No. A366 Murdock Rotary Variable Condenser.....$4.50
No. B366 Murdock Rotary Variable Condenser, interior only..... 3.75
Shipping Weight. 2 lbs.

ROTARY VARIABLE CONDENSER No. A367.



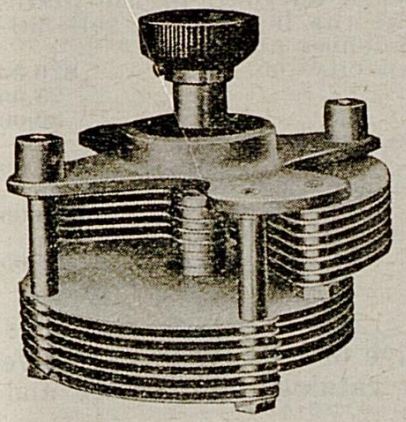
This condenser is precisely the same as our No. 366 in essentials. It differs merely in the case . Some prefer a condenser which shows the movements of the interior parts and this instrument is offered to satisfy this demand.

Detail: Same construction interior as No. 366, described above. Capacity .001 mfd.; case transparent exposing interior working of condenser. Size, 4 inches diameter; 3¾ inches high.

PRICE.

No. A367 Rotary Variable Condenser.....$4.50
Shipping weight, 2 lbs.

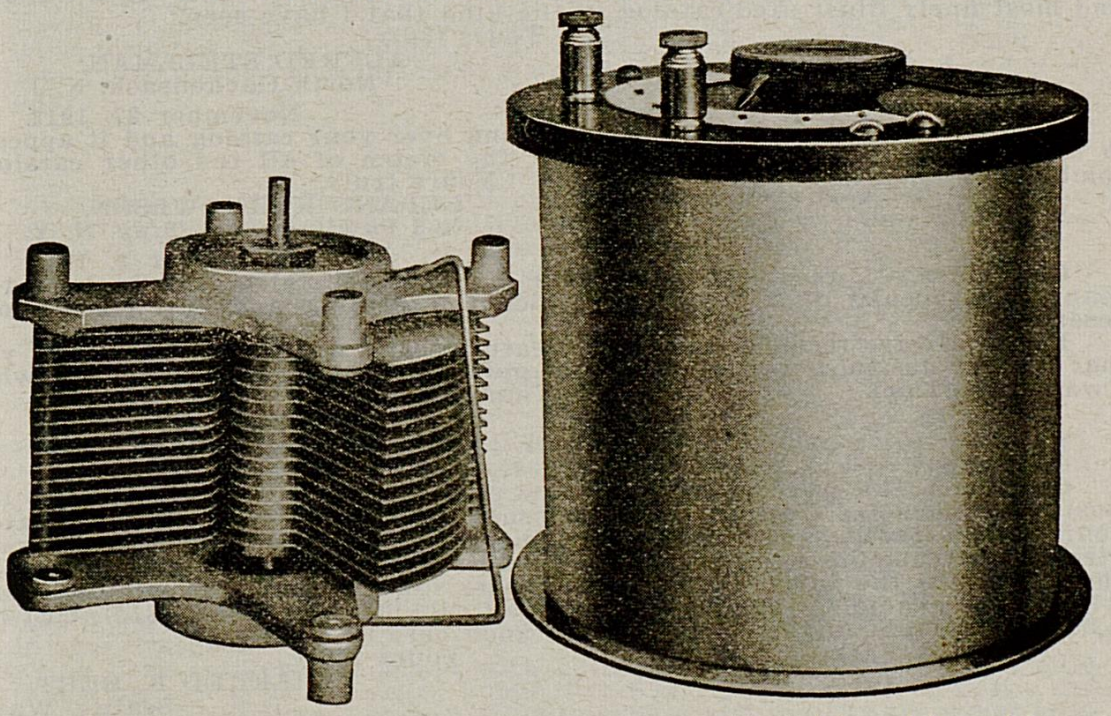
BALANCED TYPE CONDENSER.



The purchaser of a variable air capacity will find in this type a quality far above the usual. The plates are .022 thick aluminum, or about twice the thickness of such material commonly employed in small condensers, giving much greater ruggedness and decreasing the liability of short circuit. The plate assembly is made on a heavy aluminum casting with bakelite bushing, preventing loss of adjustment and changes in capacity. It is assembled with two cast bosses on the aluminum casting for mounting on the back of panels, where desired, and requires the drilling of three holes only. As it is balanced, it may be used in any position or angle, this result being accomplished by arranging one-half of the rotary plates on each side of the revolving shaft and placing the stationary plates to correspond as is plainly shown in the illustration, eliminating all counterweights or similar expedients. The maximum and minimum capacities are approximately .0006 M. F. and .00005 respectively, these capacities being derived from 14 stationary and 12 rotary plates having radii of 1½" and 1¼" respectively. Owing to the aluminum construction, the net weight of the condenser is only seven ounces.

No. W800 Balanced Variable Air Condenser, without case **$6.00**
No. W801 Same as 800 but maximum capacity .001 M. F. **8.00**
Shipping weight, one pound.

LARGE SIZE VARIABLE AIR CONDENSERS



Either condenser will be furnished in an oak cabinet 4 in x 4 in. x 4 in. with bakelite top, engraved scale and pointer, fitted with binding posts, at an additional cost of **$4.00.**

This type of variable air capacity, illustrated above, is very similar to our small balanced type in general construction, but has rigid aluminum castings carrying hard rubber bushings for both top and bottom bearings. The spacing of the plates is greater, being .048 in., and the plates themselves are stamped from .032 in. thick aluminum. The rotary plates are assembled on a shaft of highest grade tool steel running in accurately machined brass bearings. Mounting is in a nickel plated liquid tight brass cylinder with bakelite top, and the pointer indicates on a scale having a white ground with black divisions and numerals from 0 to 180 in divisions of 2 degrees and is very legible. The condenser case may be filled with liquids having a higher specific inductive

capacity than air, if desired. This condenser is also supplied without case for mounting on panels or in cabinets, in which case one-half of the plates are mounted on opposite sides of the shaft to make the instrument self-balancing, as shown in the illustration of the small condenser above.

No. W699	Condenser in metal case, maximum capacity .001	$20.00
No. W700	Same as 699 .002 M. F.	25.00
No. W701	Same as 699 .003 M. F.	30.00
No. W699A	Unmounted, balanced condenser, same construction as 699 .001 M. F.	15.00
No. W700A	Unmounted, balanced condenser, same construction as 700 .002 M. F.	19.00
No. W701A	Unmounted, balanced condenser, same construction as 701 .003 M. F.	24.00

The following letters have been picked at random from our files during the past few years. They are representative of hundreds we receive during the course of a year. They refer to our catalog, our service and our goods.

About Our Catalog

December 3, 1912.

Gentlemen:—Received your new, up-to-date catalog last week and am very much leased with same. It certainly is complete.

About those cheap 1,000 mile receiving sets—well, I second the motion you have made.

Yours truly,
LOUIS O. RICHWIEN,
2014 W. Pratt St., Baltimore, Md.

February 17, 1914.

Gentlemen:—Received your catalog and thank you for same. It is the best and most finely illustrated catalog of the kind that I have seen.

Yours truly,
ALFRED STELLMAN,
North Hackensack, N. J.

November 27, 1912.

Gentlemen:—I have just finished looking over your catalog and it appears to me that you have incorporated in it the cream of all the other catalogs combined.

Yours truly,
LELAND K. KNOWLSON,
466 Pawling Ave., Troy, N. Y.

December 8, 1914.

Gentlemen:—I received today your handsome catalog. It is indeed a beauty and speaks of a prosperity which fair dealing and first class goods deserve.

I have always received such fair treatment and such good value from you that I never do and never will think of going elsewhere when I can get what I want from Duck.

Yours truly,
EUGENE C. ROUSE,
1001 C St., Lincoln, Nebraska.

July 18, 1914.

Gentlemen:—A word about your new catalog. In my estimation it is the most comprehensive electrical catalog issued by any firm in the United States. Your wireless section especially, contains the finest selection of high-grade wireless instruments ever assembled between the covers of a single catalog. The prices are the same, (and in some cases lower) than the manufacturers' prices. For example: your No. 26X04 2-cell tubular flash light, (81c), cost me $1.50 when bought of the —— factory branch here in Seattle.

Yours truly,
WILFRED K. BERT,
Seattle, Wash.

Our Service

March 23, 1913.

Gentlemen:—On March 11, 1913 I sent a P. O. money order to you for a "Jove Wireless Key" and on Saturday, March 15, 1913, I received the same by Parcel Post. I wish to take this opportunity to extend to you my thanks for your promptness and wish to state further, that anything that I may want in the near future will be bought from your house. I sent to a New York House for a 2-inch spark coil and also a pair of wireless phones, that was on March 2nd, 1913, and as yet, I have not received either one of the articles. Thinking that New York was closer than Ohio, I thought that I would be able to get the things that I wanted much sooner.

Yours very truly,
F. H. SIGNOR,
Washington, D. C.

Feb. 21, 1914.

Gentlemen:—I wish to thank you for the prompt attention accorded my order of February 16th. Apparatus was received and installed within forty-eight hours from time order was mailed.

Yours truly,
B. D. FELLOWS,
Care W. U. Tele. Co., Pontiac, Mich.

July 17, 1915.

Gentlemen:—I wish to say that I am very much pleased in the way that you do business, I received my goods from you about three days after ordering same. At the same time I sent you an order I also sent a small one to a firm in New Jersey and—WELL?? I was a month and one day getting same.

Yours truly,
C. I. WAYS,
Cumberland, Md.

Letters Like This Have But One Meaning

March 13, 1915.

Gentlemen:—Your letter concerning my order received. The fellows here have a very high opinion of your stock. Whenever a fellow asks another one whether such and such a thing is any good or not the reply is "Well, old man, Duck handles it and you know what that means" or else he says "Well, old man, you don't see Duck handle it do you? You'd better leave it alone," and so the question is settled then and there.

Yours truly,
ALLEN E. ALGER,
214 Arizona Ave., Lorain, Ohio.

Highly Eulogistic

February 28, 1913.

Gentlemen:—I am writing you this, to tell you how well pleased I am with all the goods I have purchased from you. Everything in your catalog is just as it is represented. If I wanted to buy a gold brick, and Wm. B. Duck Co. sold them and said they were all right I would buy them. Please find order on other page.

Yours truly,
W. J. CLARKE, JR.,
Rittman, Ohio.

December, 9, 1913.

Gentlemen:—Kindly send me your catalog. Your firm is very popular in this community and has a good reputation and I have been recommended to you by a friend who finds satisfaction in your goods.

Yours truly,
PARKER LYTTE,
South 13th St., Indiana, Va.

Our Model 5AA Receiving Transformer

July 24, 1915.

Gentlemen:—I received the No. 5A Receiving Transformer two days ago. It beats anything I ever had for sharp tuning, and I have had eleven different types of Loose Couplers.

Yours truly,
HAROLD McCULLOUGH,
262 Main St., Petaluma, Calif.

August 27, 1915.

Gentlemen:—I want to thank you for the prompt shipment of the Model 5AA Navy Type Receiving Transformer, and can assure you that it is absolutely O. K. in every respect.

Having been actively connected with both amateur and commercial Radio Telegraphy for nearly seven years I feel that I am in a position to judge the merits of a Radio instrument and am able to assure you that I have never seen a more attractive looking nor have worked a more efficient "loose-Coupler" in all my experience than this one of your manufacture.

I remain, Yours truly,
GEOFFREY V. AZOY,
215—11th Ave., Belmar, N. J.

January 29, 1915.

Gentlemen:—In answer to your letter of the 27th I wish to tell you I have received perfect results with the Navy Type Tuner. Talk about long distance without an antenna. I got Arlington and WAW also NAR quite good with my phones 8 inches away from my ears, using galena detector. That's going some don't you think so?

Yours truly,
J. MILLARD ROACH,

August 14, 1915.

Gentlemen:—It may interest you to know of the results I am obtaining with that Model 5AA Tuner I just received. I have been using a Fessenden receiving set with what I called good results. In the 8 to 12 watch last night I hooked up the Model 5A with a carborundum detector, fixed condenser and 4,000 ohm head set.

Were you ever in a position where you could not express yourself with words? Well that's just the position I'm in now. I no more than got it hooked in when I heard NAR sign up. In less than three seconds NAA fired back with a screech. He actually came in so loud that I had to tune him out some in order to make his signals readable. I shifted my tuner back to the 600 meter stations and to my surprise the noise I heard sounded like a flock of bumble bees except many times louder. I'll venture to say that twenty stations were working at once. I heard everything from Morro Castle way down in the Indies to Boston. I heard ships far off the Atlantic Coast. In one instance I heard a United Fruit boat off the coast of Georgia talking with Savannah.

I have been doing commercial work for five years and in all my career I have never seen a combination of instruments that equals this. In spite of their being so much interference I could pick out without any trouble the station desired. The close tuning obtainable with this transformer is nothing short of remarkable.

Yours truly,
J. B. DOW,
Chief Elec. Radio O. N. M., Erie, Pa.

September 25, 1915.

Gentlemen:—A short time ago Mr. Chappell received a letter asking for testimonial of the efficiency of the Model 5A Transformer. Though ours had to be repaired by us after being received (it was slightly injured in transit) it is the most thoroughly efficient transformer we have yet used and is not a copy of the transformer manufactured by ————————.

Very truly yours,
A. E. BURNETT,
RALPH R. CHAPPELL.
Richmond, Va.

The Flexible Transformer

Gentlemen:—About a year ago I purchased a 1 K. W. 20,000 volts secondary transformer from you and think that you should know of the good work I am doing with it.

I am able to transmit quite a distance with this transformer, I carry on communication with a fellow in Wapakoneta, Ohio, 475 miles distance and have been heard in Omaha, Nebraska, 550 miles, and received a letter from a party in Superior, Wisc., a few days ago telling me that I come in better than stations of the same power 300 miles closer to him. He is 825 miles from me.

Your very truly,
T. J. M. DALY,
1001 Falls Bldg., Memphis, Tenn.

Gentlemen:—The "T2" Flexible Transformer I got of you last winter is certainly there with both feet when it comes to efficiency. I worked with the University of North Dakota last winter on 50 watts input a distance of 85 miles. Not once nor twice but regular day after day work and that with a makeshift aerial of 75 feet high at one end, 15 at the other and 73 feet long.

Yours truly,
EARL C. REINEKE,
No. 3 Wellington Fargon, N. D.

May 5, 1915.

Gentlemen:—In regard to the Flexible Transformer (1 K.W.), I beg to advise that it is a peach. Have never broken my record in sending although I was heard in Kansas City, Mo., a distance of (312 miles). I can talk to a friend who lives about forty miles from here at any time of the day while using transformer with shunt closed. He also uses a Flexible (1 K.W.) There is another boy living in forty miles from here, who is using a ½ K.W. transformer of a well known make. It is impossible for me to get him.

Yours truly,
MR. CHAS. C. MEDLEN,
114 East Third St., Okmulgee, Okla.

Gentlemen:—I always send to Duck's if I want **good stuff** and want it **on time.**

Yours truly,
FRANCIS BLEWER,
Newark Valley, N. Y.

Our Step-Down Transformers When Used With Spark Coils

July 3, 1915.

Gentlemen:—We are operating one of your 3-inch spark coils on a 120-watt stepdown transformer and have been getting very excellent results. We are plainly heard at Fort Wayne, Indiana, during the day time this summer. This is not "freak" work, but a regular occurrence. Considering the size of the outfit and the amount of current used the results are fine indeed, the distance being close to sixty miles in a direct line. Very respectfully yours.

CHAS. CANDLER,
St. Marys, Ohio.

February 17, 1913.

Gentlemen:—A short time ago I purchased one of your step-down transformers and must say that it is a peach. I have used it in connection with a one inch spark coil and obtained almost a half inch more spark than the coil is rated at. It was operated on 10 volts. Friends say that they hear me almost as loud as they do my ¼ K.W. transformer.

Yours truly,
ARTHUR HAMEL,
29 Martin St., Amherst, Ohio.

The Unquestioned High Quality of Our Spark Coils

December 8, 1914.

Gentlemen:—I am ashamed that I have not written to you before. I am sure I cannot praise your goods enough. I received the one-inch coil and the boys that have wireless sets around here say they have to take off their receivers because I come in so loud. I also received your new catalog and am proud of it.

A boy friend of mine saw my things which I purchased from you and he purchased a receiving and sending set from you that cannot be beat.

You may be sure to always keep me as one of your customers.

Yours truly,
HAROLD PEASE,
1114—9th St., Lorain, Ohio.

Gentlemen:—I am using one of your one-inch coils and it is a dandy. I can transmit about 16 miles with it at night.

Yours truly,
DONALD MELTON,
1688 Middlesex St., Lowell, Mass.

Gentlemen:—The two-inch spark coil is some dandy. I can get a four-inch spark from it. That's what I call very good. You may expect another order in the near future.

Yours truly,
S. B. SVENUNGSEN,
3944 Montrose Blvd., Chicago, Ill.

Gentlemen:—I wish to express my satisfaction with the one-inch coil I bought of you sometime ago. I have received as high as a two-inch and a quarter spark with six new dry cell batteries on it. It is as good as new and has a fine tone. I can highly recommend it to any of your customers.

Yours very truly,
WILLIAM EVERETT ROBBINS, JR.,
614—5th Ave., Upper Troy, N. Y.

August 1, 1913.

Gentlemen:—The goods you sent were received in good condition and I cannot help but write you and tell you how satisfied I am with them. The two-inch spark coil is certainly rated too low when it is called a two-inch because I can get a two-inch spark with just three batteries and with the rated number of batteries I get a full hot spark over three inches long.

Wishing you success, I remain,

Yours truly,
OSCAR E. PIERSON,
Williams Bay, Wisc.

Our Arlington Transformer

Gentlemen:—Have received your Arlington Receiving Transformer and I am very much pleased with it. Have received Arlington (NAA) and Sayville (WSL) and receive Springfield, Illinois every night. Have recommended it wherever I go.

Yours truly,
HANS F. GEIGER,
3151 Graceland Ave., Indianapolis, Ind.

August 24, 1915.

Dear Sirs:—Last night I tried out my Arlington Transformer Type B on a Superior Head Set and I had such good results that my friend bought it on the spot. I got Arlington NAA. Yours truly,

WALTER A. MEYER,
Sheboygan, Wisc.

Note.—We have received at least 200 testimonials on our Arlington Transformers.

Our No. R41 Receiving Set

September 6, 1915.

Gentlemen:—I think your No. R41 Receiving Set is fine. I tried the set out with a tin roof 11x21 and 11 high. I got Arlington in the day time very loud and clear using a silicon detector and a pair of 1,000 ohm receivers.

Yours truly,
E. S. FALES.
93 Downer St., Baldwinsville, N. Y.

September 10, 1915.

Dear Sirs:—In order that I may show how well pleased I am with your No. R41 Receiving Set, I take great pleasure in writing you a few lines concerning it. To me, this location seems especially well adapted for the amateur wireless operator. In fact, I have always had great trouble in "cutting out" the many undesirable ship and land stations until I used your No. R41 Set. Now my troubles of that nature are reduced more than I ever believed possible. Several times I have been able to copy Arlington through fairly severe thunder showers as the static could not overcome the clear Arlington notes that were tuned in with this set. Several wireless amateus in this locality have used my set and were astonished at the low cost, considering it a great bargain.

Hoping that this letter may be of interest to you, I remain,

Yours very truly,
ISRAEL P. TERRY,
Southold, N. Y.

Our R40 Arlington Receiving Set

May 22, 1915.

Gentlemen:—The Arlington Receiving Set which I brought home was connected on to our outfit and works perfectly. It was easy enough to get Key West and Arlington stations. Yours truly,

CHAS. O. JACKSON,
Norwalk, Ohio.

November 8, 1914.

Gentlemen:—Some time ago you wrote me in regards to how my wireless instruments were working that I purchased from your house last spring, and in reply will say that I am more than pleased with the splendid results I have been able to obtain from these instruments.

I have had a number of letters from Jewelers all over the country, as to my wireless time station, since I gave the Keystone a little write up, on wireless time, and I have advised them all to send for your catalog (the first thing they did) as it would be a big help to them and your goods are reliable.

The time and weather reports from Arlington come in very clear. Sometimes in the evening we can hold the receivers three or four inches from the ears and get them very clear. We also hear Sayville, Long Island sending every evening and a number of other stations a long distance away.

Yours very truly,
LESLIE JONES,

The Crystaloi Detector

Gentlemen:—After testing your Crystaloi type AA Wireless Detector, for two months on both the Atlantic and Pacific sides, under practically all conditions which wireless is subject to (static, freaks, etc.), I feel it my duty to tell you of a few "stunts" that I have accomplished with it.

On May 29th, while 915 miles south of Scotland Lightship, copied all of WST (Miami, Florida) press through static which was heavy. The signals came in clear and strong. The steamer "Honolulan," then about 100 miles to the south of us, was unable to hear WST on account of heavy static. I gave a copy of the press.

On June 2nd, at 1 A. M., copied Miami's press, while on the Pacific side, about 370 miles west of Balboa, Canal Zone. Signals were clear and strong and did not fade as is usually the case with most all other detectors. This was a distance of 1,600 miles, over part of Central America and the Gulf of Mexico, and was accomplished through quite a heavy static which is prevalent in the Tropics at night in the summer.

On the next night, June 3rd, I again copied Miami's press at a distance of 1,800 miles The S. S. Kansan at that time was about 100 miles away and he could not hear WST at all and said that the static knocked his point. But my Crystaloi was not in the least affected by the heavy splashes of X.

July 9th, while at anchor in Kahului harbor, Hawaiian Islands, copied KPH (San Francisco) press, at a distance of 2,100 miles, which is extremely good work for this time of the year.

I am more than pleased with your Detector and would recommend it to any one who desires a Detector for extreme long distance combined with ease of operation, and simplicity. It does not fall short, one point, in what you claim for it.

Wishing you continued success, I am, Respectfully yours,

A .H. RANDOW, Operator S. S. Dakotan.

A Wondrous Range With a Transformer Coil

Gentlemen:—I have obtained fine results with your transformer coil. At one time I sent to Pikeville, a distance of 100 miles. Yours truly,

LOUIS MILLER,
1614—9th Ave., Huntington, W. Va.

Gentlemen:—Please send me your latest catalog. I have purchased quite a few different articles from you in the past year or two and I have tried a good many other electrical houses but I always have said that The William B. Duck Company is the best place to trade. Yours truly,

ARTHUR EBERHARD,
112 Myrtle Ave., Fitchburg, Mass.

Phenomenal Range Obtained With Our Three-Slide Tuning Coil

Gentlemen:—Have received your Fixed Condenser No. 77X81 and three slide tuner No. 61X10 and find both O. K. Your catalog cut does not do the coil justice. It certainly is an exceptional value for the price. Have picked up Colon and the Atlantic stations with it. Yours truly,

ROBERT KARLOWA,
Rock Island, Ill.

Gentlemen:—I received the Potentiometer in first class condition and it is a fine instrument. A while ago I got about $12.00 or $15.00 worth of wireless instruments from a certain firm and it was the cheapest lot of "dope" I've ever seen.

Your instruments are the best yet, and you may expect my future orders.

Yours truly,
FOREST GRAY,
Butte, Mont.

The Attractive Prices of Our Flashlights

March 17, 1915.

Gentlemen:—I received the Flashlight battery and book all O. K. and I think the light is a dandy. It is more than I expected for the price, which I paid for it and far better than flashlights I have seen that sold for more than twice the price you sell them for. Yours truly,

ALFRED DeWALD,
Felton, Calif.

Parts of No. A7721 Loose Coupler

Gentlemen:—I assembled the Loose Coupler (parts of No. A7721) I purchased from you about two weeks ago and hear NAA and NAR (Arlington and Key West) very plainly. I am much pleased with the completeness of the parts. Yours very truly,

J. HADLEY HATCH,
216 Kedzie St., Evanston, Ill.

Wireless Receivers

WE CARRY THE FOUR UNDISPUTED LEADING TYPES HOLTZER-CABOT BRANDES STROMBERG-CARLSON MURDOCK.

HOLTZER-CABOT WIRELESS RECEIVERS.



NEW AND IMPROVED TYPE. 3,000 OHMS. PRICE $10.00

Holtzer-Cabot receivers have an international reputation for their high quality of construction and extreme sensitiveness. They embody all the essentials of high class wireless receivers. The windings are all made with silk covered copper wire. The magnets are made from a special quality of steel and are of the proper strength to give best results with the diaphragms used.

The manufacturers devoted several months in experimenting with these receivers, and we believe that we can unreservedly claim that in their responsiveness to weak signals, and for long distance work, they stand out in a class by themselves.

The ear pieces are of hard rubber; the shell is made of aluminum, and the binding posts are covered with hard rubber and placed external to the case so that the cords may be replaced without opening the receiver. The head bands are covered with hard rubber, and are adjustable by two large knurled thumb nuts. The screws which clamp the bands are non-turning, and the liability of catching the hair is reduced to a minimum. In the design of these receivers special attention has been given to "pitch" as well as to sensitiveness. It has been determined that the human ear is more responsive to higher pitched notes than to lower ones, and for this reason these receivers are given a higher natural period, bringing in weak signals clear and strong. We believe that comfort, light weight and sensitiveness are found in this set to a greater extent than in any other.

The receivers are mounted on ball and socket joints, and the set complete with cord weighs only 10½ ounces. The resistance is 3,000 ohms to the set, or 1,500 ohms to each receiver.

No. 99X9. Holtzer-Cabot Head Set complete, each receiver wound to 1,500 ohms, with green silk cord $10.00
Shipping weight, 20 oz.

No. 88X8. Holtzer-Cabot Head Set complete, each receiver wound to 1,000ohms, with green silk cord 9.00
Shipping weight, 20 oz.

BRANDES RECEIVERS.

Brandes wireless receivers are excelled by none manufactured. They constitute the acme of perfection in every detail, and combine everything essential to be desired in a high class wireless head set. Very few people seem to realize that one of the most vital parts of a receiving station is the wireless head set. Yet often an otherwise first-class outfit is sadly handicapped by inefficient receivers. This is not always apparent, because the ordinary wireless receiver (which in most cases is merely a high wound telephone receiver) will bring in some signals, and very often will bring them in loudly. Thus the owner is deceived into believing that his receivers are entirely satisfactory, and not until he has had an opportunity to try a real pair of wireless receivers against his own, does he discover his error.

There are many reasons why these receivers are regarded by many as superior to any other receivers. The greatest care is manifested in the selection of materials, in the design and the making. These receivers are put together with the precision of the finest watch.

Of course these receivers possess the ordinary essentials which make a high class instrument, such as permanency of adjustment and of magnetism, and handsome appearance. But they also fulfill the peculiar requirements in wireless work. These are: Extreme Sensitiveness, Tone and Lightness.

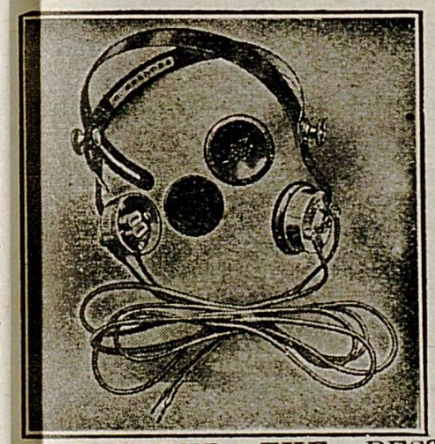
EXTREME SENSITIVENESS: This is attained only by correct calculation of the thickness of the diaphragm, strength of magnetism, and the correct number of turns of wire on the bobbin. As the ohmic resistance is only incidental, the receivers are not wound to other resistances, as the number of turns is fixed and cannot be varied without endangering the efficient working of the instrument. **Resistance does not make the receiver.**

TONE: There is also a certain pitch, which has been ascertained by experiments to be the most favorable for making long distance signals readable. Both receivers are tuned alike, thereby increasing the intensity of the sound.

LIGHTNESS: By eliminating unnecessary parts and by building the instruments of the lightest and most rigid materials possible, these receivers will be found to be very comfortable, and to fit the head perfectly. They are so light in weight that they may be worn for hours without the slightest fatigue.

IMPROVED NAVY STANDARD.

3200 Ohms.



GUARANTEED THE BEST LONG DISTANCE READING RECEIVERS.

This is without question the finest wireless headset made today. Designed especially for professional work, it has many unique features, among which we may mention.

The peculiar, soft, clear tone, a great advantage for long distance reading, its lightness and its rigid construction. The case is made of hard drawn aluminum, thus the advantage of absolute permanency, lightness and handsome appearance is gained. The ear caps are of hard rubber, which instead of having one large hole in the centre, are perforated by many smaller holes. This is done to protect the diaphragm from being damaged, should the receivers be accidentally laid on some protruding object.

The ball and swivel arrangement on the back of the receivers allows them to be properly adjusted, bringing the sound from the receivers to the centre of the ear. This swivel is hard rubber covered, to prevent grounding or short circuiting of receivers should they come in contact with the cord terminals. The head-band is of a double adjustable type, and hard rubber covered, making it not only absolutely sanitary, but the best fitting headband devised.

The 6 ft. cord is of best quality, covered with green silk, and is fitted with special terminals, to facilitate easy removal, thus insuring against any danger of damaging receivers, where in other types it is necessary to open the receivers to remove cord.

The magnets are of a special steel, so as to obtain a permanent and even magnetic effect.

The diaphragm is very thin, only .004" thick, and tin-plated to prevent rusting.

The wire used in the windings is of the best quality pure annealed copper wire .002" in diameter, and covered with pure uncolored silk.

The receivers are wound to the fixed number of turns required for best results, which registers approximately in resistance 3200 ohms

Every Professional Operator and every earnest Amateur will find that our Improved Navy Standard Receivers are an absolute necessity for the efficient working of a wireless receiving outfit. Shipping weight, 25 oz.

No. 10X92. New Model Improved Navy Standard complete (3200 ohms) $14.00
Prepaid, 25c additional.

This professional type of receiver is constructed about on the same basis as the Improved Navy, using the same good material, and also the same ball and swivel and headband arrangement, both of which are hard rubber covered. The Receivers are a trifle larger than the Navy. They are very sensitive and have the same peculiar quality in regard to the tone, to make long distance messages readable. They are excelled by no receivers on the market sold at the same price and in fact are better than some sold at a higher price.

They are fitted with diaphragms .005" thick tin-plated, and the caps are of hard rubber, shaped in such a manner that they fit very closely and feel very comfortable to the ear. They are wound with pure copper silk insulated wire .002" diameter to the required number of turns for best results, and the resistance registers approximately 2800 ohms to the set.

The 6 ft. cord is fitted to these receivers in the same manner as described under our Navy receivers.

No. 30X26 New Model Trans-Atlantic Type complete (2800 ohms) $10.00

Express additional.

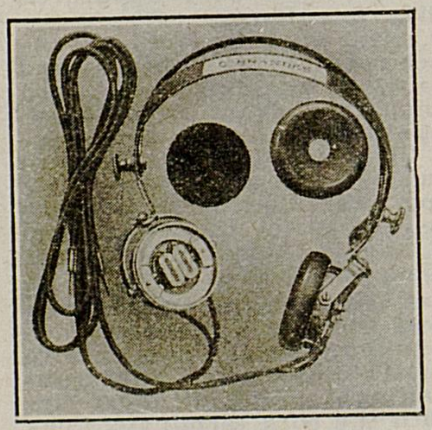
NEW MODEL TRANS-ATLANTIC TYPE.
2800 Ohms.



THE BEST LOW PRICED PROFESSIONAL LONG DISTANCE RECEIVERS.

Shipping weight, 30 oz.

SUPERIOR WIRELESS RECEIVERS.



This reeciver is also of Brandes make, and the thousands of voluntary testimonials from amateurs in all parts of the country evidence its remarkable qualities, without reference to its exceedingly low price. The case is made of aluminum, insuring rigid construction and lightness. All the interior parts are nickel plated and polished, giving them a handsome appearance. The bobbins are wound with No. 40 enameled pure copper wire throughout, to the proper number of turns, which register a resistance of 1000 ohms per receiver. The diaphragms are .006" thick, tin plated, and the receivers are fitted with hard rubber caps. None of the material is substituted by a cheaper grade, such as the cap, for which electrose is substituted for hard rubber, and the diaphragm, heavy Ferrotype is used instead of a thin metal, etc.

There is no question but that this receiver is most substantially built, of handsome appearance, and will do better wireless work in the opinions of many, than some receivers which cost as much as $8.00 per set.

No. 30X12.	2000 ohm set, as illustrated	$5.50
	Postage	.25
No. 30X13.	2000 ohm double leather covered headband set	5.25
	Postage	.25
No. 60X30.	Single 1000 ohm receiver, leather covered headband and 6 ft. cord	3.00
	Postage	.15
No. 30X42.	1000 ohm receiver only	1.85
	Postage	.10
No. 30X97.	3 ft. cord for Brandes Receiver	.35
	Postage	.02

STROMBERG-CARLSON RADIO RECEIVERS.



This improved radio head set is designed and constructed so as to give maximum sensitivity in the reception of signals from both arc and spark types of transmitting sets. Both receiver diaphragms of the pair are accurately tuned to the same natural periods of vibration so that they "pull together"—an important feature that assists greatly in the reception of signals under adverse conditions.

The receiver cases are made of drawn aluminum and are secured to the adjustable head band by universal ball joints. The pressure of the receivers is evenly distributed over the entire head. They fit firmly and snugly. The coils are wound with ninety-nine per cent pure copper magnet wire having enamel insulation. Magnets are of the bi-polar type, employing a three-section compound horse-shoe magnet of tungsten steel. Green silk-covered cord is six feet long and moisture-proof. The connections for cord are inside receiver case, thus eliminating short-circuiting of receivers on the head band and fraying of the cord at pin terminals. Diaphragms are made from very thin, flexible iron, given special treatment to be corrosion proof. Ear caps are of hard rubber. Manufacturers guarantee satisfaction.

No. A9723 2000 ohm Radio Head Set. Price.....$12.00

AMPLIFYING HEAD SET

(Cut did not reach us in time to put in this edition of our catalog.)

These receivers will positively give from two to three times the intensity with nearly all signals, several customers writing us that when used with a crystal detector, results are almost if not quite equal to the addition of an Audion Amplifier. The diaphragm is not acted upon directly by a varying magnetic force but is made of mica and receives its impulses from a thin iron armature to which it is connected by a link.

Some of the prominent advantages of this instrument may be briefly mentioned: It has a long permanent magnet being more than a complete circle since the ends overlap. The magnetic circuit has comparatively little reluctance, having a double path between the pole pieces. The air spaces are thin and the flux from the permanent magnet does not have to pass lengthwise through the armature. These features of the magnetic circuit favor a strong flux and permanency of magnetism.

The loss of power by hystersis and eddy currents is reduced to a minimum and the effect of the winding upon the armature is utilized at both ends and on both sides at each end. The diaphragm being of thin mica is very light and sensitive and the total weight of all moving parts is only a fraction of the weight of the common steel diaphragm. The headband is very simple and its construction will be easily understood from the illustration. It fits snugly and comfortably and will not pull the hair. The increase in distance and intensity of signals produced by these receivers will actually surprise you. If they don't accomplish what we say they will, return them in three days in good condition and your money will be cheerfully refunded.

No. W632. Blitzen Amplifying Telephone.....$25.00

MURDOCK WIRELESS RECEIVERS

Are as perfect as persistent experiment and long experience in manufacturing can make them. They excel in the two most important requisites of wireless receivers, first, **sensitiveness,** and second, **dependability.**

BECAUSE the amount of magnetic material is not decreased in a misdirected effort to obtain exceptionally light weight, MURDOCK RECEIVERS are more sensitive and more dependable than others. We know, from long experience, the quality and amount of magnetic material necessary to insure perfect sensitiveness combined with lasting magnetism, and we put **that quality** and **that amount** into every receiver.

BECAUSE MURDOCK RECEIVERS are constructed as units with no floating or adustable parts, they stay right **all the time,** and give unvarying sensitive service.

BECAUSE MURDOCK RECEIVERS are constructed with special attention to diaphragm thickness, position, and clamping, they give a characteristic strong, unmistakable signal, best adapted for every possible condition of wireless receiving.

BECAUSE MURDOCK RECEIVER spool windings consist of pure copper of high conductivity, enamel coated, they have more **effective** turns than receivers with other types of winding, with a consequent increase of efficiency.

BECAUSE the fittings of MURDOCK RECEIVERS are designed for comfort and service, and

BECAUSE every detail looking towards the production of perfect 'phones at moderate price is carefully studied and executed, MURDOCK RECEIVERS have earned and still maintain a reputation which makes them the most popular and best known instruments on the market.

The prospective purchaser of wireless 'phones can do no better than to TRY MURDOCK RECEIVERS. They will stand any test to which they may be put, backed by their reputation and the absolute guarantee of a manufacturing company whose product of more than a million telephone receivers implies an ability to produce unexcelled wireless 'phones.

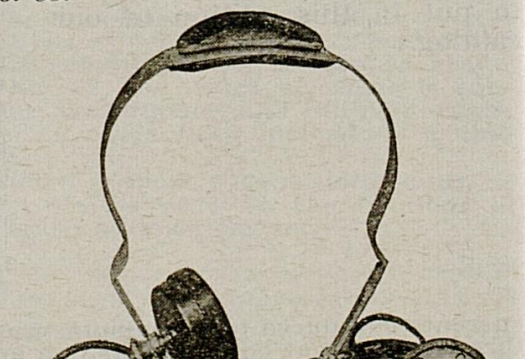
GUARANTEE FOR MURDOCK WIRELESS RECEIVERS.

We guarantee that MURDOCK WIRELESS RECEIVERS will surpass in sensitiveness any receivers of similar resistances obtainable at the same price. Fourteen days' trial allowed, in competition with any other receivers. If, at the expiration of the trial, the receivers are not considered satisfactory, purchase price will be refunded immediately upon return of receivers.

SPECIAL No. 55.



Regular.



Coronet Band.

Detail: Complete double sets made in resistances of 2000 and 3000 ohms; bipolar receivers; cases, special processed hard rubber composition with lustrous and lasting finish; MURDOCK patented SOLID construction magnets, best quality steel, in amount sufficient to guarantee dense and permanent

magnetization; spool windings, enamel coated copper wire; diaphragm, thin, flexible, non-rusting and perfectly seated; cord, five foot, mercerized, best quality; head band, nickeled German silver, split and adjustable.

No. A55 Complete double set (2000 ohms) consisting of two 1000-ohm receivers, double head band and double cord..... **$4.00**
Shipping weight, 2 lbs.

No. B55 Complete double set (3000 ohms) consisting of two 1500-ohm receivers, double head band and double cord..... **5.00**
Shipping weight, 2 lbs.

For either complete double set with Coronet head band, add.... **.50**

No. A39 Complete single set, consisting of 1000-ohm receiver, single head band and cord..... **2.50**
Shipping weight, 1 lb.

No. A40 Complete single set, consisting of 1500-ohm head band and cord. **3.00**
Shipping weight, 1 lb.

No. A41 Single 1000-ohm receiver only..... **1.50**
Shipping weight, 1½ lbs.

No. A42 Single 1500-ohm receiver only..... **2.00**
Shipping weight, 1½ lbs.



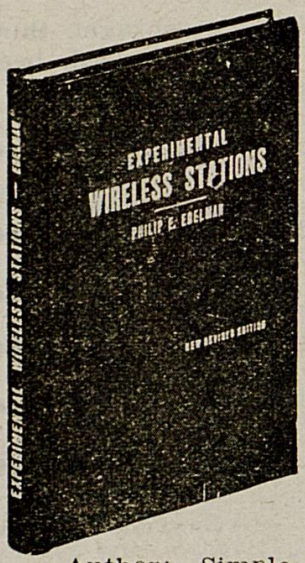
This little device is a handy and desirable addition to a wireless equipment. Its use makes possible the removal of the receiver cords from the instruments, thus preventing the accidental pulling of the apparatus with the consequent damage and loss of adjustment. The block may be screwed either on or under the operating table. The wiring is then brought to one end, and the receiver tips are placed in the holes on the other. Over-all size, 1½x1⅛x¾ inches.

No. A6 Receiver Connection Block.....**$0.20**
Shipping weight, 4 oz.

RECEIVER SUPPLIES

	Each.
Diaphragms, regular wireless.	**$0.10**
Cords, mercerized cotton, 3 ft., 4 tip.	**.20**
Cords, mercerized cotton, 5 ft., 4 tip.	**.30**
Cords, mercerized cotton, 5 ft., 6 tip.	**.50**
Cords, silk covered, 6 ft., 4 tip.	**.50**
Cords, silk covered, 6 ft., 6 tip.	**.80**
Headbands, leather covered, single No. 30L.	**.50**
Headbands, leather covered, double No. 30L.	**1.00**
Headbands, No. 55, nickeled German silver, single	**.75**
Headbands, No. 55, nickeled German silver, double	**1.00**
Headbands, No. 50, nickeled German silver, single	**.75**
Headbands. No. 50, nickeled German silver, double	**1.00**
Headbands, No. 65, Coronet type, double only.....	**1.50**
Caps for all receivers	**.25**
Rubber ear cushions.	**.50**

Postage extra on any of above parts.



EXPERIMENTAL WIRELESS STATIONS,

Their Design Construction, and Operation, with particular respect to the requirements of the new wireless law,

by Philip E. Edelman.

Price $2.00, Postpaid

Note—The following copy pertains exclusively to old edition. New edition, embracing all advances in wireless during war, ready on about April 1, 1919.

Author:—Simple Experiments in Chemistry, How to Comply with the Wireless Law, Small Transformers, etc., etc. Contributor to Modern Electrics, Popular Electricity, Electrician and Mechanic, Scientific American, etc., etc.

Cloth bound, copiously illustrated, with 19 chapters and an appendix. 224 pages, large 12mo. Complete, concise, clear, understandable. Written by an experimenter who knows just what the readers want. The **first book** to give **standard experimental** designs in accordance with the new requirements. Contains full instructions for **complying** with the **law,** building and operating apparatus and stations, modern up-to-date instruments, simplified calculations, formulas, and designs. A real "How it works and how to make it" book. Price, $2.00, prepaid.

This book is one of the most thorough and complete wireless books yet published. The author's treatment of every phase of the subject is thorough and exhaustive, anticipating practically every question that will arise in the construction and operation of a wireless set.

The work embraces 19 chapters. We give the complete contents of the first two chapters, in order to show the thorough manner in which every phase of wireless telegraphy is treated.

TABLE OF CONTENTS. EXPERIMENTAL WIRELESS STATIONS, By Philip E. Edelman. Price $1.50, Prepaid.

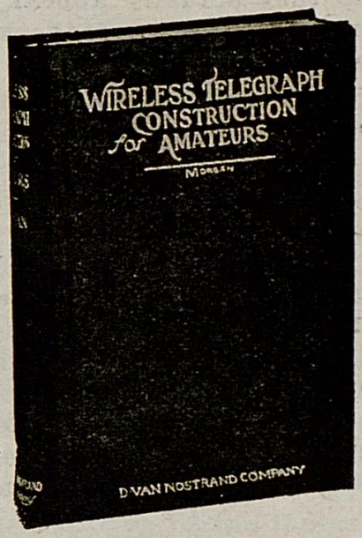
Chapter 1.—**Nature and Theory of Wireless Transmission of Intelligence.** Relation of Stations; Effect of Earth; Function of Aerial; Theories of Transmission; Height of Aerial; Directive Aerials; Comparisons of Wave Motions; Absorption; Effect of Distance; Definition and Comparison of Long and Short Waves; Night and Day Transmission; Composition of Earth; Effect of Daylight; Effect of Weather; Drawbacks to Advancement of Art; Interferences; Tuned Waves; Forced Oscillations; Static Disturbances; Electrical Storms.

Chapter 2.—**Aerials.** Definition of Wave Length and Waves; Comparison to Light Waves; Principle of Aerial; Forms; Dimensions; Merits of Long and Short Waves and Wave Lengths; Location of Aerial; Aerial Supports; Makeshift Aerials; Natural Supports; Poles; Construction; Duplex Aerials; Dimensions; Length of Aerials; Effective Length; Length for 200-meter Wave Length; Increase of Capacity to Compensate for Short Aerial; Arrangement of Aerial Wires: Number of Conductors; Damping; Definition; Advantages of Plural Conductors; Spacing; Umbrella Aerial; Modified Umbrella Aerial; Directive Aerial; Construction; Flat Top Aerials; Advantages; L Type; T Type; Directive and Loop Types; Lead ins; Constructional Details; Spreaders; Assembling; Conductors; Joints; Sizes of Wires; Pulleys and Ropes; Lead-in Wires; Poles; Bamboo; Jointed Wood; Truss Work; Iron Pipes; Dimensions, Guy Wires; Insulation. **Chapters 3 to 19 are equally thorough and complete.**

REVISED EDITION. JUST OUT. OVER 200 PAGES AND 150 ILLUSTRATIONS.

Complete——Up-to-the-Minute——Authentic——Practical.

Wireless Telegraph Construction for Amateurs



By Alfred Powell Morgan,
Author of Wireless Telegraphy and Telephony Simply Explained.
PRICE $1.50 Postpaid.
Handsomely Bound in Silk Cloth.
Third Edition. Greatly Enlarged.

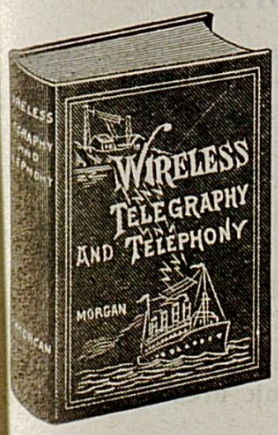
One of the latest, most authoritive, and complete works on wireless yet published.

The value of this book has been greatly increased by the addition of much new subject matter and many illustrations of recent interest.

The new text explains fully how to build the most recent forms of Quenched Gaps, Rotary Gaps, Dough-Nut Tuners, Kick-back Preventers, Audion Detectors and numerous other instruments, accompanied by dimensioned working drawings. Several very interesting and instructive photographs have been included.

Contents. Introductory. The Apparatus. Aerials and Earth Connections. Induction Coils. Interrupters. Transformers. Oscillation Condensers and Leyden Jars. Spark Gaps or Oscillators. Transmitting Helices. Keys. Aerial Switches and Anchor Gaps. Hot Wire Ammeter. Oscillation Detectors. Tuning Coils and Transformers. Receiving Condensers. Telephone Receivers and Headbands. Operation.

This book gives reliable data pertaining to the construction of wireless telegraph apparatus. The author has presented practical information for those who may wish to build, for private use, wireless instruments which are more than toys but yet not so expensive as the commercial instruments. The book shows the construction of simple, efficient instruments and at the same time gives enough elementary theory and practical hints to enable the amateur not only to construct apparatus but to design his own.



"WIRELESS TELEGRAPHY AND TELEPHONY SIMPLY EXPLAINED."

By Alfred P. Morgan.

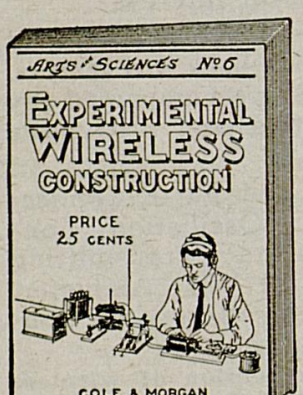
A NEW BOOK by the author of "Wireless Telegraph Construction for Amateurs."
Bound in Cloth with a handsomely embossed Cover. 200 Pages. Price $1.00 Prepaid. 150 Illustrations.

This is undoubtedly one of the most complete and comprehensive treatises on the subject ever published. and a close study of its pages will enable one to master all the details of the wireless transmission of messages. The author has filled a long felt want and has succeeded in furnishing a lucid, comprehensible explanation in simple language of the theory and practice of wireless telegraphy and telephony.

The book treats the subject from an entirely new standpoint. Several very novel and original ideas have been carried out in its making. It is well illustrated by over one hundred and fifty interesting photographs and drawings. All diagrams have been made in perspective showing the instruments as they actually appear in practice. The drawings are carefully keyed and labeled. Many of the photographs are accompanied by phantom drawings which reveal the name and purpose of each part.

It is a book which the wireless experimenter cannot afford to be without. It will prove even more valuable to the layman.

Among the contents are: Introductory. Wireless Transmission and Reception. The ether. Electrical Oscillations. Electro-magnetic waves. The Means for radiating and intercepting Electric Waves. Aerial Systems. Earth Connection. The Transmitting Apparatus. Current Supply. Spark Coils and Transformers. Condensers. Helices. Spark Gaps. Anchor Gaps. Aerial Switches, etc. The Receiving Apparatus. Detectors, etc. Tuning Coils and Loose Couplers. Variable Condensers. Tuning and Coupling. Directive Wave Telegraphy. Wireless on an aeroplane. How a message is sent and received. The Wireless Telephone. Sound and Sound Waves. The Telephone Transmitter and Receiver. The Photophone. The Thermophone. The Selenium Cell. The Speaking Arc. Wireless Telephones, etc., etc.



EXPERIMENTAL WIRELESS CONSTRUCTION
Eighty-Six Pages. Ninety-Three Illustrations
Only 25 Cents, Postpaid

Here at last is the book which every young experimenter interested in constructing his own wireless apparatus has been looking for. A book which tells how to build apparatus which anyone would be proud to own. It is a more advanced book than "Wireless Construction and Installation for Beginners," and describes apparatus which is much more elaborate and sensitive. The instruments have all been the subject of considerable experimental work and study. All the apparatus has been put to practical test and carefully improved by clever experts. By purchasing this book you get the benefit of vast knowledge and experience and are enabled to build far better instruments than by following your own designs and haphazard methods.

THE TREMENDOUS POPULARITY OF THIS VALUABLE LITTLE BOOK IS ONLY AN INDICATION OF ITS GREAT WORTH.

It has only been on the market a short time, yet the sales will undoubtedly soon reach a point which would indicate that experimenters unquestionably consider, that in proportion to its size, it is the best book on the market.

It does not describe any old or obsolete forms of wireless apparatus but only the latest types of aerials, spark coils, keys, gaps, condensers, helices, oscillation transformers, loose couplers, tuning coils, detectors, loading coils, variable condensers, aerial switches, etc.

IT IS ONE OF THE MOST DETAILED AND THOROUGH BOOKS EVER PUBLISHED.

The information is all intensely practical. Complete directions and dimensions are given. Nothing is left to be guessed at. The book must really be seen to be appreciated.

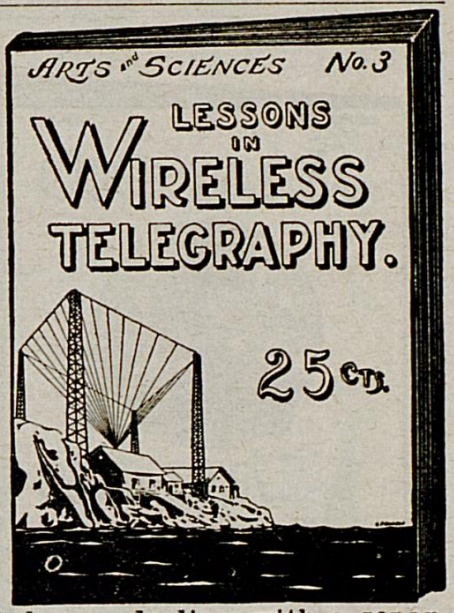
THIRTY LESSONS IN WIRELESS TELEGRAPHY.

By A. P. Morgan.

Price 25c Prepaid.

This course, considering its worth, is practically a gift at 25c.

If you know nothing at all about wireless, this excellent course will take you through the entire subject in a thorough and most interesting way. The price is the only cheap thing about it.

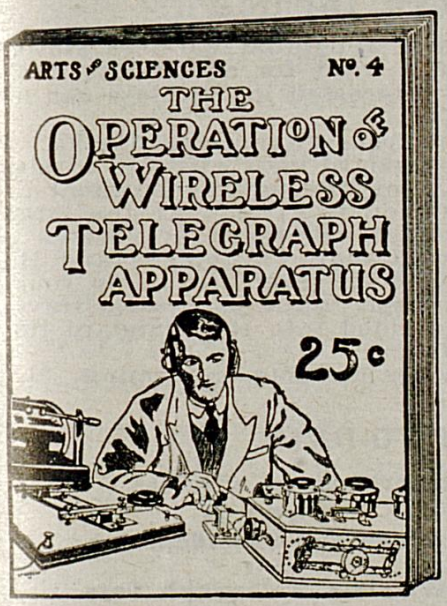


The book is divided into thirty lessons, each lesson dealing with a separate subject and following in a logical order, so that repetition and possibility of confusion are completely avoided. It is profusely illustrated with perspective drawings and diagrams each being carefully keyed so that parts may be readily discerned.

It not alone describes the actual workings and construction of the instruments that go to make up a wireless station in sufficient detail to prove of great value to the experienced student but treats the subject in such a manner that even the beginner will have no trouble to clearly grasp the matter.

The lessons thoroughly cover the subject of wireless, and all wireless instruments now in use including quenched spark gaps, rotary gaps, etc. For instance, the lesson dealing with aerials describes all the different types, and explains their peculiarities or advantages. The lesson on the theory and arrangement of circuits will be found invaluable.

THE OPERATION OF WIRELESS TELEGRAPH APPARATUS



Price, 25 Cents, Postpaid

By A. B. Cole

This book is a necessity to every Progressive Experimenter.

It shows how to obtain the very highest efficiency from any station, and how to comply with the law. How to tune, adjust your detector, spark gap, phones, etc.

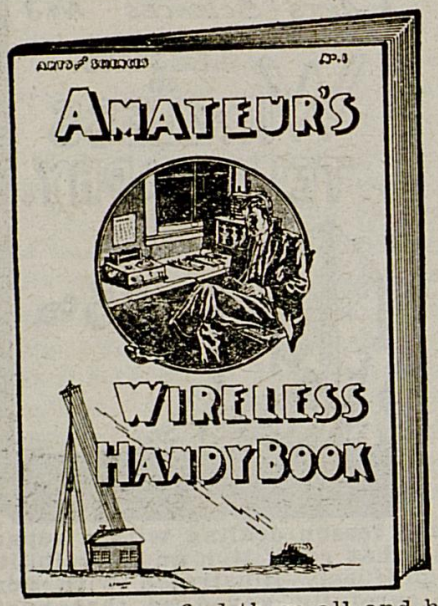
This book was written for the wireless experimenter who has passed the amateur stage, but explains how the beginner also can obtain the very best results from his station. It contains much useful information to this end and many "kinks."

It Shows How to receive or send on long or short wave lengths with highest efficiency, to tune for longest distance reception of messages, to use the buzzer test, how to test and connect condensers, receivers, etc., how to use receiving transformers, variometers, etc., all with highest efficiency in view.

It Also Describes the construction and use of a simple, inexpensive wave meter to tune the station to any desired wave length, and tells how to obtain a sharp wave and a pure wave.

Extracts From the Law are also given in such a manner that they are easily understood.

If you want to get the best results from your station this is your opportunity.



THE AMATEUR'S WIRELESS HANDYBOOK

YOU CANNOT AFFORD TO BE WITHOUT THIS BOOK.

The Handiest and Most Useful Book for the Wireless Operator, Amateur or Professional Ever Published.

NOTE:—New edition will be much larger and more complete than any previous edition. Will contain call letters of over 5,000 wireless stations. Ready for delivery May 1st, 1916.

Price, 25c Prepaid.

Over 100 large hook-ups or wiring diagrams fully illustrated in a concise and clear manner. Loop and straightaway aerials, ground, helices, spark gaps, anchor gaps, Leyden jars, induction coils, transformers, keys, aerial switches, tuning coils, loading coils, loose couplers, variometers, fixed condensers, silicon, electrolytic, carborundum, perikon and audion detectors, telephones, potentiometers, etc., you can find them all and how to connect. A hook-up for any set, accompanied by full explanation. None are missing. They are all there.

The most complete and reliable data ever collected. The result of thousands of experiments by some of the most famous wireless experts in the country.

Also it contains 36 pages of wireless calls, 1500 in all. The list is complete and thoroughly revised to date and embodies all the wireless land stations in the world, the ships of the Merchant Marine, the U. S. Navy, etc. They are all there. All the calls are classified alphabetically.

The Codes, both Morse and Continental, are shown in the form of two large full page charts printed in heavy black type so that they can be read from a distance.

A Beginner's Speed Chart of both Codes is provided, so arranged that the Codes may be quickly learned or consulted.

NEW WIRELESS MAP OF NORTH AMERICA.

It is absolutely a great necessity in any well appointed wireless station, either amateur or commercial. It fills a long felt want for a Wireless Encyclopedia in Map form, and you or any one else interested in Wireless can not be without it and do yourself justice.

This new map tages in the entire continent from Panama to Alaska. It measures about 2½ by 3 feet and is a regular standard map with all wireless features added. All amateurs of over ½ K. W. on the entire continent are shown. The call, power and owner of each station is given. At the larger cities where there is considerable wireless congestion, these are drawn to a larger scale. Enlarged drawings of Panama Canal, Philippines and Hawaiian Islands with stations are given. About 40 different steamship routes of North America are shown, each correctly located. Calls of vessels traveling over these routes are given. The map is divided into the standard time divisions. The different radio districts are shown.

Price postpaid in tube without folding and ready for hanging or framing..$1.00

JUST OUT. NEW AND UP-TO-DATE.

By A. Collins, one of the greatest authorities on wireless.

PART I.
Plans and Specifications for Wireless Telegraph Sets.

Complete and detailed instructions for making an experimental set; also a one to five mile set.

PART II.
Plans and Specifications for Wireless Telegraph Sets.

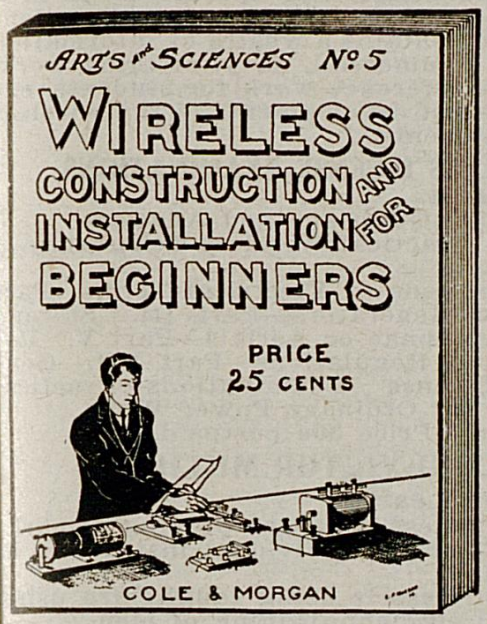
Complete and detailed data for constructing a five to ten mile set; also a ten to twenty-five mile set.

Price 25c. Prepaid.

WIRELESS CONSTRUCTION AND INSTALLATION FOR BEGINNERS

By A. P. Morgan.

(In Print. Will be ready on Dec. 1, 1914.) **Only 25c Prepaid.**



An indispensable book for the wireless experimenter. Shows how to build and operate complete transmitting and receiving equipments; also how to install and construct aerials.

Written in a very clear and simple style. This book is invaluable to the beginner. He will be able, with its aid, to construct simple apparatus, and thereby gain a mastery of the principles of wireless telegraphy. It shows how to build the latest and most approved types of tuning coils, receiving transformers, fixed condensers, keys, spark coils, detectors and other wireless instruments. There are no old or obsolete forms of apparatus discussed. The book is illustrated by numerous detailed working drawings, and several full page views of the apparatus, to enable the beginner to fully comprehend the text.

The pages on the construction and installation of aerials will be found to be of considerable help to the experimenter, for it is here that the most trouble is experienced by the beginner. The practical and helpful information on this subject alone is worth several times the cost of the book.

NEW POCKET WIRELESS MANUAL

By A. F. Collins

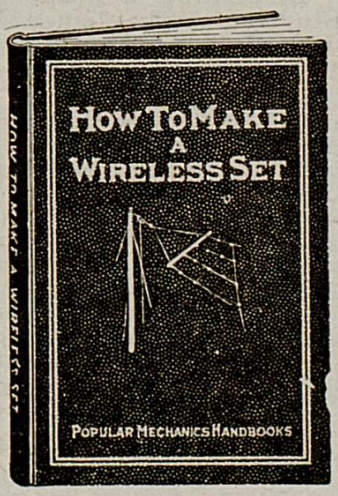
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Part V. Storage Batteries and Charging Circuits.
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Part VII. Appliances for a Radio Transmitter.
Part VIII. Aerials or Antennae.
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BY ALFRED N. GOLDSMITH, Ph.D.

Director of the Radio Laboratory of the College of the City of New York.

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Another noteworthy feature is a description of the method of transmitting a radio telephone message to a ship at sea, or across continent or ocean, including the number of persons involved.

Among the topics treated are: the construction and operation of the Armstrong oscillating audion circuits; the construction and use of bulb amplifiers; the construction of the great alternators of the Alexanderson and Goldschmidt systems and how they are controlled, especially for radio telephony.

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HOW TO CONSTRUCT A FOUR-WIRE AERIAL.

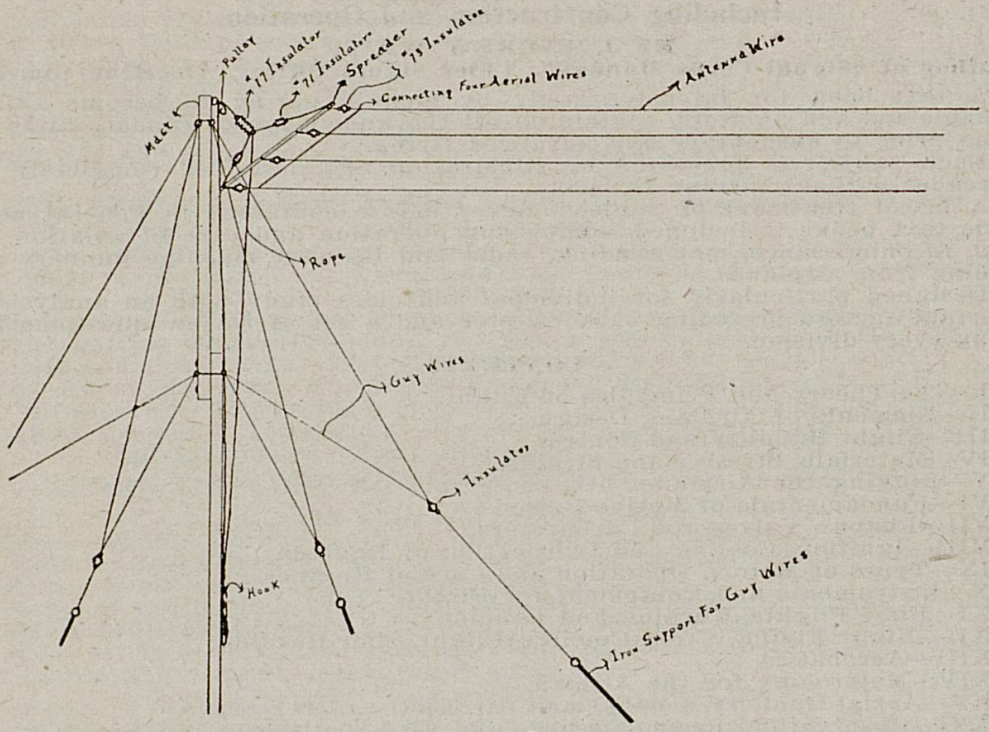


Figure I

In the construction of a wireless station, too great care cannot be exercised in the selection of a type of aerial, and a good ground connection. Of course, ground connections are easily obtained, and cause little difficulty. Not so, however, with the aerial. It is necessary to select an aerial which is suitable to the surroundings, and to decide upon the size necessary for the sending and receiving distances which it is desired to cover.

Aerials are divided into about six main types, the T, the Vertical, the L, the Fan, and the Umbrella, but the combinations of these are almost innumerable. Of these types the "T" and the "L" are perhaps most nearly perfect, and give the best results.

The methods of connecting the aerial are two, the straightaway and the loop. These two methods are shown in Figure II. The following explains in detail, the construction of a four-wire "T" type aerial. This explanation contains all the essential points of construction which will enable the amateur to erect any type of aerial, as the changes from one type to another involve only a few changes in the manner of connecting.

THE ERECTION OF AN AERIAL.

The average aerial for amateur use is from 30 to 70 feet high and consists of four, and sometimes six wires, from 40 to 100 feet long, supported by one mast set on the ground and the other placed on the roof of the house or building. The mast used for supporting the aerial wires should be of sufficient size to withstand any ordinary strain. For an aerial 40 feet high, a couple of 2 by 4's about 22 feet long will suffice for each mast.

The two pieces are laid on the ground and fastened together by means of carriage bolts, leaving a lap of about 2 feet. The splice should be further strengthened by wrapping a couple of pieces of No. 10 or No. 12 iron wire tightly around it.

Four guy wires are placed at the top of each mast, one on each side. Four more are also placed at the point where the mast is spliced. The guy wires are either of No. 12 or No. 14 iron wire and are of sufficient length to extend out to whatever supports have been provided for securing them. Large screw eyes are good for this purpose. They can be screwed into some

part of the building, or into a neighboring fence. The guy wires should be insulated as shown on Figure 1, either by a porcelain knob or some good insulator such as No. 70X3. Two small pulleys are next suspended from the top of the masts (one on each mast) by means of a short piece of No. 14 iron wire, or a small piece of good rope. A good stout oiled rope is then run through each pulley. These ropes are used for raising and lowering the aerial. They should be of sufficient length to extend from the top of the mast down to the bottom of the mast and then back up to the pulley again. The masts are now ready to be placed in position. If the masts are no larger than the size given, they can be easily set in position by one person, while the other fastens the guy wires to the supports provided for them. Tighten the guy wires until the masts stand rigid.

After the masts have been erected, the aerial spread is made. Too much care cannot be used to have the aerial wires well insulated from the supporting objects. The spreaders are made of oak strips 6 feet long and 2"x2" square. Beginning at one end, fasten a No. 70X3 Insulator or a porcelain cleat, every two feet, using a piece of No. 14 iron wire for this purpose. This will allow four to be fastened on each spreader. Fasten on each end of the spreaders, a piece of iron wire (insulated as shown in Figure 1) of sufficient length to form a "V" 3 feet long. To the No. 10X7 Insulator, at the middle of the "V," tie the ends of the ropes which run through the pulleys at the top of the mast.

Next cut four equal lengths of wire, such as you have purchased for your aerial (either aluminum, copper, phosphor bronze or stranded copper) of sufficient length to run the distance between the masts, and fasten the ends to the respective insulators on the spreaders. A straight piece of wire is then soldered across one end, connecting the four wires together as shown in Figure II.

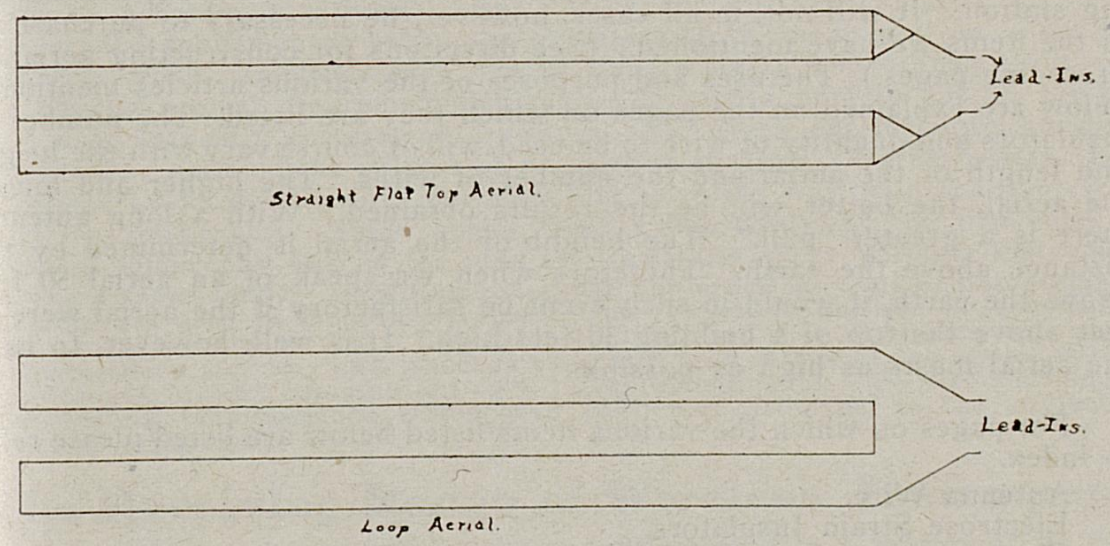


Figure II

The lead-in wires can be either of No. 12 or No. 14 bare copper wire, soldered to the end opposite the one to which the straight piece has been soldered. (See Figure II.) Great care must be taken in leading in the aerial wires. The usual method on small power sending instruments or receiving instruments, is to bore a hole through the wall, and place a porcelain tube therein, leading the leading-in wires through this tube. The best method, however, is to bore a hole in the window pane, and lead the wire through a hard rubber tube. This tube should be ¾" external diameter, and ¼" internal diameter. The tube is threaded throughout its entire length. Two hard rubber flanges ¼" thick and 1½" square, are next threaded to the screw on the tube. The tube is inserted in the hole in the window pane and the flanges screwed on either side. The leading-in wire is then passed through the tube. The lead-in wires should be fastened just outside of the window to relieve the glass pane and the rubber tube from all strain. No. 4 Rubber Covered wire is the best wire to use in wiring from the aerial and ground, inside the building.

A suitable ground switch is a necessary part of all wireless stations. Full instructions for connections to ground switch will be found on page 29 of this catalog.

A matter of the utmost importance in all transmitting and receiving stations is a good ground. This is practically one-half of a wireless set. A water pipe makes the best ground. When water pipe is not available, a gas pipe may be used. If neither is available a piece of iron pipe or hard iron should be driven into the ground, where there is moisture. Scrape the pipe at the place where you solder the ground wire, and see that the wire is securely soldered.

ANTENNA AND OTHER MATERIAL NECESSARY FOR A COMPLETE SENDING AND RECEIVING STATION.

Our Patrons Are Earnestly Requested to Read this Page Carefully before Ordering Wireless Sets.

The list of items mentioned below includes all that is necessary, in addition to the instruments themselves, for a complete sending and receiving station. It will not, in all cases, however, be necessary to purchase all of the items we have mentioned. (See directions for constructing aerial on preceding pages.) The uses and purposes of the various articles mentioned below are explained on the pages on which they are listed. The number of insulators and quantity of wire to be used, will of course vary with the height and length of the aerial and the number of wires. The higher and longer the aerial, the better will be the results obtained. With a long antenna, there is a greater "pull." The height of the aerial is determined by the distance above the earth. Therefore when we speak of an aerial 50 feet above the earth, it would in such event be satisfactory if the aerial were 20 feet above the top of a building 30 feet high. It is well, however, to have the aerial masts as high as possible.

For pages on which the various items listed below are listed please refer to index.

Antenna Wire.
Electrose Strain Insulators.
Cleats.
Spreader and Masts. (Must provide yourself.)
Bare Iron Wire for guy wire.
Rope for Raising and Lowering Antenna.
Two Pulleys.
Insulating Lead-In.
High Tension Cable for lead-in to sending station.
No. 4 Rubber Covered Wire for lead-in from instruments to ground connection.
Ground Switch.
Antenna Switch.
Ground Clamps.

Note:—By following diagram and instructions for constructing aerial on preceding pages, you can easily determine the number and style of insulators needed in constructing your aerial.

PART III

Amateur Wireless Outfits

For the information of the experimenter who has purchased, or is contemplating the purchase of his first wireless outfit, we submit the following general information concerning experimental wireless telegraphy.

While the subject of wireless telegraphy at first glance seems mystifying and perhaps perplexing, a little study of the subject will show that whatever is mystifying or perplexing about it, originates and exists principally in the wondrous part played by the forces of nature.

The instruments used in experimental wireless telegraphy are so comparatively simple in construction and the experience necessary to use the instruments intelligently, can be acquired so easily and with such little effort, that it seems almost impossible of belief that intelligence can be conveyed so mysteriously and with so little effort, in the presence of seemingly insurmountable barriers.

The brief explanation of the fundamental principles of the science given on the following pages, will show how simple the subject is and how little it costs to purchase a wireless outfit. It is not a difficult matter at all to master the fundamental principles of this science, or to put up a set for practical work. Opposite each one of our receiving and transmitting sets we display a clear diagram, which makes it very simple to put up the set. We most earnestly recommend, however, that every experimenter purchase a first-class book on the subject of wireless telegraphy. We list several very excellent books dealing in a complete and scientific way with the subject of wireless telegraphy. These books treat exhaustively of the principles of wireless telegraphy and of the uses of practically every wireless instrument on the market today. Diagrams are given for practically all combinations of instruments used in modern wireless. The respective authors so thoroughly and comprehensively treat the subject, however, that diagrams are really not necessary; for any one who has carefully read either of the books will be able to put up any combination of wireless instruments. We also recommend the reading of magazines which give particular attention to the subject of wireless telegraphy.

The Receiving Range of Wireless Instruments

The distance a set of instruments will receive is a matter of no little concern to the average experimenter, and while we have endeavored to estimate the respective ranges of our various receiving sets, we are aware that we cannot approach anything like certainty on this subject. The only safe way in which an estimate can be placed upon the range of any receiving set is to use one set as a standard and rate the others accordingly. This we have done, although the ranges we give are more than verified by actual experiments. The receiving station is always what may be termed standard in its action; that is, a certain combination of instruments properly adjusted and with proper aerial, will pick up wave motions until they have reached a certain point of delicacy, the most sensitive station picking up those wave motions to a point where they have almost died out, and consequently such receiving stations give to the transmitting station its greatest possible range. The strength of the signals, even when coming from the same station, or a station of equal power, is not always the same, because of climatic, atmospheric and other local conditions. Consequently, the range of the receiving station is affected by these same conditions, but only because the sending stations are in the first instance thus affected. The uncertainty therefore is primarily with the sending station, rather than with the receiving station. If a wave motion from a 10 K. W. station 800 miles away were no more pronounced than a wave motion from a 1-inch spark coil but one mile away, the former station could be picked up as readily as the latter.

A BRIEF EXPLANATION OF WIRELESS TELEGRAPHY AND HOW TO OPERATE A WIRELESS SET.

As we have already stated, it requires no great amount of ability to install and operate a wireless set. The invisible ether, which fills all space, and is of such exceeding fineness as to be capable of passing through glass, walls of brick or even harder substances, furnishes the means of communicating our thoughts through the use of wireless instruments. The infinite sea of ether is continually in a state of intense turmoil, and is constantly transferring energy radiated from the sun to our earth and to other planets. The transmission of wireless signals takes place in the form of wave motions, which are known as electro-magnetic waves.

The apparatus comprising the simplest form of a sending station consists of very few instruments. Indeed, there have been wireless stations in operation for a great many years, but there was no known way of intelligently picking up the messages. When the set is connected, you just press the transmitting key—a quick tap for a dot, or a tap a trifle longer for a dash—exactly as is done by the operators of cable stations, and a spark flashes between the spark gap or between the spark balls, producing a disruption in the ether and sending millions of wave motions into space, the distance depending upon the power of the spark coil, the amount of inductance, and the height and type of aerial. The wave motions for the most part travel at right angles to the aerial. These wave motions are of various lengths, all depending upon the height of the aerial, inductance, etc. They are generally rated in meters instead of feet, a meter measuring approximatly 39 inches.

To pick up or receive these wave motions, we have the receiving set. The simplest set consists of a detector and a telephone receiver, with cord to attach to the proper terminals. With only these two instruments and an antenna, etc., you can pick up messages from a considerable distance from those stations which have an aerial of the same length as the aerial of your receiving station and also any high power stations in the immediate vicinity regardless of the height and length of your aerial. The purpose of the detector is to detect the wave motions. There are several styles of detectors. The electrolytic type, of which there are many, and some of which are very expensive, consists of a small cup, containing nitric or other acid, into which the end of a very fine platinum wire is slightly immersed. With still another type of detector, very sensitive metals or crystals are used, one of the most sensitive to date being the Ferron crystal. These detectors are so extremely sensitive, that when properly adjusted, in connection with the other instruments comprising the receiving set, they are affected or disturbed by the slightest disturbance in the ether. Their extreme sensitiveness can be faintly understood when it is realized that they are responsive to the slightest disturbance in the ether—by invisible wave motions of such exceeding fineness as to easily penetrate glass or harder substances. A telephone receiver enables you to hear these clicks which the detector picks up. Now it must be clear, that with instruments of such exceeding delicacy, in order to be affected or in any way disturbed by very delicate wave motions, the most perfect harmony must prevail among all the instruments comprising the receiving set. The detector will not be affected by every disturbance in the ether; or in other words, it will not be disturbed by every wave motion that comes in its path. It would not be reasonable to suppose that the detector in and of itself would respond to wave motions of every length, and in fact it will not unless they are particularly strong and powerful. If there is no tuning coil in the receiving set, the detector will generally respond to wave motions only from the high power stations in the immediate vicinity and those sending stations within its range, that have aerials of the same length as those of the receiving station. It therefore follows that the receiving station must be in synchronism or tune with the sending station. In order, therefore, that a receiving station may respond to wave motions of various lengths, the tuning coil was invented. This instrument consists of a number of thin wires, wound very close to one another on a drum or core. The wire wound around this drum serves the purpose of increasing the wave length of the receiving station, exactly as if so much more wire were added to the aerial itself, though these turns of wire increase the wave length of the receiving station to a much greater extent than if the same number of feet of wire were added to the receiving aerial. In determining the increase of wave length the tuning coil gives to a receiving set, however, a great deal depends upon the diameter of the turns, their number and the nearness of one turn to another. Along the top of the coil is a sliding contact, which barely touches the turns of wire on the coil, and which may be moved along the top

of the coil at will, thus enabling the operator to vary the wave length of his receiving station at will, by practically adding any number of feet desired to the length of the antenna. It will therefore be seen that the tuning coil, as the name implies, enables you to get in tune with any sending station within the range of the receiving station, and whose wave length is not greater than the extreme wave length that can be obtained with the aerial and tuner combined. The tuning coil greatly adds to the efficiency of any receiving set, and in fact if you intend to receive from any considerable distance, it is absolutely indispensable. The variable and fixed condensers are used for the purpose of cutting out static and other electrical disturbances which are sometimes the cause of the wireless signals being very indistinct.

HOW TO SET UP AND SUCCCESSFULLY OPERATE TRANSMITTING SET No. 60X00 AND RECEIVING SET No. 61X13.

(Follow Diagram.)

Connect the batteries in series; that is, zinc of one cell to carbon of next cell, and when all the batteries are connected, you should have one zinc and one carbon post unconnected. You should, of course, see that all insulation is off wires where connections are to be made. Connect one wire from carbon of battery to the terminal of key nearest to battery and connect another wire from the other terminal of key to the nearest terminal of primary of spark coil. (The primary terminals of our coils are just above the vibrator.) Connect another wire from the zinc side of batteries to the other terminal of primary of coil.

Two terminals on top of the spark coil are called the secondary terminals. Connect one of these terminals with your antenna wire, and the other with the ground wire.

Next connect the Leyden jars and spark gap in circuit by taking a small piece of copper wire and connecting the two brass rods on top of jars. Then connect a wire from one brass post to one secondary of spark coil, then another piece of wire from same post on jar to one binding post of the spark gap. Next take a piece of bare copper wire and wrap it around each jar several times connecting the two jars at this point. Then run a wire from this outside connection on jar to the other secondary of spark coil and another wire from the outside connection on the jar to the other binding post of the spark gap. Next connect the aerial to one post on the spark gap and the ground wire to the other post on spark gap.

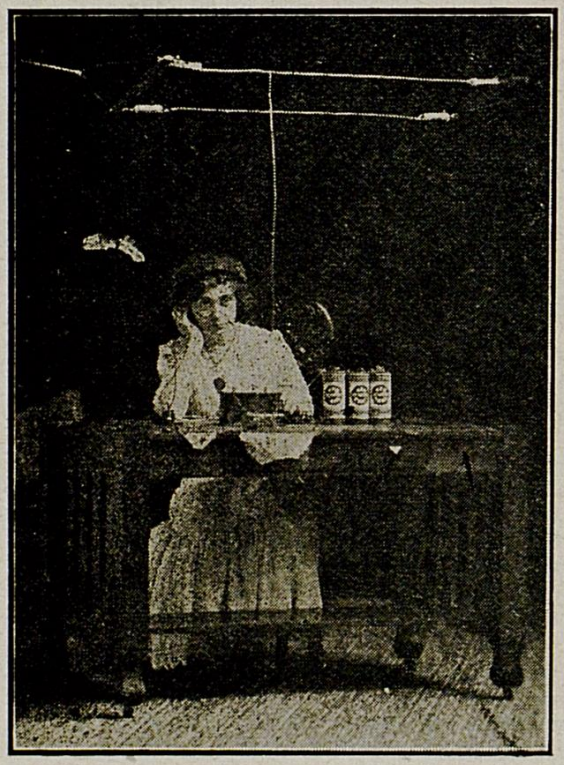
To ground a wire, connect it to a water or gas pipe in house by winding it around the same a few times, and securely solder the wire to the pipe, to insure good connection. If sending station is outside of house, connect and solder as above to a piece of water or gas pipe, or any hard piece of iron, and drive the same into the ground where there is moisture. A ground clamp should be used for grounding the wires to insure having a good ground. Your transmitting set is now ready for operation.

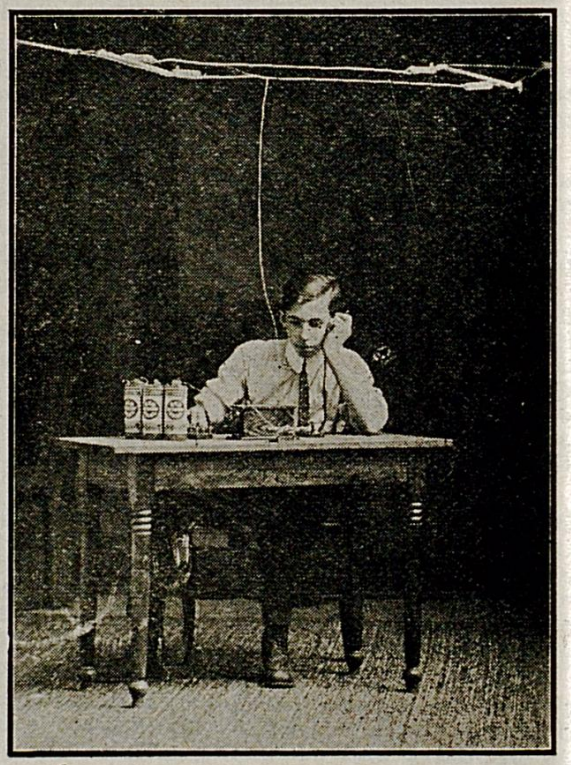
For 61X13 Receiving Set run aerial wire to one of the binding posts on top of tuning coil; from the other top binding post run wire to one of the binding posts on fixed condenser; run wire from one of the binding posts on opposite end of tuning coil, as shown in diagram, to one of the binding posts on detector, and from same binding post on detector run wire to receiver; connect wire from the other binding post of detector to binding post of fixed condenser, and from this same binding post on fixed condenser connect wire to receiver.

Both sets are now ready for operation. In order to send signals, merely press the transmitting key. For distance over 200 feet, an aerial 25 or 30 feet high should be erected. It is not absolutely necessary that the aerial should be in the open air. For experimental purposes, aerials are often constructed inside a long room, and while an aerial so situated is not generally as efficient as an outside aerial, in many cases very excellent results are obtained. The leading-in wire running from the operating room to aerial should be well insulated, particularly where it comes in contact with wall or window. A small hole can be bored through a pane of glass to permit of the leading-in wire passing through. It is not of course necessary that the leading-in wire should be bare. It may well consist of a very substantial copper wire, well insulated, but glass insulators should be used every few feet to securely hold same. As is well known, wireless signal radiate at right angles from the aerial, and consequently a slanting type of aerial will be found much more efficient for sending purposes than a parallel type.

PARLOR SET

COMPLETE WIRELESS TRANSMITTING AND RECEIVING OUTFIT, INCLUDING ALL NECESSARY MATERIAL FOR IMMEDIATE USE, $6.65.





Give a demonstration in your parlor of the great mysteries of Wireless Telegraphy by sending wireless messages through the walls and ceiling to any room in your home

There are no doubt, in the United States alone, many millions of people to whom wireless telegraphy looms up as something bordering almost on the supernatural. With but the slightest experience, however, its seeming mysteries are easily grasped and understood, and you find yourself acquainted with one of the greatest and most interesting and instructive discoveries of the age. If you were to tell a person unacquainted with wire-

less telegraphy that brick walls, buildings, and in many cases, even mountains, in no way interfere with wireless transmission, but that on the contrary wireless signals pass through such substances as easily as over the water, he would undoubtedly think that you were endeavoring to take advantage of his ignorance of the subject and were crediting wireless telegraphy with being more wondrous than it really is. However, if you were to tell him that for only $5.00, he could purchase a complete wireless transmitting and receiving set and satisfy himself that what you were telling him were very common facts, he would no doubt immediately manifest an anxiety to purchase the set, and try the experiment. What we term our parlor set will fully demonstrate the basic principles of wireless telegraphy. The transmitting set may be placed in any room in the house and the receiving set in any other room on the same floor, or even upstairs, and communication may be thus carried on. The set is complete for purposes of communication. The regular Morse Code is generally used. All the necessary instruments and material are furnished.

It is, of course, hardly necessary to mention that there is no danger in operating such an outfit. In sending and receiving messages throughout your home, a regular aerial is not, of course, necessary. Two pieces of No. 14 aluminum wire, about eight feet in length, connected as shown on page 58, are sufficient for your aerial. Miniature spreaders about one and one-half feet wide, are provided with outfit, together with necessary cleats, wire, etc., so that set may immediately be put in use without the necessity of purchasing any other material. If there are wireless stations in your city, particularly high power stations, you can, if you desire, put up an antenna consisting of three or four pieces of aluminum wire, the entire length of two rooms, for a distance of 20 or 30 feet, and pick up the messages from these stations when they are sending. Messages have been picked up a distance of several hundred miles with indoor aerials.

To grown persons, this set will prove highly interesting and instructive, while for the boy, nothing could please him better. Thousands of dollars are spent every year for toys, and but a small percentage of the money expended for toys serves any useful purpose. Here is something most instructive and absorbingly interesting. It appeals to the active imagination of the boy and develops his mind in the right channels. Thousands of boys from 9 years and upwards have very complete wireless stations, and are receiving messages from stations hundreds of miles distant. During the week immediately following the sinking of the Titanic over two thousand amateurs in New York City alone heard practically all of the wireless messages concerning news of the disaster, including many messages from the sister ship Olympic, which was practically half-way across the Atlantic.

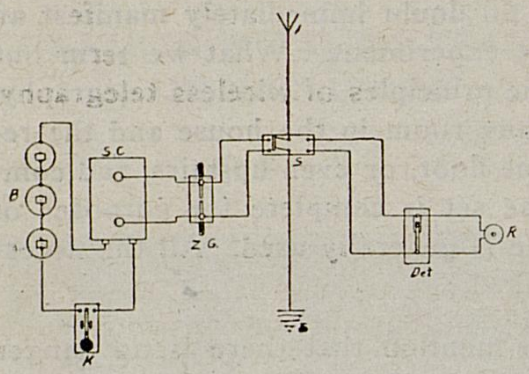
While we call this a Parlor Set, we do not mean to imply that its range is circumscribed only within the limits of a dwelling. With an aerial 20 feet high and 30 or 40 feet in length, it has a sending range of from 1 to 3 miles and a receiving range all the way up to 25 miles. In receiving from

high power stations it is well to use a tuning coil which will respond to wave lengths up to at least 600 meters.

Get this outfit and entertain your friends with a demonstration of the principles of this wondrous discovery.

List of Instruments Comprising Parlor Set No. 90X71.

Note.—To locate instruments refer to index.



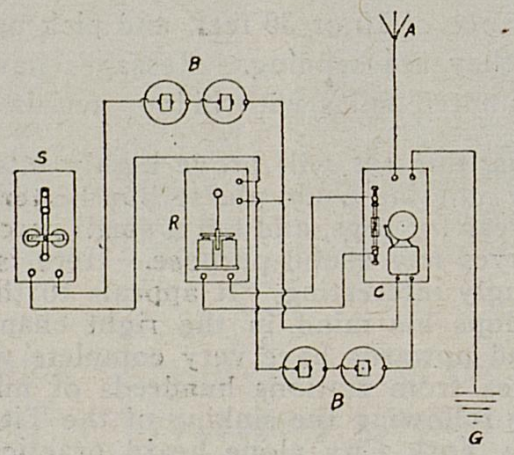
TRANSMITTING SET.

No. 39X0 ¼-in. Spark Coil.
No. 60X15A Spark Gap.
No. 10X1 Reliable Key,
3 Red Seal Dry Batteries.

RECEIVING SET.

No. 60X12 Detector Stand,
No. 40 Watch Case Receiver, with cord.
Also all necessary material for antenna, including cleats, wood spreaders, aluminum wire, etc.
Parlor Set No. 90x71, less batteries..$5.75
Parlor Set No. 90X71 with three Red Seal dry batteries $6.65

WIRELESS SET SHOWING THE FUTURE POSSIBILITIES OF WIRELESS, SUCH AS IGNITING OF EXPLOSIVES, DRIVING MOTORS, LIGHTING BUILDINGS, RINGING BELLS, TAKING FLASH LIGHT PICTURES, ETC.



In addition to communicating intelligence by means of wireless, there are a great number of other experiments which may be successfully demonstrated. To one inexperienced in wireless it seems almost incredible of belief that a wave motion of such exceeding fineness as to penetrate brick walls, or even harder substances, could ignite an explosive, operate a motor, or furnish the initial force for any of the uses to which batteries may be put.

However, a little reflection and thought will show that these seemingly wondrous achievements are in reality but very natural results. When the wireless waves pass through the coherer and decoherer, they cause the filings to instantly cohere; that is, stick together—the coherer and decoherer acting like a detector. The wireless waves then pass on through the coils on the relay magnets, magnetizing their cores, and drawing the armature over, and thus closing the battery circuit, in which circuit the device used is connected.

Our polarized relay is our only type of relay which can be used in these experiments, when it is desired to permanently close the circuit. With our other types of relays, the circuit will immediately open upon the cessation of the wave impulse. The tension spring on our polarized relay is so constructed that by simply screwing the binding post above the spring, the spring is relieved of tension, and when the wave impulse passes through the coherer and decoherer, the armature of the relay will remain down and the circuit permanently close. If other than a polarized relay is used, it would be necessary to have a special electro-magnet with a sufficiently heavy armature, so that it would remain down upon the closing of the circuit. It will therefore be seen that when the armature circuit is closed, the experiments which may be carried on will be limited only by the number and power of batteries in the circuit.

In case it is desired to light an explosive, all that is necessary is to connect a small piece of No. 36 bare German silver resistance wire in circuit with the battery, attach a fuse to this wire, and when the battery circuit closes, the current from the batteries will be more than ample to heat this wire to the melting point, with a consequent ignition of the fuse. Powder may also be placed over the resistance wire, and it will at once ignite upon the closing of the battery circuit.

Another very interesting experiment is to take a flash light picture with an ordinary kodak without the presence of any persons. The camera should, of course, be fixed for a time exposure.

Wireless messages may, of course, be sent and received with this set, a sounder being connected with the relay to render the signals understandable. You should, of course, readjust the relay by putting sufficient tension in the spring to permit of the successive opening and closing of the circuit. With a suitable aërial, the receiving set will pick up signals from high power stations all the way up to 30 miles.

This set has been purchased from us by a great many professors of universities and high schools for demonstration purposes, and will demonstrate the wondrous advantages and mysteries of wireless telegraphy, such as no other combination of instruments can.

No. A6000 Transmitting Set, less batteries (page 93) **$7.00**

No. A6000 Transmitting Set, with batteries (page 93) **8.80**

Receiving Set, consisting of No. 60X13 Coherer and Decoherer, and No. 55X6 Polarized Relay, 50 ohms **8.25**

Note.—Sounders, toy motors, etc., will be found listed in other sections of catalog. See index.

CAUTION

Excessive and Untruthful Ranges Advertised for Wireless Instruments.

Do Not Be Misled by Untruthful Advertisements of the Range of Wireless Instruments.

Note.—We reproduce on the following pages a "Caution Pamphlet" prepared and widely distributed by this company during the year 1915. This pamphlet met with such an unusually hearty welcome and reception among experienced wireless operators to warrant our incorporating it in its entirety in succeeding editions of our catalogue. Since wireless will be even more popular with the important part played by amateurs during the recent war, prospective purchasers of radio apparatus should be more vigilant than ever.

It is with deep regret that it has become necessary to caution the inexperienced in wireless on the unscrupulous advertising that is at present found in a few magazines on the ranges of so-called wireless instruments. It seems too bad, that in a subject fraught with so many possibilities for helpful intellectual recreation and advancement, particularly among the younger people, that an unscrupulous element, ever on the alert to pilfer dollars for junk, will take advantage of the ignorance and credulity of young men and those inexperienced in wireless, and advertise, at seemingly low prices, instruments of questionable worth, for which ranges are claimed that are obtainable only with the very best commercial sets. Of course, such concerns soon find themselves in bankruptcy, no matter how profitable their business may be in the beginning, **because no business built on fraud can long endure.** Particularly is this so in a business where success must of necessity depend upon good will and repeat orders. We speak from personal experience when we say that were it not for the kind words spoken of us and our instruments by our many patrons, and the natural stimulus of business that comes from this source, together with the many repeat orders that come from satisfied customers, that our own business would be a disastrous failure. It is, however, the policy of some persons to attempt to defy the basic principles of business success, and reap a quick harvest before an awakened and indignant people are aroused to their unconscious perfidy. But even in this, the disastrous experiences of others hold out little hope.

Last year a concern whose advertising, pamphlets and wireless instruments were about identical to that of those concerns to whom we refer, went into bankruptcy, owing thousands of dollars to magazines and others who supplied them with much of the material used in making their sets. This concern lasted just one year. Our files are full of letters teeming with indignation because of the worthless junk that was sold to them.*

When these other concerns come to the same end, there will, perhaps, be those who may not even have the satisfaction of getting that for which

*Since this article was written every one of the concerns we had in mind has gone out of business owing thousands of dollars to persons who could obtain neither the goods nor their money.

they so foolishly bargained. According to familiar principles of law, all cash in the possession of a concern when it becomes bankrupt, becomes a part of the entire assets and is pro ratably distributed among all the creditors.

In our own catalog we endeavor as far as lies within our power to give a correct estimate of the ranges of our instruments. The ranges we advertise have all been verified many times over, not only by ourselves, but by our many patrons. In fact, the estimates on all our wireless instruments have in numerous instances been doubled, but we do not regard these freak instances as fair standards by which to estimate the ranges of our sets. In fact, there will be many cases where even the results we claim will not be obtained. The reasons for all this are quite elaborately set forth in our catalog. If there is anything uncertain about wireless, it is the range of a receiving set. It is assumed that if a transmitting set, for instance, has a range of say 100 miles that only those stations 100 miles distant can pick up the signals from such station, and then if the extreme transmitting range of a station is 100 miles, only the very best receiving sets will give to such station its greatest possible range. For instance, you should not expect to pick up signals from such a station 100 miles distant with a receiving set consisting of an ordinary tuning coil and other ordinary instruments. A receiving transformer of more than ordinary selectivity and a first-class head set, and other instruments of equal merit, would be necessary.

When a concern, therefore, advertises a range of 2,500 miles for a receiving set consisting of a tuning coil, fixed condenser, detector and a very ordinary head set, they are making claims that they know cannot be substantiated under the conditions that wireless sets are used.

Consider for a moment some simple facts capable of exact analysis. The range for first-class transmitting sets is usually estimated at 100 miles per kilowatt in the daytime and about twice this distance in the night time. Therefore to receive a distance of 2,500 miles with even the very finest commercial set, in the daytime, it is necessary that the station have a capacity of at least 25 K. W., and in the night time that the station have at least half this capacity. At the present time there are not over five stations of this size in the United States, and they are in different sections of the country. When it is said that a receiving set has a range of 2,500 miles it means that it has a range of approximately 100 miles for each 1 K. W. of energy of a transmitting station. However, the range of a wireless set decreases in proportion to the capacity of the set, and a 25 K. W. set, therefore, would not send twenty-five times as far as a 1 K. W. set. A few familiar instances, which readers of daily news may be able to recall, will show how utterly absurd these claims are. When the steamship Titanic was in distress, wireless signals were picked up by the Carpathia, a distance of 200 miles. The Carpathia was something like 700 or 800 miles from shore and used a 2 K. W. transmitting set, and yet was unable to send messages direct to any land station. The messages had to be relayed through another ship. Two hundred miles was the maximum range obtained by the wireless set on the Carpathia in the night time over salt water, the most ideal conditions for effective wireless transmission. It is also well to remember that even a range of 200 miles was obtained only in connection with a very sensitive and high class receiving set at the other end.

With these facts in mind, it is not a very difficult matter to determine the approximate range of any receiving set. Without reference to the in-

struments, the aerial should in the first place be as high as is reasonably possible and from 80 to 150 feet in length. A good ground is also indispensable. The distance from which signals may be picked up will of necessity depend upon the instruments in the receiving set. In order to get the most efficient results it is but reasonable to assume that the utmost harmony must prevail. The receiving station must be in perfect synchronism or tune with the sending station. The instrument with which the most effective and successful tuning is accomplished is what is familiarly termed a Loose Coupler or Receiving Transformer. A tuning coil cannot possibly give the results that are obtainable with a receiving transformer. An efficient receiving transformer will increase the range of a receiving set fully 50 per cent.

Then there is the head set. There are several different makes of head sets on the market, for many of which high claims are made, and it is not a difficult matter in looking over the catalogs of reputable concerns dealing in wireless instruments to pick out an efficient head set. A first-class 2,000-ohm head set will increase the efficiency of a wireless station from 20 per cent. to 30 per cent., and in many cases it makes communication possible with stations that would be utterly closed to it without such a head set.

The detector is also of great importance, because it is the detector through which the signals must come before they are heard in the receivers. In order for a detector, no matter how efficient, to pick up the signals, the set must in the first place be properly tuned. There are many different types of inexpensive mineral detectors that serve remarkably well, but it is in the adjustment you are able to get with the detectors, and the kind and the sensitiveness of the mineral used, that permits of good results being obtained. The most sensitive type of detector to date is the Audion Detector, which is one and a half to three times as sensitive as any form of electrolytic or crystal detector. This detector has in many cases made possible communication with stations that would be otherwise closed to it. For instance, only a short time ago we furnished a first-class receiving set, costing between $35.00 and $40.00, to a patron in the extreme western part of the state of Iowa, who was unable to pick up the time in the daytime from the 100 K. W. station at Arlington, with a crystal detector, though there are many instances where the time has been picked up from this station with crystal detectors. All the other instruments comprising the set were first-class instruments. An Audion Detector was purchased and the signals from Arlington came in clear and loud. Yet this person was not over 2,500 miles from Arlington, the most powerful station in America, and was not able to pick up the time without using the Audion Detector.

How unfair it is, therefore, to advertise a range of 2,500 miles for the instruments of very questionable quality mentioned above.

A short time ago, upon complaint being made to them, Popular Mechanics' Magazine ordered one of these concerns to send them a set for testing. The set was given to a professional operator on a boat on the Great Lakes. The antenna and ground connections were as perfect as they could be, and yet this operator was able to receive but a distance of 40 miles with this set. Popular Mechanics Magazine gave this concern the option of either cutting out the range entirely or advertising the range as it was found to be by the commercial operator, and as might be expected, they refused to advertise the range of 40 miles, and cut the range out entirely, relying upon the pamphlets that they would send out, as the result of the

queries, to clinch the sale of their goods.

The ranges of the transmitting sets of these concerns are equally exaggerated. For instance, a range of 12 to 15 miles is advertised for a 1½-inch spark coil and spark gap and helix. We are not certain whether the condenser mentioned in the ad is used with the transmitting or receiving set. This range could only be obtained in freak cases. We advertise a range of 7 to 15 miles for a transmitting set consisting of a 2-inch spark coil of excellent construction, a first-class helix, two one-quart Leyden jars, and spark gap. This complete set costs $18. Yet two concerns are advertising a range of 12 to 15 miles for these other instruments, which do not begin to measure up to the standard of those in our catalog.

The manufacturers of the so-called 1½-inch spark coil inform us that they supply this concern with only a one-inch coil for their instruments, and that they do not purchase or use 1½-inch spark coils.

Sometimes these concerns, in a pitiable endeavor to have their advertisements ring true, will guardedly advertise "Money Back," but usually this bold statement is hedged around carefully thought out words. For instance, they might tell you that your aerial is not high and long enough, and suggest an aerial costing several times the price of the set; or it may read like the advertisement now before us: "We guarantee the coil or money refunded." This statement appears in connection with an advertisement on "A Complete Wireless Station" for which a receiving range of 1,200 miles and a transmitting range of 12 to 15 miles is advertised. Note the meaningless wording of the offer to refund: "We guarantee the coil or money back." What coil? The spark coil or the tuning coil? What does the guarantee cover? What about the rest of the set? What about guaranteeing the range?

It is, therefore, a very safe rule, in endeavoring to ascertain, within the limits of reasonable certainty thus far available, the range of any transmitting or receiving set, to know something about the identity of the dealer, and to observe the comparative cost of the instruments.

It should not be necessary to apologize for these wholesome words of instruction to persons contemplating the installation of a wireless set. There is no selfishness or purpose back of what we say. The facts speak for themselves. There are several concerns selling first-class wireless instruments and advertising truthful ranges for their equipment. We have always endeavored to foster a lively interest in the subject of wireless telegraphy, and nothing has done more harm to the subject than the unfair practices of those "get-rich-quick" concerns. One of these concerns lasted for a year; the others, we are sure, will not last this long; but we believe it our duty to hasten their demise, and thereby make a two-fold contribution to wireless, in that dollars which might otherwise be lost may be judiciously expended, and the harm which might otherwise be done to this inspiring science and discovery, be transmuted into an enthusiastic admiration of its boundless possibilities, and a rightful appreciation of its secure position among the truly great achievements of the present century.

November 2d, 1914.

THE WILLIAM B. DUCK COMPANY.

OUR NEW MOUNTED COMBINED TRANSMITTING AND RECEIVING SETS.

We know that we strike a popular chord among wireless enthusiasts in putting out our new mounted combined transmitting and receiving sets To our knowledge there are no first class sets of this type on the market. Practically all the instruments in these sets are among our most popular sellers and will be found described at length in catalog. To make these sets in every sense popular we have put prices on all of them that are within the reach of the average experimenter. In fact a reference to the prices of all the instruments in these sets shows that very little extra is added for the base, wiring and mounting of instruments.

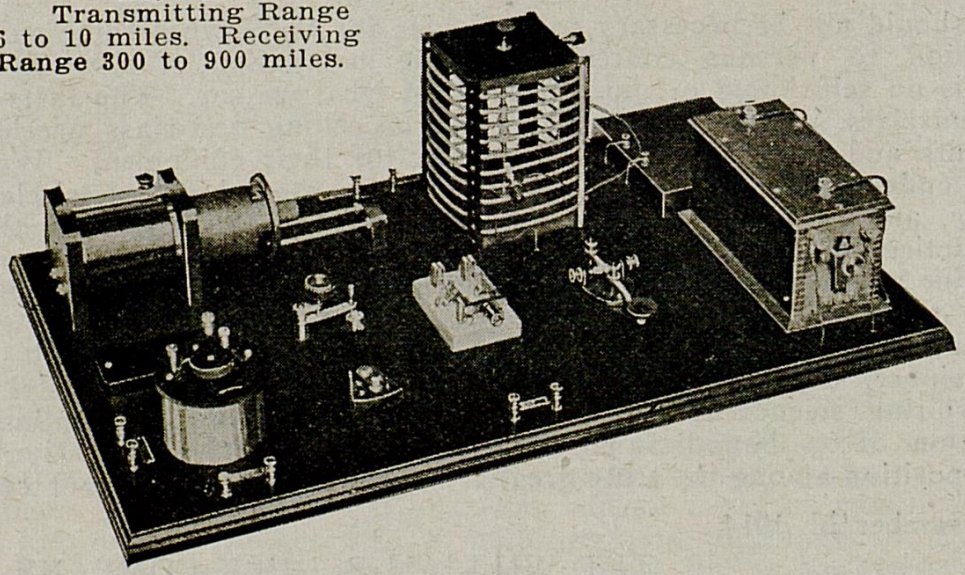
All the instruments are mounted on a beautifully mahogany finished base. The photographs fail to do justice to the beautiful finish of the base and of the instruments. All the wiring is concealed in slotted grooves underneath the base. A double pole double throw switch is provided on each set for connecting from transmitting to receiving set. Switch is also provided on all the transmitting and receiving sets for short circuiting the detector when the transmitting set is in operation. Etched brass name plates are provided at all terminals showing the various connections.

The ranges estimated for all these sets are unusually conservative, and yet in estimating the receiving range of these various sets it is impossible to estimate them with any reasonable degree of certainty. Any one that knows much about wireless appreciates the limitations in estimating the range of any receiving set. Consideration must of necessity be given to the power of the transmitting station from which it is intended to receive, weather conditions, the time of day, location of the operating room, height and length of antenna, and the skill of the operator. These estimates or ranges, therefore, are more for the guidance of the beginner in wireless that he may be aided in selecting a set that will reasonably answer his requirements. The ranges are exceedingly conservative and in all cases the maximum ranges stated by us have been exceeded. Note our conservative transmitting ranges and then read the many enthusiastic testimonials on our spark coils on pages 49 to 56.

In this connection we call attention to pages immediately preceding, reproducing our "Caution Pamphlet" on the subject of excessive and untruthful ranges advertised for wireless instruments.

No. D20 TRANSMITTING AND RECEIVING SET

Transmitting Range 6 to 10 miles. Receiving **Range 300 to 900 miles.**



Note.—Receivers and antenna material are not included with these sets. The average experimenter prefers to exercise his own choice in selecting these items [illegible] pages 59 to 67 and page 74 for receivers and antenna material.

T[illegible]X81 Fixed
Cond[illegible] Variable
Cond[illegible]4X6—1-in.
Spark[illegible]r; special
type [illegible]T. Switch.

F[illegible]g both in
trans[illegible]beer. The
recei[illegible]g. It has
meri[illegible]s we have
sold [illegible] our most
popu[illegible]other type
of cr[illegible] these sets
duri[illegible]stic letters
of co[illegible]

No. [illegible].....$20.50

[illegible] miles.
inch[illegible] that a 1½-

No. [illegible].....$21.90

[illegible]) miles.
2-in[illegible]ing that a

No. [illegible].....$23.90

[illegible]) miles.



[illegible]n this set or

No[illegible]

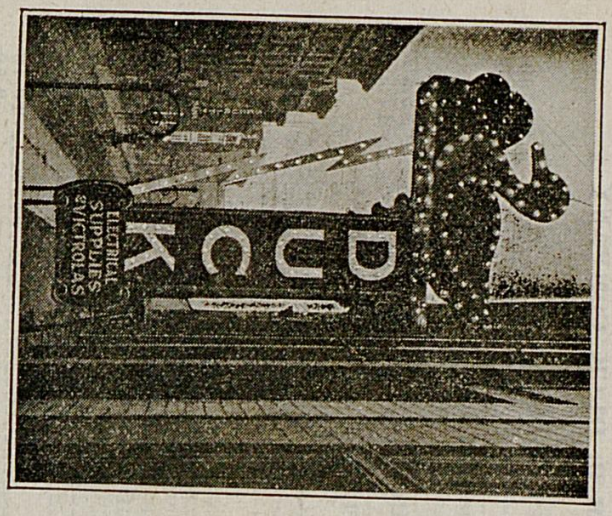
in[illegible]l two sliders
Fi[illegible]l; No. 77X81
Co[illegible]4-inch Spark
W[illegible]. A562 Junior

le[illegible]hs. We have
me[illegible]eiving equip-
set giving more than ordinary results we can [illegible]n inexpensive
as a great value. [illegible]mend this set

Dimensions, 15 in.x 27 in.
No. D23 Transmitting and Receiving Set.....$12.75

Note.—See testimonial on No. 61X10 Tuning Coil on pages devoted to testimonials, 49-56.

Revised Price List to
Duck's Big Electrical & Wireless Catalog
February 15, 1919
Our latest catalog mailed for 12c in stamps or coin.



THE WILLIAM B. DUCK COMPANY
TOLEDO, OHIO

Note.—Receivers and antenna material are not included with these sets. The average experimenter prefers to exercise his own choice in selecting these items. See pages 59 to 67 and page 74 for receivers and antenna material.

This set comprises our No. 71X18 Receiving Transformer; No. 77X81 Fixed Condenser; No. A7712 Ever-Ready Crystal Detector; connections for Variable Condenser, (Condenser shown in cut $3.75 extra, if desired); No. 44X6—1-in. Spark Coil; No. 60X15 Spark Gap; No. A1916 Transmitting Condenser; special type of Helix; No. A562 Junior Wireless Key and No. 71X0 D. P. D. T. Switch.

For a moderate price set permitting of exceptionally fine tuning both in transmitting and receiving, we believe this set to be without a peer. The receiving transformer is comprehensively described in our catalog. It has merited unstinted praise from many amateurs during the several years we have sold it. The Ever-Ready Crystal detector has always been one of our most popular detectors. No better adjustment can be obtained with any other type of crystal detector listed in our catalog. In our introductory sale of these sets during the summer months our No. D20 brought forth many enthusiastic letters of commendation.

Dimensions, 15 in. x 24 in.

No. D20 Transmitting and Receiving Set.....$20.50

No. D21 TRANSMITTING AND RECEIVING SET

Transmitting Range 8 to 15 miles. Receiving Range 300 to 900 miles.

This set comprises the same instruments as No. D20, excepting that a 1½-inch spark coil is provided in place of a 1-inch spark coil.

Dimensions same as D20.

No. D21 Transmitting and Receiving Set.....$21.90

No. D22 TRANSMITTING AND RECEIVING SET

Transmitting Range 10 to 17 miles. Receiving Range 300 to 900 miles.

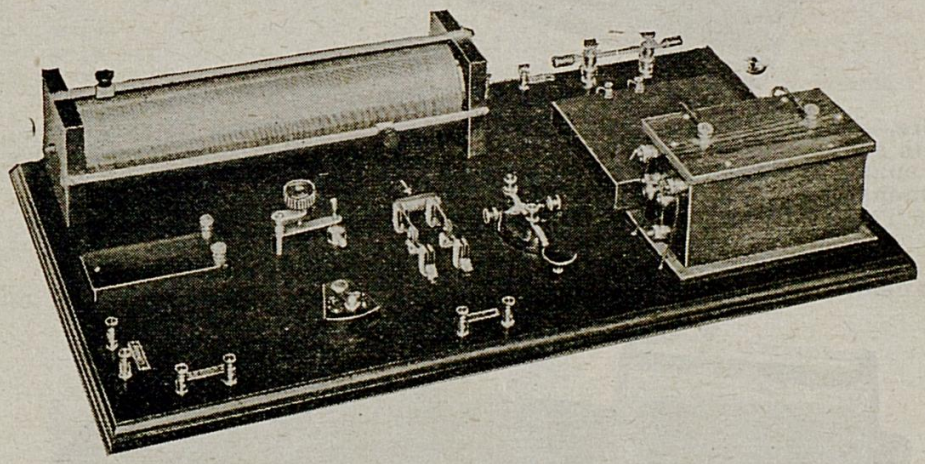
This set comprising the same instruments as No. D20, excepting that a 2-inch spark coil is provided in place of a 1-inch spark coil.

Dimensions same as D20.

No. D22 Transmitting and Receiving Set.....$23.90

No. D23 TRANSMITTING AND RECEIVING SET

Transmitting Range 1 to 3 miles. Receiving Range 300 to 800 miles.



Note.—Transmitting condenser is not necessarily required with this set or No. D24. Deduct $1.00 from cost of set if it is not desired.

This set comprises our No. 60X10 Standard Tuning Coil with two sliders instead of three; No. A7712 Ever-Ready Crystal Detector Stand; No. 77X81 Fixed Condenser; connections for variable condenser; No. 39X0—¼-inch Spark Coil; No. A1916 Transmitting Condenser; No. 60X15 Spark Gap; No. A562 Junior Wireless Key and No. 71X0 D. P. D. T. Switch.

This receiving set will respond to exceedingly long wave lengths. We have letters in our files showing a range of over 1,400 miles with the receiving equipment of this set, but we do not guarantee any such range. For an inexpensive set giving more than ordinary results we can unqualifiedly recommend this set as a great value.

Dimensions, 15 in.x 27 in.

No. D23 Transmitting and Receiving Set.....$12.75

Note.—See testimonial on No. 61X10 Tuning Coil on pages devoted to testimonials, 49-56.

Revised Price List

This revised price list contains every article listed in our late catalogs on which the price has changed, or which cannot now be supplied. In some cases we list items that appear only in our latest catalog. There are many items in our catalogs that do not appear on this revised price list. All these items can of course be supplied, and at the prices shown in catalog No. 11.

The items in this revised price list appear in numerical order. It will be observed that articles with a letter after the number will follow in alphabetical order after the articles numbered in figures only. Those items in our catalog that have no numbers are listed by numbers in alphabetical order.

To avoid any misunderstanding with our patrons we desire it understood that even this revised price list, without reference to the time you receive it, and even though it bears no changes, is not to be construed that these prices are in effect or that changes have not been changed, are yet in effect. In fact as this that catalog prices that have not been changed, are yet in effect. In fact as this that catalog prices that have not been changed, are yet in effect. In fact as this revised price list is going to press, we are without definite information of our costs on a number of items and it is also probable that other items may shortly increase in price. It is, of course, impossible for us to discard thousands of these price lists because of a few changes in prices and it is evident that such changes cannot be put on the price list by hand.

It is a safe assumption that the prices on some goods may decline in a short while, and in such cases our patrons may feel assured that any excess amount remitted to us will be promptly refunded.

Therefore on those goods not of our own manufacture, where the manufacturer announces and advertises any reduction in price, prices shown in our catalog or on revised price list are subject to reduction on any remittance made at reduced prices.

There are a number of items shown on this revised price list that may not appear in the latest catalog you have or even in the latest catalog, but they can nevertheless be supplied by us.

Remember, if you do not find the article you wish on this revised price list, this means that the prices shown in our catalog No. 11, or No. 12, if one be published, shall be so numbered, because of the prices changing so often. This the price shall be so numbered, because of the prices changing so often. This revised price list should always be consulted before you order.

THE WILLIAM B. DUCK COMPANY

February 15, 1919.

No. 1 Panel Detector Set with Audio Tron bulb	$34.00
No. 1 Detector Set without bulb	9.00
High Voltage Batteries for above will be supplied in lots of ten or more at 36c each.	
No. 1 Flexible Toy Transformer	3.20
No. 2 Cabinet Panel Detector Set with Audio Tron Bulb	52.50
No. 2 Cabinet Panel Detector Set less bulb	17.50
No. 2 Flash light batteries will be installed in either of the above sets at an additional cost of $5.00.	
No. 2 Flexible Toy Transformer	4.00
No. 2 Jr. Omnigraph, complete	16.00
No. 2 Omnigraph, new type	23.00
Extra Dials for No. 2 and No. 2 Jr., each 20c.	
No. 2 Arbor Press	20.00
No. 2 Arbor Press	12.50
No. 2 Detector and Amplifying Set, equipped with two Audio Tron bulbs	45.00
No. 2 Detector and Amplifying Set, complete with two voltage batteries	
High Voltage Batteries will be supplied in lots of ten or more at 36c each;	
No. 2 Flexible Toy Transformer	5.75
No. 2 Omnigraph, complete	9.00
Extra dials for No. 2 Omnigraph, each 10c.	
No. 5AA Navy Type Receiving Transformer	3.50
No. 6AA Navy Type Receiving Transformer	1.26
No. 10X Little Starter Motor Parts	25.50
No. 14X Hydro Electro Dynamo	2.50
No. 15 Cotton Twisted Cord, per foot	22.50
No. 24X 75 Watt Dynamo	19.50
No. 26X Finished Medical Coil	1.50
No. 28X Binding Posts, each	.14
No. 46 Murdock Watch Case Receiver	1.20
No. 46 Murdock Watch Case Receiver with Cord	2.40
No. 46 Murdock Watch Case Receiver with Cord and Headband	21.25
No. 61X Parts for Hydro Electro Dynamo	1.25
No. A10 Hand Lantern (Black and Nickel only)	Discontinued
No. A20 Hand Lantern	10.00
No. 59X Motor	2.17
No. 60 Searchlight Flashlight, complete	1.24
No. 65 Searchlight Flashlight, Brass Finish	2.45
No. 70 Hand Lantern Nickel Finish	2.60
No. 71 Hand Lantern, Nickel Finish	16.00
No. 90X Dynamo	1.25
No. 97X Legless Key	1.25
No. 98X8 Little Starter Motor	2.30
No. 99X Dynamo	1.37
No. 118X1 Reliable Telegraph Key	.31
No. 118X1 Fan Blades	
No. 112A Telephone No. 2 Transmitter, Series	
No. 112A Telephone No. 4 Transmitter, Series	Discontinued
No. 112A Telephone No. 2 Transmitter, Multiple	
No. 112A Telephone No. 4 Transmitter, Multiple	
No. 112A Telephone	Discontinued
No. 114B Telephone	Discontinued
No. 114B Telephone	
No. 121 Tungsten Flashlight Battery	6.38
No. 123X9 Type B Dynamo	Discontinued
No. 158 Knapp Electric Thriller	Discontinued
No. 158X Motor	.48
No. 173X Electrose Insulator	.05
No. 113X9 Motor	Discontinued
No. 192 Type XXX Motor	.86
No. 195 Knapp Reversible Switch	3.00
No. 200X Motor Complete	1.34
No. 203 Babe Tubular Nickel Flashlight, complete	1.23
No. 204 Tubular Nickel Flashlight, complete	1.42
No. 218 Tubular Nickel Flashlight, complete	1.68
No. 218 Miners Nickel Flashlight, complete	1.43
No. 220 Miners Nickel Flashlight, complete	1.37
No. 221 Extra Two-cell Tungsten Battery	.44
No. 221 Extra Three-cell Tungsten Battery	.71
No. 231 Buzzer	2.91
No. 232 Searchlight Flashlight, complete	1.24
No. 236 Searchlight Flashlight, complete	2.75
No. 239X9 Benjamin Air Rifle	
Air Rifle Shot, per pound, 25c.	
No. 316 Tubular Audion Bulb—No longer obtainable.	
No. 321X1 Candelabra Porcelain Socket	.40
No. 322X1 Candelabra Keyless Socket	.45
No. 323X2 Miniature Porcelain Socket with leads	.18
No. 323X3 Candelabra Porcelain Socket with leads	.20
No. 323X5 Candelabra Porcelain Receptacle	.20
No. 324 Extra Three-cell Tungsten Battery	Discontinued
No. 371 Experimental Laboratory	Discontinued
No. 385 Motor	Discontinued
No. 396 Motor	Discontinued
No. 398 Motor	2.25
No. 3783 ¼ in. Spark Coil	11.00
No. 4403A Hill, R. S. Dynamo, Standard Winding	11.00
No. 4403B Hill, R. S. Dynamo, Special Winding	11.00
No. 44X0 ¼-inch Spark Coil	1.10
No. 44X0 1¼-inch Spark Coil	11.05
No. 42X0 2-inch Spark Coil	.30
No. 421 Extra Two-cell Tungsten Battery	19.75
No. 422 Extra Two-cell Battery	.30
No. 431 Extra Three-cell Tungsten Battery	.55
No. 434 Telegraph Outfit	2.70
No. 437 Telegraph Outfit	29.85
No. 44X0 4-inch Spark Coil	Discontinued
No. 44X0 6-inch Spark Coil	6.50
No. 44X0 One-inch Spark Coil	60.00
No. 43a3 Six-inch Spark Coil	4.00
No. 470 Hot Wire Ammeter	2.50
No. 471 Hot Wire Ammeter	15.00
No. 472 Hot Wire Ammeter	12.00
No. 473 Hot Wire Ammeter	3.00
No. 50X0 Sounder	3.00
No. 51X1 Sounder	4.50
No. 53X3 Sounder	4.75
No. 54X4 Sounder	5.00
No. 55X5 Combination Set	7.40
No. 59X3 Combination Set	5.00
No. 59X5 Sounder	Discontinued
No. 60X4 Combination Set	5.00
No. 62X0 Induction Coil Core Wire, per pound—Price upon application.	
No. 63X1 Inductance Coil	9.25
No. 63X3 150 Ohm Relay	8.00
No. 63X4 150 Ohm Relay	9.80
No. 63X6 Standard Main Line Relay	6.00
No. 63X7 Standard Main Line Relay	6.50
No. 63X8 Polarized Relay	9.00
No. 63X9 Polarized Relay	7.25
No. 65X7 Polarized Relay	13.50
No. 65X8 Polarized Relay	11.00
No. 65X9 Polarized Relay	27.00
No. 66X9 Polarized Relay	29.00
No. 67X1 Polarized Relay	23.00
No. 66X7 Pony Relay	4.50
No. 66X8 Pony Relay	4.75
No. 66X9 Pony Relay	4.50
No. 67X0 Pony Relay	8.70
No. 67X1 Pony Relay	8.90
No. 67X2 Pony Relay	4.25
No. 67X3 Pony Relay	4.40
No. 67X4 Rubber Covers, each	.40
No. 67X5 "1000" Model Pony Relay	6.75
No. 67X6 "500" Model Pony Relay	7.00
No. 67X7 "250" Model Pony Relay	7.25
No. 67x8 "100" Model Pony Relay	7.55
No. 68X1 Telegraph Outfit	Discontinued
No. 68X6 Telegraph Outfit	2.50
No. 69X7 Telegraph Outfit	7.00
No. 69X7 Telegraph Outfit	3.70
No. 69X8 Telegraph Outfit	3.30
No. 69X9 Telegraph Outfit	3.10
No. 66X0 ¼ K. W. Blitzen Transformer	18.00
No. 66X0 Toy Flexible Transformer	3.20
No. 69X1 T-1 Flexible Transformer	20.00
No. 69X2 T-2 Flexible Transformer	26.80
No. 69X3 T-3 Flexible Transformer	Discontinued
No. 64X0 ½ k. w. Blitzen Transformer	30.00
No. 65X8 ¼ k. w. Blitzen Transformer	42.00
No. 67a No. 2 Double Coil Style	Discontinued
No. 70X7 B. P. D. T. Switch	1.10
No. 70X8 B. P. D. T. Switch	.33
No. 70X9 D. P. S. T. Switch	.42
No. 71X7 D. P. D. T. Switch	.68
No. 71X8 "Electrose" Insulators	.40
No. 71X9 D. P. Single Pole Panel Cut-out	1.20
No. 71X Extra Tronsel Battery	.30
No. 72X "Electrose" Insulator	.10
No. 73X Wireless Buzzer only	.75
No. 75X Rhumkoff Coil	4.25
No. 77X Rhumkoff Coil	8.40
No. 77X Rhumkoff Coil	12.00
No. 78X Rhumkoff Coil—Price upon application.	
No. 845 Double Line Binding Post Strip	.20
No. 846 Double Line Binding Post Strip	1.20
No. 847 Mazda Lamp	.30
No. 851 Double Line Binding Post Strip	1.40
No. 852 Mazda Lamp	.30
No. 853 Double Line Binding Post Strip	1.60
No. 854 Double Line Binding Post Strip	2.00
No. 855 Double Line Binding Post Strip	.20
No. 856 Mazda Lamp	.30
No. 92X5 Battery Lamp	.30
No. 88X8 Holtzer Cabot Head Set	12.50
No. 95X8 Pueblo Cutout	.40
No. 95X1 Pueblo Cutout	.40
No. 98X0 Standard Wireless Key	12.75
No. 93X9 Hotrow Cabot Headset	2.20
No. 1442 Red Devil Water Motor	2.75
No. 1443 Red Devil Water Motor	19.00
No. 1525 Set of three inductance Coils	9.75
No. 1528 Inductance Coil	9.75
No. 16X99 One Point Switch	.14
No. 16X97 Two Point Switch	.15
No. 16X98 Four Point Switch	.25
No. 16X99 Four Point Switch	.30
No. 14X10 Five Point Switch	.35
No. 14X12 Seven Point Switch	.45
No. 14X13 Nine Point Switch	.50
No. 14X14 Nine Point Switch	.52
No. 16x35 Ten Point Switch	.58
No. 13X20 One Point Keystone Switch	.30
No. 10X27 Two Point Keystone Switch	.40
No. 17X31 Ball Oscillating Battery	1.25
No. 17X32 Ball Oscillating Battery	.35
No. 1911 Short Wave Regenerative Receiver	28.50
No. 1913 Detector Stand	2.00
No. 1921 Blue Felt Polishing Wheel for Silver	.35
No. 1922 Cloth Buffing Wheel for Brass	.55
No. 1923 Brown Polishing Wheel for Steel	.75
No. 1924 Felt Polishing Wheel	.65
No. 1938 Taper Screw Spindle for Jeweler's Buff	.46
No. 1940 Emery Wheel	.55
No. 1942 Emery Wheel	.37
No. 1944 Wall Bracket	.55
No. 1945 Leather Flat Belt	
Pulleys, any style, 2 inches diameter, 55c.	
No. 1992 Red Devil Water Motor	2.50
No. 1993 Red Devil Water Motor	3.00
No. 1994 Red Devil Water Motor	4.25
No. 2000 Hotrow Receiver—Price reduced to	Discontinued
No. 2473 Flashlight, complete	.92
No. 2471 Flashlight, complete	.85
No. 2472 Flashlight, complete	1.35
No. 2009 Electric Headlight, complete	6.00
No. 2010 Electric Headlight	6.00
No. 2477 2000 Ohm Headset	4.25
No. 8X41 1000 Ohm Receiver only	2.25
No. 2475 Flashlight complete	1.55
No. 2200 Electric Headlight	7.50
No. 2477 Flashlight, complete	1.46
No. 2478 Flashlight, complete	1.75
No. 2011 Standard Batteries	.30
No. 40X31 Standard Detectors	1.25
No. 46X20 Electrose Insulator	Discontinued
No. 46X46A Ammeter	Discontinued
No. 46X46V Voltmeter	Discontinued
No. 46X47 Weston Volt-ammeter	Discontinued
Write for prices on Flange Type Meters (New Type.)	
No. 44X09—Moulded Condenser Section	2.00
No. 44X46 Helix Clip	.15
No. 2210 Baby Tubular Flashlight, complete	.75
No. 2211 Baby Tubular Flashlight	1.10
No. 2218 Ball Dog Flash Light, complete	1.70
No. 2229 Miners Flashlight, complete	1.40
No. 2231 Miners Flashlight complete	1.46
No. 14X13—Candelabra Keyless Socket, nickel plated	.45
No. 14X15 Candelabra Pull-chain Socket	.45
No. 16X10 Storage Cell	2.29
No. 16X13 Storage Cell	3.08
No. 12X14 Storage Cell	5.20
No. 12X22 Storage Battery Set	7.40
No. 12X26 Storage Battery Set	17.00
No. 16X28 Storage Battery Set	27.00
No. 2233 Bulb	1.13
No. 2004 Renewal Bulb	.25
No. 68X37 Lead in Bushing	3.50
No. 40X13 Standard Coherer and Decoherer complete	.75
Diling Tube only	.35
No. 40X15 Coherer Tube	.35
No. 40X15 Zinc Spark Gap, New Type with special composition base same as used on our No. 71X81 Fixed Condenser	.85
No. 40X35A Zinc Spark Gap	Discontinued
No. 40X36 Antenna Switch	1.75
No. 40X17 Leyden Jar, ½ pint	2.50
No. 40X18 Leyden Jar, 1 pint	3.00
No. 40X19 Leyden Jar, 1 quart	3.50
No. 40X29 Leyden Jar, ½ quart	5.50
No. 60X30 Single 1000 ohm Receiver	.80
No. 60X31 Single 1000 ohm Receiver	13.50
No. 60X05 Tikker Receiving Transformer is again on the market for only	.40
No. 60X06 Slim Pull, per lb	.40
No. 60X07 Slim Pull, per lb	1.20
No. 60X80 Boston Key	4.25
No. 60X81 Boston Key	4.25
No. 60X82 Boston Key	4.25
No. 61X05 Electrolytic Detector	Price on application
No. 61X06 Electrolytic Detector	Discontinued
No. 61X06A Mascot Tuning Coil	1.35
No. 62X04 Lead in Bushing	2.00
No. 62X05 Lead in Bushing	2.00
No. 62X06 Lead in Bushing	2.00
No. 62X20 Sounder	2.40
No. 62X22 Lead in Bushing	5.00
No. 62X23 National Automatic Transmitter—Discontinued—See Omnigraphs.	
No. 62X23 National Automatic Transmitter—Discontinued—See Omnigraphs.	
No. 64X20 Potentiometer	1.75
No. 63X11 Lead in Connector	7.00
No. 63X12 Lead in Connector	2.10
No. 63X24 Lead in Connector	2.50
No. 76X05 1 K. w. Antenna Switch	24.00
No. 76X06 2 K. w. Antenna Switch	28.00
No. 71X10 Transformer Coil Without Vibrator	1.00
No. 71X18 Receiving Transformer	4.85
No. 1200 Flashlight complete	2.75
No. 1201 Flashlight complete	.20
No. 71X31 Fixed Condenser	.90
No. 80X26 Orange Shellac, ½ pint bottle	.50
No. 80X27 White Shellac, ½ pint bottle	.50
No. 8174 108 Ampere 660 Volt S. C. D. T. Ground Switch	4.25
No. 8175 No. 2 Oscillation Transformer	.95
No. 8X40 ¼ K. w. Oscillation Transformer	14.00
No. 8X60 1 K. w. Oscillation Transformer	14.40
No. 8X87 New York Ground Clamp	.25
No. 8X71 Parlor Set less Batteries	8.70
No. 8X71 Parlor Set less Batteries	.30
No. 8X71 Ground Clamp	.30
No. 8X72 Ground Clamp	.35
No. 8X16 Ground Clamp	.35
No. 90X31 Ground Clamp	.35
No. 90X31 Ground Clamp	.40
No. 90X34 Ground Clamp	.30
No. 8X117 Ground Wire, Cable, per foot	.10
No. 8X117 Buzzer	.75
No. 94X162 Buzzer, 2¼ inches Bell	.50
No. 94X162 Buzzer, 3 inches Bell	.60
No. A1 Soldering Set	1.25
No. A11 Single Connection Block	.40
No. A12 Dynamo Motor	Discontinued
No. A19 Complete 1000 ohm Headset	2.50
No. A18 Complete 1000 ohm Headset	2.50
No. A41 Single 1000 ohm Receiver only	1.25
No. A42 Single 2000 ohm Receiver only	2.00
No. A57 Nickel Pliers	.71
No. A58 5 inch Pliers	.85
No. A59 2000 ohm Headset complete	4.00
No. A75 500 watt Dynamo	65.00
No. A76 Fan	2.25
No. A188 Guard	.59
No. A189 Guard	.59
No. A190 Universal Detector Stand	2.50
No. A160 Universal Motor	1.65
No. A191 Type C Motor Separator	5.40
No. A178 Double Cell Medical Battery	11.00
No. 178A Parts for No. 178 Motor	1.05
No. A198 Type C Motor	Discontinued
No. A181 Knapp Leader Motor	3.50
No. A184 Type XX Motor	4.92
No. A185 Type XX Motor	4.75
No. A186 Knapp AAI Motor	5.01
No. A187 6 inch Pliers	1.05
No. A150 6 inch Pliers	.85
No. A151 8 inch Pliers	1.25
No. A152 9 inch Pliers	1.60
No. A153 Motor Oscillation Transformer	4.05
No. A154 Motor 110 Volts, 60 cycle A. C	12.15
No. A155 Motor 110 Volts D. C	15.15
No. A157 1 Emery Wheel	.75
No. A158 1 Emery Wheel	.90
No. A161 Universal Type Oscillation Transformer	10.00
No. A162 Type C Ammeter	1.75
No. A163 Type C Ammeter	3.65
No. A142 Rotary Spark Gap complete	
No. A143 Rotary Spark Gap less Motor	Discontinued.
No. A143 Disc and Stationary Electrodes	
Per pair	.90
No. A453 Rheostat	2.50
No. A457 Antenna Series Condenser	1.35
No. A458 Loading Inductance	1.95
No. A114 Junior Tuning Coil	1.20
No. A115 Junior Tuning Coil	1.20
No. A146 Junior Wireless Key	4.50
No. A147 Junior Receiving Set	4.50
No. A148 Junior Receiving Set	4.50
No. A446 ¼ k. w. Blitzen Transformer	14.00
No. A447 ½ k. w. Blitzen Transformer	19.35
No. A442 1 k. w. Blitzen Transformer	22.00
No. A443 2 inch Pliers	.80
No. A444 2½ inch Pliers	1.00
No. A974 Crystal Detector Stand	1.11
No. A975 Crystal Detector Headset	Discontinued
No. A976 Battery Lamp	.30
No. A943 4 inch Pliers	.69
No. A941 5 inch Pliers	.85
No. A942 6 inch Pliers	.95
No. A944 Type C Receiving Transformer	Discontinued
No. A943A Standard Wireless Key	4.50
No. A945 Junior Wireless Key	Discontinued
No. 1067 Receiving Set	8.71
No. A1050 5 inch Pliers	.85
No. A1049 6 inch Pliers	.95
No. A1048 7 inch Pliers	1.05
No. A1091 Arlington Receiving Transformer	5.00
No. A1092 Arlington Receiving Transformer	7.50
No. A1645 Type C Receiving Transformer, Improved Type	9.00
No. A1642 Overland Key	6.00
No. A1643 Overland Key	4.50
No. A1644 Overland Key	3.00
No. A1732 Type C Sayville Rotary Gap	17.50
No. A1774 Tuner for Long Wave Lengths	4.50
No. A1776 Protective Device	4.50
No. A1816 Transmitting Condenser	12.15
No. A1818 Bissell Sewing Machine Motor	2.25
No. A1819 Fixed Condenser	Prices on Application
No. A1821 1 K. w. Condenser	Prices on Application
No. A1940 Hand Microphone Set	Discontinued
No. A1958 4 inch Pliers	1.26
No. A1958 8 inch Pliers	1.96
No. A2250 Battery Lamp	.30
No. A2250 New Automatic Wireless Self Trachie—Discontinued—Refer to Omnigraph.	
No. A2774 Soldering Stick	.35

Loose Item

No. A3776 Soldering Paste, 2 oz. box ..... .39
No. A3777 6 inch Plierette 1.75
No. A3956 6 inch Pliers 2.24
No. A3957 7 inch Pliers 2.75
No. A3958 8 inch Pliers 3.60
No. A3959 Fountain Flash Light ..... Discontinued
No. A3784 Type A Lightning Arrester Gap 12.00
No. A3744 5 to 7 Amperes Ground Switch 2.25
No. A3745 7 to 10 Amperes Ground Switch 2.75
No. A3918 Spark Gap ..... .50
No. A3919 Spark Gap ..... Discontinued
No. A3592 Transmitting Set with Batteries 3.37
No. A3593 Transmitting Set less Batteries 4.92
No. A3594 Transmitting Set with Batteries 4.35
No. A3595 Transmitting Set less Batteries 13.81
No. A4090 Transmitting Set with Batteries 5.37
No. A4091 Transmitting Set less Batteries 16.12
No. A4601 Transmitting Set with Batteries 13.72
No. A4602 Transmitting Set less Batteries 22.36
No. A4092 Transmitting Set with Batteries 19.06
No. A4093 Transmitting Set less Batteries 27.52
No. A4094 Transmitting Set with Batteries 34.25
No. A4603 Transmitting Set less Batteries 49.25
No. A4604 Transmitting Set with Batteries 44.76
No. A4095 Transmitting Set with Batteries 90.15
No. A4096 Transmitting Set less Batteries 82.29
No. A4606 Transmitting Set 26.25
No. A4607 Transmitting Set 36.46
No. A4608 Transmitting Set 49.72
No. A4609 Transmitting Set 103.40
No. A4610 Transmitting Set 197.10
No. A5651 ¼ k. w. Condenser 12.00
No. A5652 ½ k. w. Condenser 24.00
No. A5653 1 k. w. Condenser 48.00
No. A2112 Receiving Set 5.62
No. A2113 Receiving Set 6.85
No. A2114 Receiving Set 8.75
No. A2115 Receiving Set 11.60
No. A4119 Receiving Set 16.15
No. A4120 Receiving Set 26.00
No. A5121 Receiving Set 27.75
No. A1284 Oscillation Transformer 6.00
No. A1731 Receiving Transformer 6.00
No. A4725 Navy Type Receiving Complete ..... Discontinued
New and Improved Stromberg Carlson 2000 ohm Radio Head Set.. 12.50
No. 355 Complete 2000 ohm Head Set 5.00
No. 3183Xs Standard Wireless Key 5.00
No. B1413 Rheostat 1.50
No. A1414 Receiving Set 77.50
No. D20 Transmitting & Receiving Set 16.05
No. D21 Transmitting & Receiving Set 28.47
No. D22 Transmitting & Receiving Set 33.07
No. D23 Transmitting & Receiving Set 16.58
No. D24 Transmitting & Receiving Set 23.57
No. D25 Transmitting & Receiving Set 31.57
No. D26 Transmitting & Receiving Set 13.85
No. D27 Transmitting & Receiving Set 18.33
No. D28 Transmitting & Receiving Set 26.74
No. D28A Transmitting & Receiving Set 35.74
No. D29 Transmitting & Receiving Set 45.86
No. D30 Transmitting & Receiving Set 12.00
No. M14 Composition Binding Post ..... Discontinued
No. M71 Engraved Scales ..... Discontinued
No. M73 180 degree Celluloid Variable Condenser Scale ..... .75
No. B40 Receiving Set complete 18.75
No. B41 Receiving Set complete 23.50
No. B42 Receiving Set, less Variable Condenser 23.50
No. W409 ¾ k. w. Tesla High Frequency Coil 12.00
No. W401 1 k. w. Tesla High Frequency Coil 19.00
No. W502 Complete ¾ k. w. High Frequency Outfit 42.00
No. W503 Complete 1 k. w. High Frequency Outfit 60.00
No. W504 Complete 2 k. w. High Frequency Outfit 100.00
No. W505 Complete High Frequency Coil 68.00
No. W501 Complete High Frequency Outfit 275.00
No. W409 2 k. w. Tesla High Frequency Coil 90.00
No. W410 Complete 2 k. w. Frequency Outfit 150.00
No. W411 Hinged Electrolytic Interrupter 3.00
No. W413 Extra Glass Tube 1.10
No. W414 Extra Alloy Rod, each ..... .88
No. W417 Blitzen Electrolytic Rectifier 3.25
No. W418 Blitzen Electrolytic Rectifier 15.00
No. W419 Renewal Charge of Chemicals ..... .50
No. W420 Hot Wire Meter 7.50
No. W434 Blitzen Wave Meter 9.50
No. W447 Hot Wire Meter 12.00
No. W448 Hot Wire Meter 12.00
No. W449 Hot Wire Meter 14.00
No. W139 ¼ k. w. Tesla Transmitter complete 110.00
No. W140 ½ k. w. Hytone Set, complete 210.00
No. W141 ¾ k. w. Hytone Gap, Motor and Transformer 125.00
No. W772 1 k. w. Hytone Gap, Motor and Transformer only 140.00
No. W773 Type X Tuner Improved Type ..... Price on application
Audio Tron Bulb, price reduced to 15.00
Annunciator Wire, additional, per pound ..... .20
Adjustable Hangers ..... Prices on application

Blitzen Transformer Parts:

¼ k.w. Core 4.00
¼ k.w. Primary 5.50
¼ k.w. Cabinet 6.75
½ k.w. Primary 7.00
½ k.w. Core 9.00
½ k.w. Secondary 9.50
½ k.w. Cabinet 10.00
1 k.w. Core 9.00
1 k.w. Secondary 16.00

Blitzen X-ray Tubes and Screens ..... Prices on application

Books—
"Audel's Easy Lessons in Wireless Telegraphy," new and up-to-date pocket Wireless Manual, postpaid ..... .55
"Brazing & Soldering" ..... .25
"Bunnell's Telegraph Instructor" 2.50
"Condensed Alloys all its Applications," half morocco 7.50
"Electric Wiring Diagrams and Switchboards" 2.00
"Experimental Wireless Stations," 1919 Edition, enlarged and up-to-date 2.00
"Hawkins Electrical Guides," per set, postpaid 9.60
"Hawkins Electrical Guides," per volume, postpaid 1.60
"Hawkins 20th Century Book of Receipts, Formulas and Processes" 3.50
"House Wiring" ..... .40
"Model Engineer's Series of Books ..... Out of print
"Operation of Wireless Telegraph Stations" ..... Out of print
"Practical Pattern Making" 2.00
"Pyrography Outfit" 1.50
"Saw Filing and Management of Saws" ..... .75
"Shop Kinks" 1.00
"Switchboards" 2.00
"Telephone Construction, Installation, Wiring, Operation and Maintenance" 1.25
"The Key Mechanic" 1.00
Woodworkers Series of Books ..... Out of Print
Complete Set of Parts for No. 1 Panel Detector Set 7.75
Following separate items have advanced in price:
1 Panel, Highly Polished Formica ¼"x5¼"x11" Drilled, Edges Finished 2.75
12 No. 6BX Binding Posts 1.48
1 No. B1413 Rheostat, Back Mounted 1.10
1 No. B1432 Rheostat, Back Mounted ..... .90
Rubber Covered Wire for connection ..... .20
Blue Print of connections ..... .25
Complete Set of Parts for No. 2 Panel Detector Set 13.35
Following separate items have advanced in price:
1 Panel, Highly Polished Formica ¼"x7¼"x12", Drilled, Edges Finished 4.00
1 No. B1432 Rheostat, Back Mounted 1.10
12 No. 6BX Binding Posts 1.48
Rubber Covered Wire for connections ..... .40
1 No. B1433 Nickel Plated Socket ..... .45
Blueprint of Connections ..... .25
Complete Set of Parts for No. 3 Panel Detector and Amplifier Set 23.75
Following separate items have advanced in price:
1 Panel, Highly Polished Formica ¼"x7¼"x11¼", Drilled Edges Finished 3.54
1 No. A7349 Amplifying Transformer Coil 9.00
2 No. B1432 Rheostat Back Mounted 2.20
24 No. 12X Binding Posts 3.34
Rubber Covered Wire ..... .45
1 No. B1433 Nickel Plated Sockets 1.80
1 Blueprint of Connections ..... .25
Cords, Mercerized Cotton, 4 ft. 4 tip ..... .38
Cords, Mercerized Cotton, 5 ft. 4 tip ..... .40
Cords, Mercerized Cotton, 5 ft. 6 tip ..... .60
Cords, Silk Covered, 4 ft. 4 tip ..... .60
Cords, Silk Covered, 5 ft. 6 tip ..... .75
Countershaft, No. 1 ..... 4.00
DeForest Audion Detectors—Discontinued. See Panel Detector Sets.
Ever-Ready Ammeters, Voltmeters and Volt Ammeters (Same prices as in Catalog No. 19.)
Flexible Micanite. Advance over catalogue price 50%
Generators—
Standard Type "S" Direct Current Generators,
Standard Type "J" Direct Current Generators,
Robbins & Myers Alternators,
Motor Generator Sets,
Rotary Converters,
Stationary Field Alternators. } Prices on application.
German Silver Wire, Plain or Cotton Covered—
Additional on 1 pound spool ..... .20
Additional on ½ pound spool ..... .20
Headbands, leather covered, single No. 22L ..... .75
Headbands, leather covered, double No. 30D 1.50
Headbands, No. 55 Nickeled German Silver 1.50
Headbands, No. 55 Unnickeled German Silver 1.50
Iridium Platinum Wire ..... Prices on application
Iron Fuileys ..... Prices on application
Key Contacts—
Extra Silver Contacts for No. 9BX 1.00
Extra Silver Contacts for No. A 893 ..... 1.50
Extra Silver Contacts for No. 898X 2.50
Induction Coils, Telephone Type ..... Prices on application
Lighting Plants ..... Prices on application
Manila Lamps ..... Approximately 20% Increase
Magnetic Keys ..... Prices on application
Mignon Receiving Cabinets, Detectors and Adjustable Disc, Core Undamped Wave Receivers. Listed in first edition of Catalog. No. 11 and former edition, also in third edition of catalog. No. 11 and inadvertently omitted from second edition of Catalog No. 12.
No. 1C Mignon Receiving Set, less Detector, very compact; especially designed for Navy Type installations 10.80
No. 1C2 Mignon Receiving Set, less Detector, equipped with duplex vario-coupler. Wave length capacity 4,300 meters 23.00
No. 1LCS Mignon Receiving Set, less Detector, equipped with Mignon loose coupler, wound on laminated Drum Forms which greatly increase the efficiency of coupler. Wave length capacity, 4,300 meters 46.80
No. RB1N Detector. Represents the last word in Wireless Audio Bulb Detector. Equipped with Electron Audio Bulb wired in accordance with specifications of Mignon Undamped Wave System, including Auto Transformer encircling bulb. In one of the most efficient detectors ever produced, more than doubles the efficiency of ray Radio Receiving Stations 31.00
Mignon Adjustable Disc Core Undamped Wave Receivers (Latest Mignon Invention). embrace a new field in Radio engineering. These latest types introduce adjustable special metal disc. cores hereto-fore considered absolutely impossible. These new undamped wave receivers consist of two variometers used for reception of damped waves by addition of my loose coupler without interfering with the reception of undamped waves.

No. RW1 (No core equipment for use in connection with RBD8 Detector 48.00
No. RW3 (With adjustable disc, core) for use in connection with R. B. D's Detector 65.00
No. RW4 Receiver with R. B. D. 8 circuit adjustable disc, core equipment and four wires terminals for damped wave reception 110.00
Type "UL-1 Mignon Long Wave (19,400 meters) Undamped Wave, Receiving Cabinet, less detector with record of picking up foreign stations in France, Italy, Honolulu, etc. (New type not listed in earlier editions of our catalog) 60.00
Type UM-1 Receiving Cabinet for damped or undamped waves, from 200 to 2500 meters, less Detector 60.80
Motors—
K & D Motors no longer listed. Prices on any style upon application.
Type "N" Direct Current Motors.
Type "A" and type "AA" Induction Motors } Prices on application

NEW WIRELESS PRESS BOOKS.

New Editions just off the press, incorporating the latest, most authoritative and complete works on radio yet published.
"Radio Telegraphy"—Goldsmith $2.60
"Practical Wireless Telegraphy"—Bucher 1.75
"Practical Aviation"—Wireless 1.75
"Vacuum Tubes in Wireless Communication"—Bucher 1.75
"How to Pass U. S. Government Wireless Examinations" 1.50
"Radio Instruments and Measurements" 1.75
"Signal Corps Manual" 1.75
"Wireless Telephone Guide" 1.50
"Wireless Age", yearly subscription 2.00

NEW VARIABLE CONDENSERS

Balanced Type Condenser. A variable air capacity far above the normal. The plates are of .023 thick aluminum, which is about twice the thickness of such material commonly used in small condensers, giving much greater ruggedness. The plate assembly is made on heavy aluminum uprights, with the entire bunting or spacing loss of adjustment and change in capacity is thus prevented. Designed for mounting on back of panels and base. Can be furnished in the following sizes and variations:
No. W910 Balanced Variable Air Condenser, without case, maximum capacity .0095 M. F., minimum capacity .00005 M. F. $6.00
No. W802 Same as above but maximum capacity .003 M. F. 4.00
Either condenser will be furnished in an oak cabinet 4"x4"x4" with hard rubber panel, switch handle and pointer, fitted with binding posts, at an additional cost of 4.00
Large size variable Air Condenser, similar to the type described above. The spacing of the plates however, is greater being .048 in. and the plates themselves are stamped from .032 inch thick aluminum. The rotary plates themselves are assembled on a shaft of highest grade hard brass rod, running in bushings of the same material. Mounting is on a round light brass cylinder with bakelite top, and the pointer is fitted with a bakelite knob and with black divisions which is very legible. Condenser is also supplied without case and when so supplied is made self-balancing by special arrangement of plates.
No. W919 Condenser in metal case, maximum capacity .001 M. F. $20.00
No. W705 Same as W919 .002 M. F. 22.00
No. W706 Same as W919 .003 M. F. 20.00
No. W705A Unmounted, balanced condenser, same construction as W919 .001 M. F. 15.00
No. W705A Unmounted, balanced condenser, same construction as W705 .002 M. F. 19.00
No. W705A Unmounted, balanced condenser, same construction as W705 .003 M. F. 24.00

NEW HOT WIRE MILLIAMMETERS.

These Meters are arranged for flush mounting on panels or cabinets and are calibrated with extreme care for accuracy. They are entirely a new design which insures permanency of zero adjustment even under great temperature changes and severe shock. The meter shaft runs in highest grade jewels and is controlled by a hair spring as used in the best marine instruments. The instrument is arranged for flush mounting on panel or cabinet and is designed to be placed in a mahogany case in an oak box with hinged cover with binding posts. Resistance about 2 ohms. Aside from its general high quality and accuracy, the permanency of the zero point will recommend the instrument to all who have had experience with meters of this class. While a zero adjustment is provided on the front of the case, its use will seldom if ever be required.
No. W902 Hot Wire Milliamster for flush mounting; scale 0-500 or 0-1000 M. A. $9.00
No. W903 Same as W902, but scale reading 0-250 M. A. 9.50
For either meter mounted in polished dark finished oak box with binding posts add 2.50

Norway Iron Core Wire for induction coil cores ..... Prices on application
Parts of Spark Coils. Advance over catalog prices 10%
Parts of Spark Coils. Advance over catalog prices 10%
¼ k.w. Transformer Secondaries, complete 5.75
Parts of Telegraph Instruments. Advance over catalog prices 10%
Primary Cable, per foot ..... .09
Receivers—Type A, M. and Leader Style Receivers no longer sold.
Rubber Covered Wire for connections of No. 1 Panel Detector Set ..... .20
Receiving Transformers of No. 6IX13 Coherer and Decoherer and No. 55X6 Polarized Relay 11.75
Secondary Cable, per foot ..... .09
Seven Strand No. 32 Bronze Wire, per hundred feet 2.00
Silicon Steel for Transformer ..... Price on application
Switchboard Hooks and Sliders ..... Prices on application
Tuning Coils, Hooks and Sliders—
For Mascot Tuning Coil 4¾" long, each ..... .40
For Standard Tuning Coil 15" long, each ..... .50

TWL 4 Volt 40 A.H. Storage Battery
TWL 6 Volt 40 A.H. Storage Battery } Discontinued
TWL 6 Volt 80 A.H. Storage Battery } See Universal Batteries
TWL 6 Volt 90 A.H. Storage Battery } sold by us at substantial
TWL 6 Volt 120 A.H. Storage Battery } reduction from regular price.
TWL 6 Volt 158 A.H. Storage Battery
Two Conductor No. 14 Lighting Cable, per foot ..... .10
Types TWL-H & HMT Storage Batteries Isolated Lighting Plant Type....Discontinued

Type "C" Ammeter ..... .80
Type "C" Voltmeters 3-3 Volts 1.85
Type "C" Voltmeters 9-12 Volts 1.80

Type "C" Volt Ammeter
0-30 Amperes 1.15
3-3 Volts
0-15 Amperes 1.85
9-12 Volts

UNIVERSAL STORAGE BATTERIES

We can quote a very special price on a Universal Storage Battery for any type of automobile manufactured. Send name, model and year of your car.

We are now supplying the following types of Universal Storage Batteries, in place of the Type TWL storage batteries listed in former editions of our catalogue, which we have discontinued:
Type 1 4 Volt 40 A.H. Storage Battery $10.35
Type 1 6 Volt 40 A.H. Storage Battery 12.95
Type 1 6 Volt 60 A.H. Storage Battery 15.60
Type 1 6 Volt 80 A.H. Storage Battery 18.20
Type 1 6 Volt 100 A.H. Storage Battery 24.75
Type 1 6 Volt 120 A.H. Storage Battery 27.25

We also supply a very complete line of Universal Storage Batteries for Isolated Lighting Plants and will be pleased to send quotations upon request.

WIRELESS BLINKER SETS

No. 1948 Blinker Set, consisting of key, socket and bulb mounted on neat mahogany base $2.25
No. 1949A Blinker Set as above with addition of watch case buzzer and two-point switch so that either bulb or buzzer may be used 3.00

WIRELESS PRACTICE (BUZZER) SETS

No. 1949A Buzzer Set, consisting of key and watch case buzzer mounted on a neat mahogany base with binding post connections $2.50
No. 1936 Adjustable Buzzer Practice Set as above, but with adjustable high tone buzzer and with extra dry battery 3.25
No. 1936A Adjustable Buzzer Practice Set, less wire and battery 1.90
No. 231 Adjustable Buzzer only 1.25
No. 6IX6 Blitzen Receiving Transformer is again on the market for only 12.50
Also A1465 Deluxe Receiving Transformer 25.00

THE WILLIAM R. DUCK COMPANY
TOLEDO, OHIO



Revised Price List to Duck's Big Electrical & Wireless Catalog
February 15, 1919
Our latest catalog mailed for 12c in stamps or coin.

Loose Item

No. D24 TRANSMITTING AND RECEIVING SET

Transmitting Range 1½ to 4 miles. Receiving Range 300 to 800 miles.

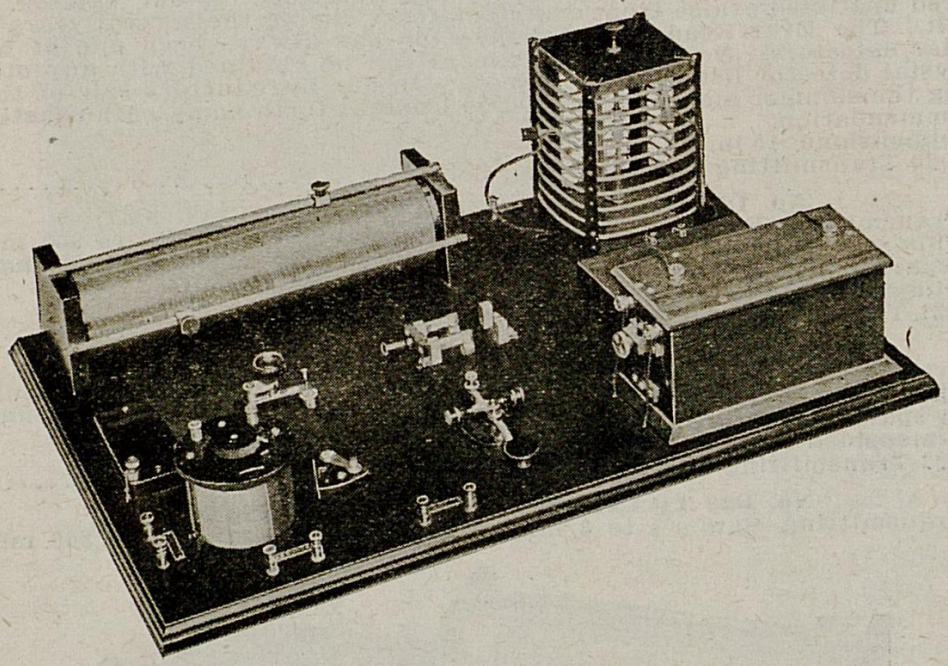
This set comprises the same instruments as No. D23, excepting that a ½-inch spark coil is provided in place of a ¼-inch spark coil.

Dimensions same as No. D23.

No. D24 Transmitting and Receiving Set.....$13.50

No. D25 TRANSMITTING AND RECEIVING SET

Transmitting Range 6 to 10 miles. Receiving Range 300 to 800 miles.



Note.—Variable condenser shown in cut supplied for $3.75 additional.

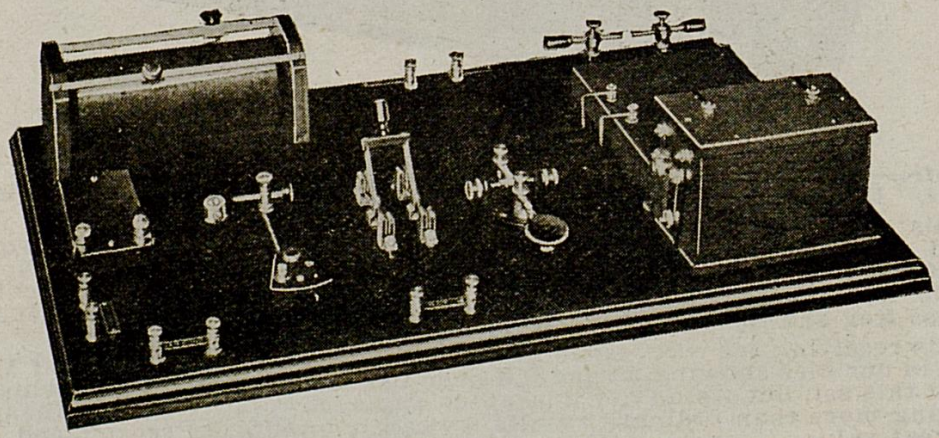
This set comprises all the instruments in No. D23 and also a helix, with a 1-inch spark coil substituted in place of a ¼-inch spark coil.

Dimensions, 15 in. x 27 in.

No. D25 Transmitting and Receiving Set.....$17.90

No. D26 TRANSMITTING AND RECEIVING SET

Transmitting Range 1 to 3 miles. Receiving Range 70 to 200 miles.



Note.—Transmitting condenser is not necessarily required with this set. You may deduct $1.00 from cost of set if it is not desired.

This set comprises No. A514 Junior Tuning Coil; No. 77X81 Fixed Condenser; No. A500 Junior Detector Stand; and all the transmitting instruments in set No. D23.

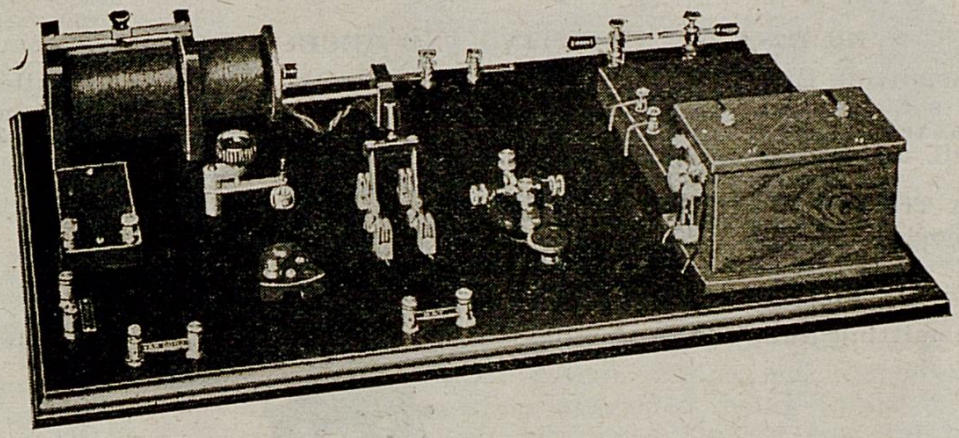
This is the lowest price mounted transmitting and receiving set we make. All the instruments are made with the same care as in many of the higher price sets but they are not designed for great ranges either in transmitting or receiving. It is an excellent set for the beginner. We also recommend it for schools in teaching the principles of wireless telegraphy.

Dimensions, 15 in. x 24 in.

No. D26 Transmitting and Receiving Set.....$10.65

No. D27 TRANSMITTING AND RECEIVING SET

Transmitting Range 1½ to 5 miles. Receiving Range 200 to 700 miles.



Note.—Deduct $1.00 from cost of set if transmitting condenser is not desired.

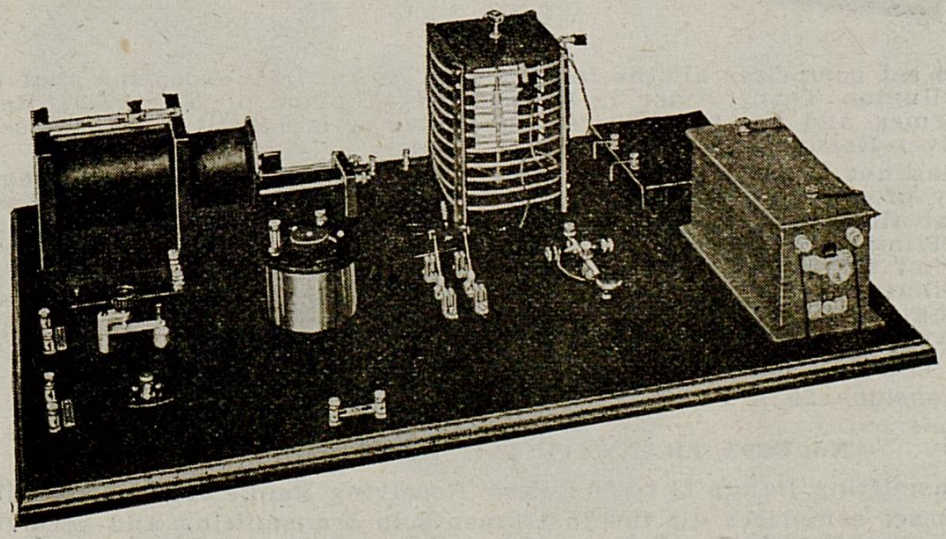
This set comprises our No. A520 Receiving Transformer; No. 77X81 Fixed Condenser; No. A7712 Ever-Ready Crystal Detector; and the same transmitting instruments as in No. D24. This is our lowest price set in which a receiving transformer is part of the receiving apparatus. This transformer is described at length in our catalog. It is exceptionally well made and will give surprising results. Note the exceptional quality of the other wireless instruments comprising this set.

Dimensions, 18 in. x 30 in.

No. D27 Transmitting and Receiving Set.....$14.10

No. D28 TRANSMITTING AND RECEIVING SET

Transmitting Range 10 to 17 miles. Receiving Range 300 to 1,000 miles.



We are certain that this set will prove to be very popular. It comprises No. A7721 Receiving Transformer; No. 77X81 Fixed Condenser; No. A7712 Ever-Ready Crystal Detector. No. 30X50 Blitzen Variable Condenser and connections for additional variable condenser; No. 42X0—2-inch Spark Coil; No. A1916

Sending Condenser; No. 60X15 Spark Gap; special Helix; No. A562 Junior Wireless Key and No. 71X0 D. P. D. T. Switch.

We call your attention to the description of the various instruments comprising this receiving set as set forth in our catalog. No. A7721 Receiving Transformer has always been one of our most popular transformers. It is a most beautifully finished instrument, the workmanship being on a par with that on many transformers selling for a great deal more. In fact every instrument comprising this set is of more than ordinary quality.

Dimensions, 20 in. x 32 in.

No. D28 Transmitting and Receiving Set.....$28.25

No. D28A TRANSMITTING AND RECEIVING SET

Transmitting Range 14 to 20 miles. Receiving Range 500 to 1,200 miles.

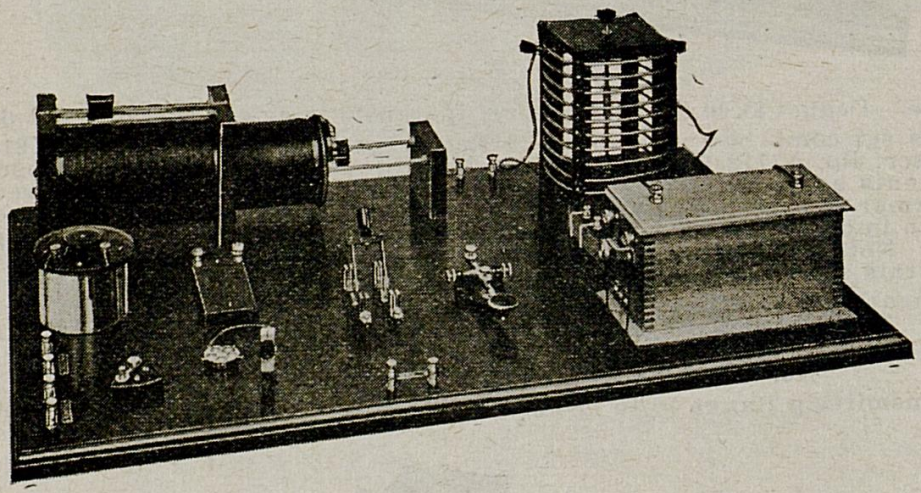
This set comprises all the instruments in transmitting and receiving set No. D28, excepting that a 3-inch spark coil is substituted in place of a 2-inch spark coil, and two No. A1916 Transmitting condensers are provided in place of one.

No. D28A Transmitting and Receiving Set.....$35.25

Dimensions, 20 in. x 32 in.

No. D29 TRANSMITTING AND RECEIVING SET.

Transmitting Range 10 to 17 miles. Receiving Range 800 to 1,500 miles.



This set comprises all the instruments in No. D28, excepting that our No. 1091 Arlington Transformer is substituted in place of No. A7721 Receiving Transformer, and No. A512 Turret Cup Detector is substituted in place of No. A7712 Ever-Ready Crystal Detector.

It has not been many years when a set combining the advantages and efficiency of our No. D29 set would cost from $65.00 to $75.00. There is no reason at all why a range of 1,500 miles cannot quite easily be obtained with the receiving apparatus on this set. We know of no receiving transformer on the market selling for $15.00 that will give even as good results as our No. 1091 Arlington Transformer. It looses none of its efficiency in responding to wave lengths up to 4,000 meters. With commercial stations rapidly increasing their wave lengths this set will, we know, be exceedingly popular.

No. D29 Transmitting and Receiving Set.....$33.00

Dimensions, 20 in. x 32 in.

No. D29A TRANSMITTING AND RECEIVING SET.

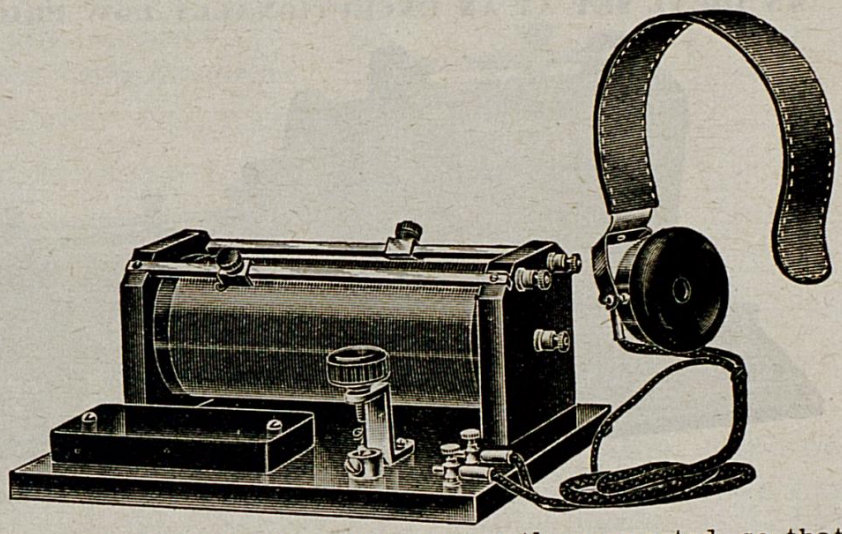
Transmitting Range 14 to 20 miles. Receiving Range 500 to 1,500 miles.

This set comprises all the instruments in transmitting and receiving set No. D29, excepting that a 3-inch park coil is substituted in place of a 2-inch spark coil and two No. 1916 Transmitting Condensers are provided in place of one.

No. D29A Transmitting and Receiving Set.....$40.00

Dimensions, 20 in. x 32 in.

JUNIOR RECEIVING SET

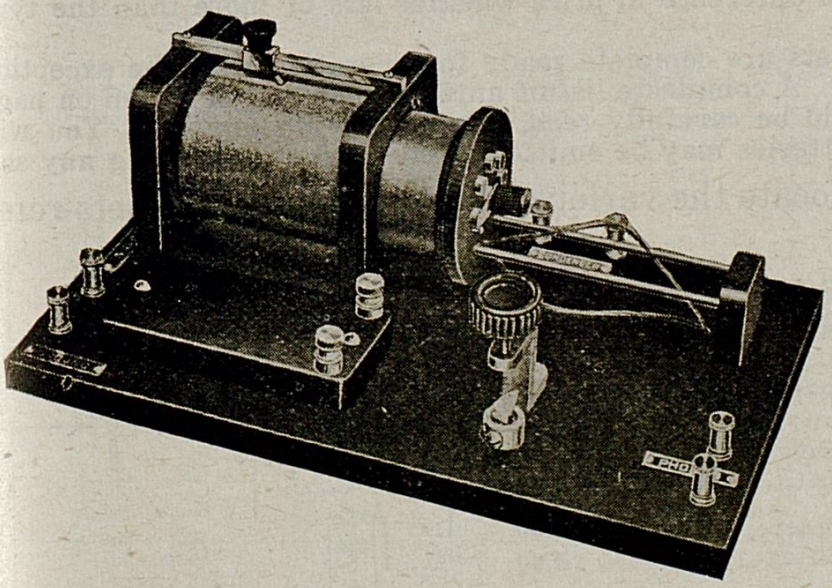


We believe that this set represents the greatest value ever offered in a first class wireless experimental set. Every instrument is exceptionally well made. Theer is no more fascinating pastime than wireless, and surely as a Christmas gift, nothing could possibly please a boy like a wireless set. It is the ideal set for the beginner. The set compries a complete receiing outfit, already to connect to the aerial and ground. The instruments are all mounted upon a mahogany finished base, and permanently connected, so that there is no possibility of a faulty connection, which might lower the efficiency. The set consists of a double slide tuning coil, detector, and a fixed condener. The wire is all entirely concealed, being inlaid in grooves in the bottom of the base. Set is provided with binding post for te aerial, ground and phones. The woodwork is all finished in dark mahogany. It will be observed that for the convenience of those who desire to pick out their own receivers, which is a necessary part of the outfit, the set is sold without receivers and with various typese and styles of receivers.

No. A580 Junior Receiving Set (Shipping weight, 6 lbs.).....$ 4.00

JUNIOR RECEIVING SET

LOOSE COUPLED TUNER

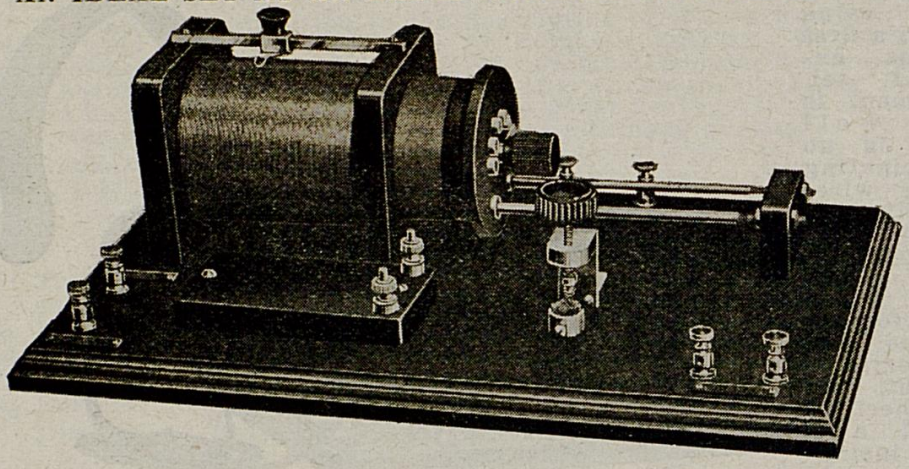


This set is even more sensitive than our No. A580. It is provided with a loose coupled tuner or receiving transformer in place of a double slide tuning coil The instruments are all mounted on a mahogany finished base and permanently connected. The set comprises a loose coupled tuner, detector and fixed condenser. The loose coupler is our well known No. A520. It makes very selective tuning possible and enables the experimenter to tune out any unwanted station and bring the one desired in loudly and clearly.

No. A585 Junior Receiving Set with Loose Coupled Tuner, 8 lbs.....$ 5.60
Shipping weight, 6 lbs.

RECEIVING OUTFIT No. A1002

AN IDEAL SET AT AN EXCEPTIONALLY LOW PRICE



This set is similar to No. A1001, with the exception that it is provided with our No. 71X18 receiving transformer which permits very close tuning. Too much importance cannot be attached to this, because if you wish to receive long distance messages it is absolutely essential to do some very close tuning. The loose coupler makes it possible. This outfit is also provided with two extra sets of binding posts to which a variable condenser may be attached. Range 300 to 700 miles. Size, 8½x15x4½ inches. Shipping weight, 8 lbs.

No. A1002 Receiving Outfit ..... $ 7.85

TRANSMITTING SETS

The following transmitting sets comprise a great variety of wireless instruments, and for those who do not prefer a mounted set these sets offer a wide range and variety of wireless instruments from which to choose.

It will be observed that we offer the complete sets at particularly attractive prices, allowing a substantial discount from the net prices of the various instruments comprising a complete set. No substitutions are allowed on any of these sets, excepting with receivers. We appreciate that there are oftentimes prejudices in favor of certain types of receivers or head sets and for this reason we allow any type of receiver or head set to be substituted upon payment of the difference in price whether less or more than the type listed with the set.

The following sets are complete ready for operation with the exception of antenna material. A compleete list of antenna material is shown on page 74. This page should be carefully read before ordering any set. You will also observe that batteries may be omitted at cost price in ordering any set.

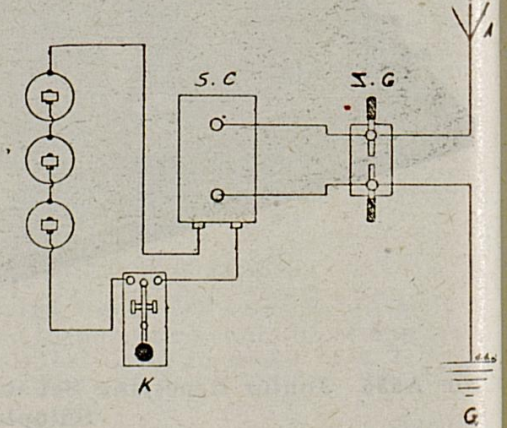
NOTE: To locate the various instruments in these sets refer to index.

TRANSMITTING SET No. A5998

Range, ½ to 3 miles, using four-wire aerial 25 feet above earth.

No. 39X0 ¼-inch Spark Coil	$ 2.25
No. 60X15A Spark Gap	.50
No. 10X1 Reliable Key	.85
3 Red Seal Dry Batteries.....	.90
Special price on Complete Outfit....	$ 4.50
Less Batteries	3.60

Note.—For list of antenna material, see page 74.



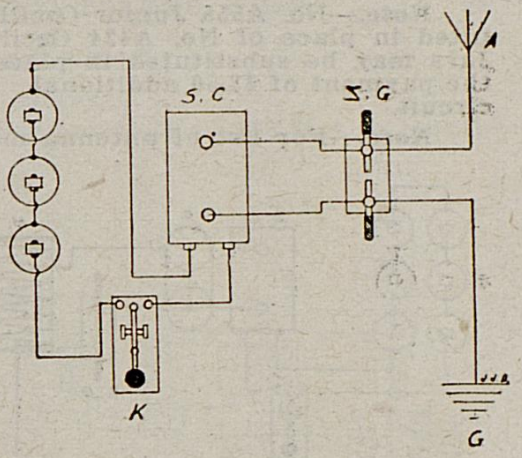
February 15, 1919
Our latest catalog mailed for 12c in stamps or coin.

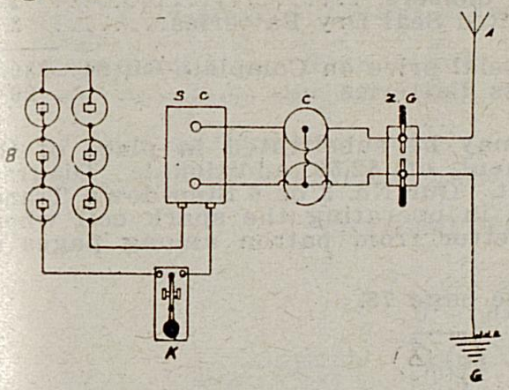
TRANSMITTING SET No. A5999

Range, 1 to 4 miles, using four-wire aerial feet above earth.

No. 40X0 ½-inch Spark Coil	$ 2.65
No. 60X15A Spark Gap	.50
No. 10X1 Reliable Key	.85
4 Red Seal Dry Batteries	1.20
Special price on Complete Outfit	$ 5.00
Less Batteries	3.85

Note.—For list of antenna material see page 78.





TRANSMITTING SET No. A6000

Range, 4 to 8 miles, using four-wire aerial 30 feet above earth.

No. 44X6 1-inch Spark Coil	$ 4.25
No. A1916 Transmitting Condenser	1.00
No. 10X1 Reliable Key	.85
No. 60X15 Spark Gap	.90
6 Red Seal Dry Batteries	1.80
Special price on Complete Outfit	$ 8.75
Less Batteries	7.00

Note.—Two No. 60X18 Leyden Jars may be substituted in place of No. A1916 Transmitting Condenser, if desired, for $3.50 additional. Diagram shows connections for Leyden Jars.

Note.—For list of antenna material see page 74.

TRANSMITTING SET No. A6001

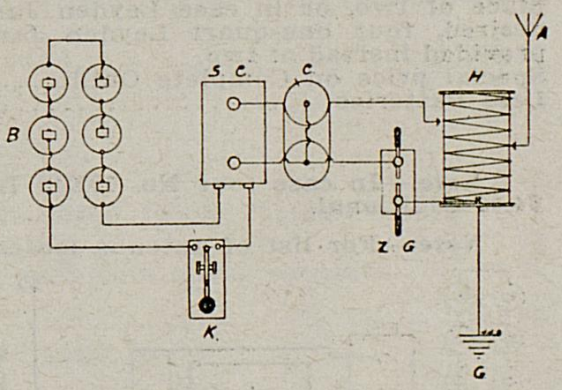
Range, 5 to 10 miles, using four-wire aerial 30 feet above earth.

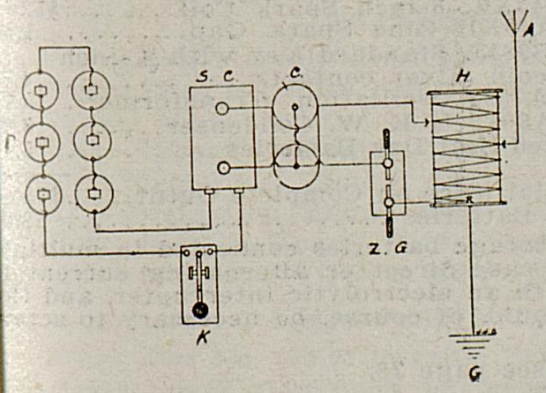
This set comprises all the instruments in set No. A6000 and in addition, No. A555 Junior Oscillation Transformer.

Special price on Complete Outfit. $12.55
Less Batteries 10.75

Note.—Two No. 60X18 Leyden Jars may be substituted in place of No. A1916 Transmitting Condenser, if desired for $3.50 additional. Diagram shows connections for Leyden Jars.

Note.—For list of antenna material see page 78.





TRANSMITTING SET No. A6002

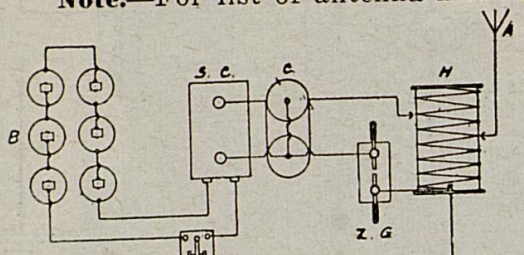
Range, 7 to 15 miles, using four-wire aerial 40 feet above earth.

No. 42X0 2-inch Spark Coil	$ 8.15
No. A4018 Spark Gap	1.40
No. A424 Oscillation Transformer	4.50
No. 10X0 Legless Key with platinum contacts	1.10
No. A1916 Transmitting Condenser	1.00
8 Red Seal Dry Batteries	2.40
Special price on Complete Outfit	$17.75
Less Batteries	15.35

DUCK'S BIG Electrical & Wireless Catalog
February 15, 1919
Our latest catalog mailed for 12c in stamps or coin.

Note.—No. A555 Junior Oscillation Transformer may, if desired, be substituted in place of No. A424 Oscillation Transformer. Two No. 60X19 Leyden Jars may be substituted in place of No. A1916 Transmitting Condenser upon the payment of $3.50 additional. Diagram shows Leyden Jars connected in the circuit.

Note.—For list of antenna material see page 78.



TRANSMITTING SET No. A6003

Range, 12 to 20 miles, using four-wire aerial, 40 feet above earth.

No. 43X0 Spark Coil	$14.70
No. A4018 Zinc Spark Gap	1.40
No. 98X5 Standard Wireless Key	2.00
No. A7628 Oscillation Transformer	5.75
2 No. 1916 Transmitting Condensers	2.00
12 Red Seal Dry Batteries	3.60
Special price on Complete Outfit	$30.00
Less Batteries	26.40

Note.—Two No. 60X19 Leyden Jars may be substituted in place of the Transmitting Condenser upon the payment of $2.50 additional. Diagram shows Leyden Jars connected in the circuit. Our No. 3 or 6 Step-down Transformer may be very advantageously used in operating the spark coil where alternating current is available. Read letter from patron among pages of testimonials, 49-56.

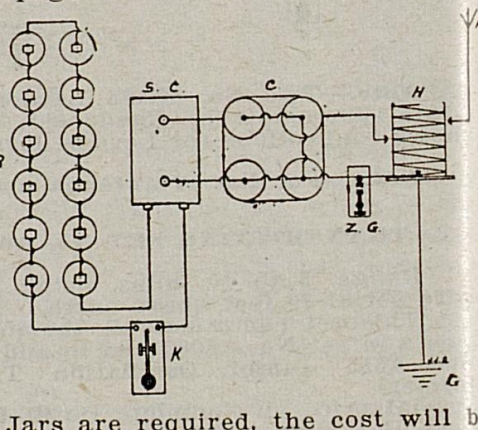
Note.—For list of antenna material see page 78.

TRANSMITTING SET No. A6004

Range, 15 to 30 miles, using four-wire aerial, 60 feet in length and 50 feet above earth.

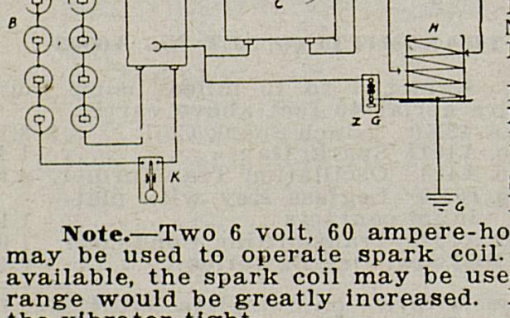
This set comprises the same instruments as set No. A6003, except that a four-inch spark coil is substituted in place of the 3-inch spark coil, and three No. A1916 Transmitting Condensers are provided in place of two, or in case Leyden Jars are desired, four one-quart Leyden Jars are provided instead of two.

Special price on Complete Outfit	$34.00
Less Batteries	30.40



Note.—In case four No. 60X19 Leyden Jars are required, the cost will be $4.00 additional.

Note.—For list of antenna material see page 78.



TRANSMITTING SET No. A6005.

Range, 25 to 50 miles, using four-wire aerial, 60 feet in length and 50 feet above earth.

No. 45X0 6-inch Spark Coil	$53.00
No. A40X18 Zinc Spark Gap	1.40
No. B98X5 Standard Key with ⅜-inch coin silver contacts	4.00
No. A7628 Oscillation Transformer	5.75
No. A6051 ¼ K. W. Condenser	8.00
18 Red Seal Dry Batteries	5.40
Special price on Complete Outfit	$75.00
Less Batteries	69.60

Note.—Two 6 volt, 60 ampere-hour storage batteries connected in multiple may be used to operate spark coil. In case direct or alternating current is available, the spark coil may be used with an electrolytic interrupter, and the range would be greatly increased. It would, of course, be necessary to screw the vibrator tight.

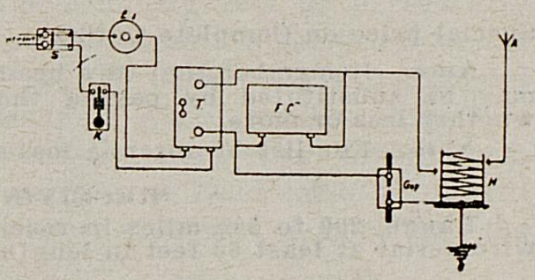
Note.—For list of antenna material see page 78.

TRANSMITTING SET No. A6006

For use on 110-volt direct or alternating current.

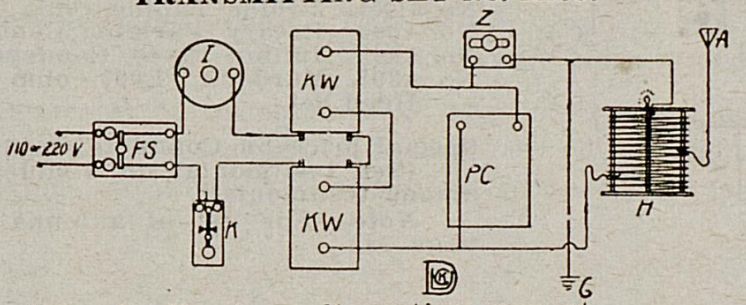
Range, 15 to 40 miles, using four or six-wire aerial 60 to 100 feet in length and 50 feet above earth.

No. 71X10 ½ K. W. Transformer...	$ 6.50
No. W611 Blitzen Electrolytic Interrupter	2.50
No. A40X18 Zinc Spark Gap.....	1.40
3 No. A1916 Transmitting Condensers.	3.00
No. 71X4 "Trumbull" D . P. Single Branch Fused Panel Cut-out with 2 10-ampere Edison Fuse Plugs.	1.00
No. A7628 Oscillation Transformer..	5.75
No. 9X85 Standard Wireless Key...	2.00
Special price on Complete Outfit.....	$22.00



Note.—For list of antenna material see page 78.

TRANSMITTING SET No. A6007



For use on 110-volt, direct or alternating current.

Range, 30 to 50 miles, using four or six-wire aerial 60 to 100 feet in length and 50 feet above earth.

2 No. 71X10 ½ K. W. Transformer Coils at $6.50.....	$13.00
No. A6051 High Potential Condenser.....	8.00
No. A7628 Oscillation Transformer	5.75
No. A4018 Zinc Spark Gap.....	1.40
No. W611 Blitzers Electrolytic Interrupter.....	2.50
No. 71X4 "Trumbull" D. P. Single Branch Fused Panel Cut-out with 2 10-ampere Edison Fuse Plugs.....	1.00
No. 98X5 Standard Wireless Key with ¼-inch coin silver contacts.....	3.75
Special price on Complete Outfit.....	$34.95

Note.—For list of antenna material see page 78.

TRANSMITTING SET No. A6008

For use on 110-volt alternating current only.

Range 75 to 100 miles, using four or six wire aerial 60 to 100 feet in length, and 50 feet above earth.

No. 63X0 Type T-O Flexible Transformer, with protective device.....	$12.25
4 No. 48X00 Murdock Molded Sending Condensers.....	8.00
No. A7628 Oscillation Transformer	5.75
No. 63X01 Sayville Rotary Spark Gap.....	12.00
No. A98X5 Standard Wireless Key, with ¼-inch coin silver contacts.....	3.75
Special price on Complete Outfit.....	$42.00

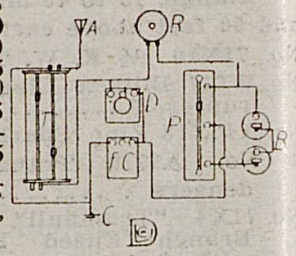
Note.—Our No. 63X01 Sayville Rotary Gap may be substituted in place of No. A4019 Spark Gap upon payment of difference in price. As previously stated no other substitutions will be allowed.

Duck's Big Electrical & Wireless Catalog
February 15, 1919
Our latest catalog mailed for 12c in stamps or coin.

RECEIVING SET No. A6115

Range, 100 to 300 miles, receiving from high power stations, with four-wire aerial at least 60 feet in length and 30 to 40 feet above earth.

No. 61X06 Improved Electrolytic Detector	$ 1.25
No. 61X08A Mascot Tuning Coil	2.00
No. A30L Murdock 1,000-ohm Head Set	2.50
No. 66X82 Potentiometer	1.25
No. A962 Junior Fixed Condenser	.60
1 Red Seal Dry Battery	.25
Special price on Complete Outfit	$ 7.35

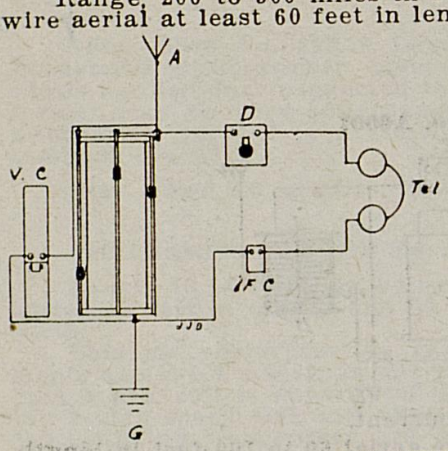


Note.—Remember that any head set listed in catalog may be substituted by paying the difference in price, whether less or more.

Note.—For list of antenna material see page 78.

RECEIVING SET No. A6116

Range, 200 to 500 miles in receiving from high power stations with four-wire aerial at least 60 feet in length and 30 to 40 feet above earth.



No. 40X01 Standard Detector	$ 1.25
No. 61X10 3-Slide Tuning Coil	3.35
No. A368 Rotary Variable Condenser	3.50
No. A962 Junior Fixed Condenser	.60
No. A30L Murdock 1,000-ohm Single Head Set	2.50
Special price on Complete Outfit	$10.50

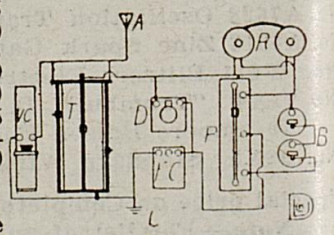
(See testimonial on 3-slide Tuning Coil among testimonials.

Note.—For list of antenna material see page 78.

RECEIVING SET No. A6117

Range, 100 to 450 miles in receiving from high power stations with four-wire aerial at least 60 feet in length and 30 to 40 feet above earth.

No. 61X06 Improved Electrolytic Detector	$ 1.25
No. 60X10 3-slide Tuning Coil	3.35
No. A30L Murdock 1,000-ohm Head Set	2.50
No. 66X82 Potentiometer	1.25
No. A368 Rotary Variable Condenser	3.50
No. A962 Junior Fixed Condenser	.60
1 Red Seal Dry Battery	.35
Special price on Complete Outfit	$11.90

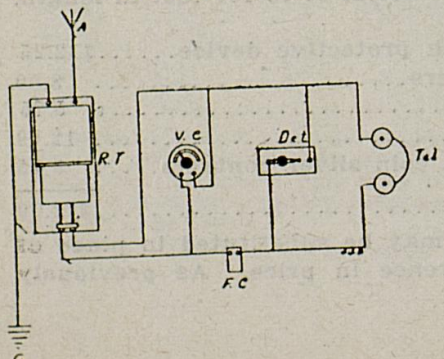


Note.—For list of antenna material see page 78.

Remember that any head set in catalog may be substituted, if desired, by adding or deducting from cost of complete set.

RECEIVING SET No. A6118

Range, 500 to 700 miles in receiving from high power stations with four or six-wire aerial at least 60 feet in length and 40 to 50 feet above earth.



No. 40X01 Standard Detector	$ 1.25
No. 71X18 Receiving Transformer	5.00
No. A30L Murdock 1,000-ohm Single Head Set	2.50
No. A368 Rotary Variable Condenser	3.50
No. 77X81 Fixed Condenser	.70
Special price on Complete Outfit	$11.65

Note.—Any head set in catalog may be substituted upon payment of the difference in price.

Price.—For list of antenna material see page 78.

RECEIVING SETS

The following receiving sets comprise a great variety of wireless instruments, and for those who do not prefer a mounted set these sets offer a wide range and variety of wireless instruments from which to choose.

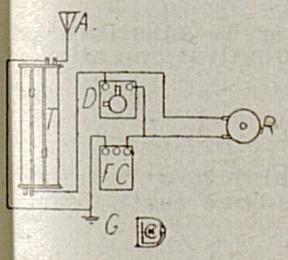
It will be observed that we offer the complete sets at particularly attractive prices, allowing a substantial discount from the net prices of the various instruments comprising a complete set. No substitutions are allowed on any of these sets, excepting with receivers. We appreciate that there are oftentimes prejudices in favor of certain types of receivers or head sets and for this reason we allow any type of receiver or head set to be substituted upon payment of the difference in price whether less or more than the type listed with the set.

The following sets are complete ready for operation with the exception of antenna material. A complete list of antenna material is shown on page 74. This page should be carefully read before ordering any set. You will also observe that batteries may be omitted at cost price in ordering any set.

The prices on dry batteries as listed are not in effect during the continuance of the war. On account of inability to obtain certain of the raw materials entering into their construction, the present price is 35 cents each.

RECEIVING SET No. A6113

Range, 25 to 30 miles, receiving from high power stations, with four-wire aerial, 25 feet above earth.



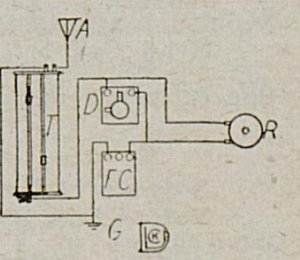
No. 40X01 Standard Detector	$ 1.25
No. 40 Watch Case Receiver and Cord	.85
No. 61X08A Mascot Tuning Coil	2.00
No. A962 Junior Fixed Condenser	.60
Special price on Complete Outfit	$ 4.20

Note.—For list of antenna material see page 78.

RECEIVING SET No. A6114

Range, 100 to 300 miles, receiving from high power stations, with four-wire aerial at least 60 feet in length and 30 to 40 feet above earth.

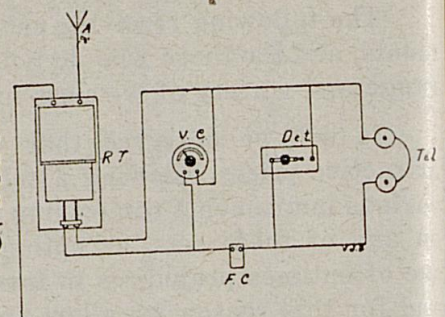
No. 40X01 Standard Detector	$ 1.25
No. 61X08A Mascot Tuning Coil	2.00
No. A962 Junior Fixed Condenser	.60
No. A30L Murdock 1,000-ohm Head Set	2.50
Special price on Complete Outfit	$ 6.00



Note.—For list of antenna material see page 78.

RECEIVING SET No. A6119

Range, 600 to 800 miles in receiving from high power stations with four or six-wire aerial 60 feet in length, and 30 to 40 feet above earth.

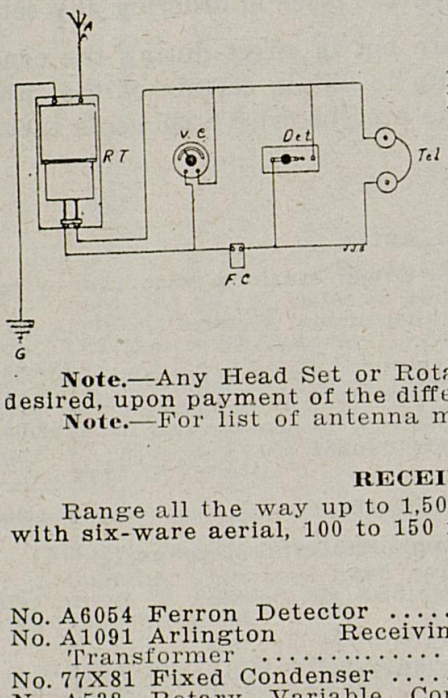


No. 1915 Detector Stand	$ 2.00
No. A7721 Loose Coupler	5.75
No. B55 Murdock 3,000-ohm Head Set.	5.00
No. A368 Rotary Variable Condenser...	3.50
No. 77X81 Fixed Condenser	.70
Special price on Complete Outfit	$15.90

Note.—Any Head Set or Rotary Variable Condenser may be substituted, if desired, upon payment of the difference in price. No other substitutions allowed.
Note.—For list of antenna material see page 78.

RECEIVING SET No. A6120

Range, 600 to 900 miles in receiving from high power stations with four or six-wire aerial, 50 feet in length and 50 feet above earth.

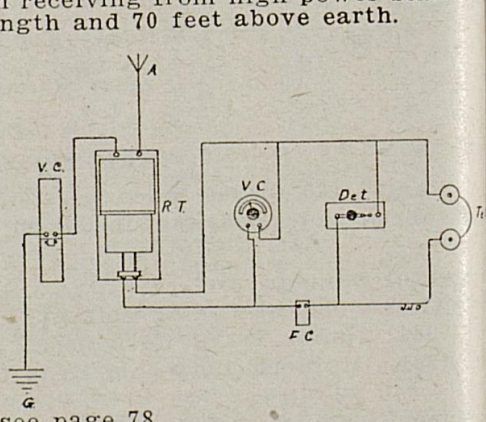


No. 1915 Detector Stand	$ 1.50
No. A1092 Arlington Receiving Transformer	6.50
No. 77X81 Fixed Condenser	.70
No. A367 Murdock Rotary Variable Condenser	4.50
No. B55 Murdock 3,000-ohm Head Set.	5.00
Special price on Complete Outfit	$18.00

Note.—Any Head Set or Rotary Variable Condenser may be substituted, if desired, upon payment of the difference in price. No other substitutions allowed.
Note.—For list of antenna material see page 78.

RECEIVING SET No. A6121

Range all the way up to 1,500 miles in receiving from high power stations with six-ware aerial, 100 to 150 feet in length and 70 feet above earth.

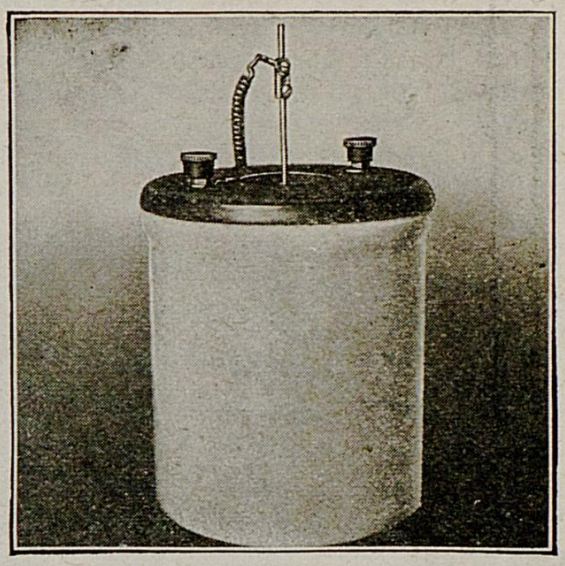


No. A6054 Ferron Detector	$ 5.00
No. A1091 Arlington Receiving Transformer	7.50
No. 77X81 Fixed Condenser	.70
No. A538 Rotary Variable Condenser	4.50
No. A366 Rotary Variable Condenser	4.50
No. B55 Murdock 3,000-ohm Head Set	5.00
Special price on Complete Outfit	$26.25

Note.—For list of antenna material see page 78.
Note.—Any type of Head Set listed in our catalog may be substituted, if desired.

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Our latest catalog mailed for 12c in stamps or coin.

THE BLITZEN ELECTROLYTIC INTERRUPTER.



Small vibrating interrupters may be satisfactory for small powers and for use on battery currents, but where 110-volt lighting current, either direct or alternating, is available the output of any coil will be greatly increased by the use of this electrolytic, or Wehnelt interrupter as it is often called. In contrast to the thin, feeble discharge at the secondary usually obtained, this interrupter will transform the spark into a flaming caterpillar spark of much greater length and intensity. This interrupter cannot be used on less than 50 volts.

The Blitzen Electrolytic Interrupter is contained in a stoneware jar 5¾ inches in diameter and 6 inches high, fitted with a wooden cover impregnated with an acid-proof insulating compound.

The cover supports the lead electrode and the special glass tube for the active electrode. The active electrode is composed of an alloy rod which feeds automatically by gravity as it is consumed.

Our Blitzen Spark Coil is particularly well adapted for use with this interrupter, but with spark coils having a vibrating interrupter the contact on this interrupter must be screwed down tight so that it will not vibrate. For use the interrupter is merely connected in series with the spark coil and any lamp socket and it should be noted that when the service is **direct current** the electrolytic interrupter will operate only in one direction, which can usually be best determined by experiment, although if a polarity indicator is at hand the proper connection is, negative wire to lead electrode, positive electrode to alloy rod. On alternating current the wires may be connected in either direction.

The jar should be filled to a depth of about 3½ inches with a 10% solution of sulphuric acid, and should always be filled to a sufficient depth so that the point of the alloy rod and the lower part of the lead electrode are well covered.

This solution may be obtained from any drug store for a few cents and is not furnished with the instrument on account of the difficulty of shipping.

By connecting a ¼ K. W. Blitzen Reactance Regulator in series with the interrupter, different powers may be used and the rate of interruption varied over quite a wide range.

This interrupter does not require any condenser connected across it, as is the case with all other forms of interrupters.

For operating spark coils where lighting current is available, nothing can equal this form of interrupter, and it will greatly increase the output and efficiency and give the most brilliant results whether used for X-Rays, Radio Telegraphy, for operating Tesla Coils, or for any other purpose.

We urgently recommend that a fuse be installed on the circuit supplying this interrupter to prevent damage to the spark coil in case of accidental short circuit.

It is also well to lift the rod out of the electrolyte when not in use to avoid waste, although this is not necessary, as the waste is very slight unless left for a long period of time.

No. W 611 Blitzen Electrolytic Interrupter, complete as above. Price....$2.50

No. W 612 10-Foot Double Cord with Attachment Plug for connecting interrupter to any lamp socket. Price..... .65

No. W 613 Extra Glass Tube for Rod. Each..... .90

No. W 614 Extra Alloy Rods. Each..... .05

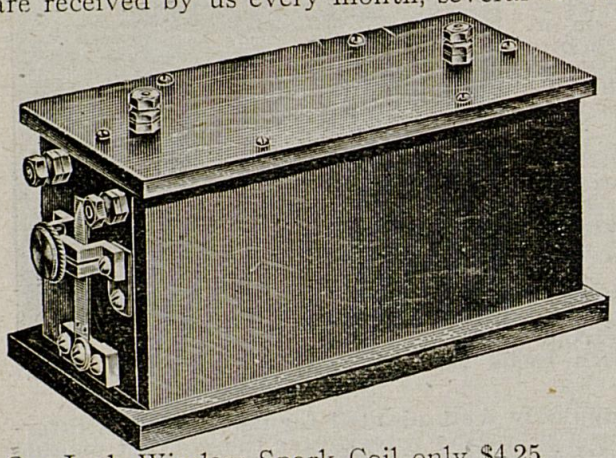
No. 71X4 "Trumbull" D. P. Single Branch Fused Panel Cut-out with 2 10-ampere Edison Fuse Plugs.....$1.00 Postage 25c

Revised Price List to
Duck's Big Electrical & Wireless Catalog
February 15, 1919
Our latest catalog mailed for 12c in stamps or coin.

WIRELESS SPARK COILS.

The Greatest Value in High Class Wireless Spark Coils on the Market.

Our spark coils are made by one of the foremost coil companies in the United States—a company which has for many years enjoyed the enviable reputation of putting out spark coils for wireless use, superior to any on the market. Our patrons have been quick to appreciate the high quality of these coils, as is evidenced by the scores of voluntary testimonials which are received by us every month, several of which are reproduced in this catalog, and the great demand for the coil from among persons who have witnessed its performance. Our big purchases enable us to procure closer prices than any other house in the wireless business and we give our patrons the full benefit of these attractive prices. It will be observed that the prices in this catalog are slightly higher than the prices in our catalog before the war, but it must be remembered that there has been a big advance in the cost of all raw materials entering into the construction of this coil. We may mention that for a very short period during last year and also during this year, we sold a one-inch coil at $3.65, but we soon were deluged with complaints when the coil did not give the rated spark length and was otherwise inefficient. Of course between meeting cheap competition and suffering the ill will of our patrons there was only one course to pursue, and we can now assure our patrons that the one-inch coil we now sell at $4.25 is the same coil that has been listed in our catalog for a great number of years and for which, as with all the other types of spark coils listed therein, renewal parts can be obtained at any time.



One-Inch Wireless Spark Coil only $4.25.

It has always been our experience in testing out, for instance, the one-inch coil that a good fat 1¼" spark could be obtained. In fact, the ratings of all the coils are under-rated rather than over-rated. For those that desire effective wireless transmission with spark coils we can unqualifiedly recommend these coils to be without competition, quality and price considered. They are all provided with very excellent condensers. The vibrators are specially made for wireless work; are capable of very fine adjustment and will operate at high speed and with a uniform action.

Read the testimonials between pages 56 61.

No. 44X6.	1 inch Spark Coil (Shipping Weight, 7½ lbs.)	$ 4.25
No. 39X0.	¼ inch Spark Coil (Shipping Weight, 4 lbs.)	2.25
No. 40X0.	½ inch Spark Coil (Shipping Weight, 5 lbs.)	2.65
No. 41X0.	1½ inch Spark Coil (Shipping Weight, 8 lbs.)	6.00
No. 42X0.	2 inch Spark Coil (Shipping Weight, 8½ lbs.)	8.15
No. 43X0.	3 inch Spark Coil (Shipping Weight, 11 lbs.)	14.70
No. 44X0.	4 inch Spark Coil	24.00
No. 45X0.	6 inch Spark Coil	53.00

Number of Batteries to be used with our wireless coils to get the best results:

¼-in., 3 cells; ½-in., 3; 1-in., 6; 2-in., 8; 3-in., 12; 4-in., 12; 5-in., 16 dry

cells or storage battery of 18 to 20 volts; 6-in., 20 dry cells or storage battery of 24 volts.

Note.—Where alternating current is available, spark coils may also be operated by step-down transformer. See page 104.

PARTS OF OUR STANDARD SPARK COILS.

A great many persons prefer to build their own spark coils, and in this way acquire a thorough knowledge of spark coil construction. We list the complete parts for our spark coils from ¼ inch to 4 inches. The amount of wax compound to be used will, of course, depend upon the size of the spark coil.

	¼-in.	½-in.	¾-in.	1-in.	1½-in.	2-in.	3-in.	4-in.
Secondaries	$0.40	$0.50	$1.00	$1.25	$2.65	$3.90	$6.75	$12.75
Primaries	.25	.35	.40	.50	.65	1.00	1.25	2.25
Condensers	.25	.25	.35	.35	.50	.80	.80	1.50
Vibrators complete	.45	.55	1,20	1.50	1.50	1.50	2.25	3.00
Box	.45	.60	.85	.85	.85	.85	2.25	3.00
Terminals	.40	.40	.40	.40	.40	.40	.40	.45

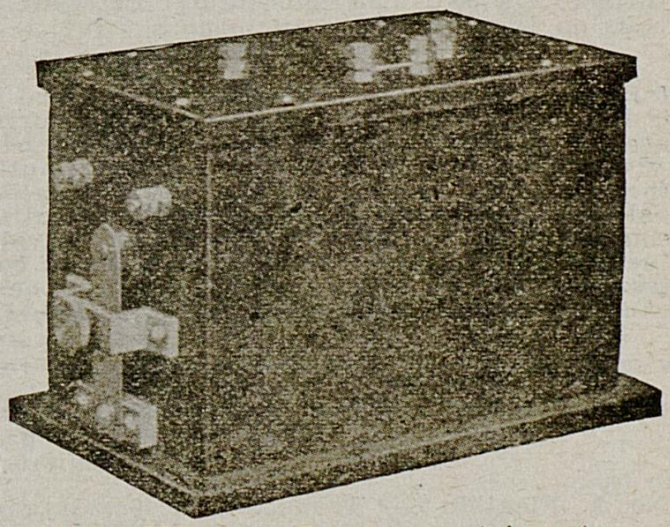
Wax Compound, 15c a pound.

Postage on parts extra. Must be estimated by purchaser.

Parts of ½ K. W. Transformer Coil Secondaries (2) $2.80; Condenser 55c; Primary $1.10; Box $1.10; Terminals 45c; Vibrator Spring 85c; Complete Vibrator $2.10.

½ K. W. TRANSFORMER COIL.

A great many wireless experimenters find it too expensive to purchase closed core transformers for wireless transmission. Up to a short time ago it was not practical to use anything but a closed core transformer when a range in excess of fifteen miles was desired, on account of the great cost of spark coils giving spark lenghts in excess of 4 inches, designed to operate by dry batteries. With our ½ K.W. transformer coil, it is possible to obtain as great a range as can be obtained with an 8-inch spark coil, costing in excess of $75.00, and the cost of the coil and necessary accessories is less than one-eighth of this amount.



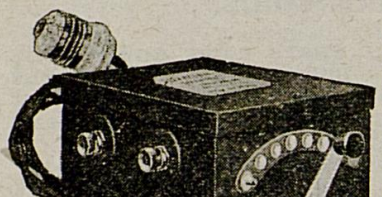
(Note.—Vibrator shown on cut is not on coil for use on line current.)

This coil has no vibrator, and is designed and constructed particularly for electric light circuits of 110 volts, direct or alternating current. **This transformer is built along entirely different lines than the ordinary spark coil. The secondaries are in blocks and are wound with No. 30 B. & S. enameled wire. This is a point of considerable importance, as a much greater number of ampere turns are obtained in a given space than when wound in any other way. Four top rubber binding posts are provided, so that one secondary may be used at a time, both in series, both in parallel, and for other important experiments.** The primary is wound with No. 16 B. & S. gauge Black Enamel wire. It is of course necessary that our electrolytic interrupter be used in connection with this coil when connected with line current. A spark all the way from ¾ to 1 inch in length and about ¼ inch thick is obtained with this coil, and because of the great amperage thereby radiated from the antenna, the range is very great, under favorable conditions twenty-five miles being a common occurrence.

No. 71X10 Transformer Coil, without vibrator.....$6.50

Shipping weight, 11 lbs.

Get Three Times the Efficiency Out of Your Spark Coil by Using Our Flexible Alternating Current, Step Down Transformer



The range of any spark coil can be greatly increased by using our Flexible Step-down Transformer, at the same time dispensing with the use of batteries. This transformer operates directly from the line current of 100 to 130 volts, 60 to 133 cycles, alternating current, and can also be supplied without additional charge wound for 110 volts, 25 cycles, and 220 volts, 60 cycles. These transformers cannot be used on direct current. The flexible feature consists of a **regulating switch and master connection post,** by means of which a range of voltages from zero to the maximum limit of the transformer is available in small and uniform steps. They are made in four different sizes. The Little Jeff listed hereunder and more completely described on page 199 of this catalogue because of its air type construction, has a capacity of 75 watts and generates 8 secondary voltages in steps of three volts. No. 1 has a capacity of 75 watts and generates 10 secondary voltages; No. 2 has a capacity of 100 watts and generates 16 secondary voltages. No. 3 has a capacity of 150 watts and generates 20 secondary voltages. A spark coil is three times as efficient when operated by a transformer in place of dry batteries, and there is an enormous saving in cost. ¼ to ½-inch coils may operate on 12 volts; 1-inch to 2-inch coils on 18 volts; 3-inch coil on 20 volts; 4-inch coil on 24 volts. The ¼ to 1-inch coils may be operated with the Little Jeff Transformer; 1½ to 2-inch coils on our 100 watt transformer and the 3 and 4-inch coils on the 150 watt transformer.

It must be understood that in operating spark coils with step-down transformers about twice the voltage is required as when dry cells are used. This is because in stepping down alternating current to such low voltages the natural frequency is greatly reduced, and it becomes a pulsating direct current with a consequent disproportionate diminution of its original force. Should there be any unusual sparking at the vibrator contacts it is advisable to gradually reduce the voltage until all abnormal sparking is eliminated. With the small and uniform steps in voltage, of 1½ volts you can quickly and surely use the proper voltage in operating your spark coil. See letter from patron among testimonials on pages 49-56 testifying to the wonderful results obtained using one of our step-down transformers in connection with a three-inch spark coil.

A more comprehensive description of these transformers will be found elsewhere in catalog in the pages devoted to these instruments.

No. 6—"Little Jeff" Flexible Toy Transformer, complete with cord and plug. (Completely described on page 199).....$2.15
Shipping weight, 4 lbs.

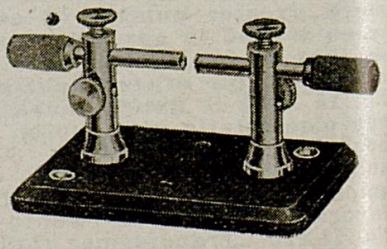
No. 1 Flexible Toy Transformer, 10 voltages, 1½ to 15 volts, in 1½ volt steps. (Regular price $4.00).....**$3.20**
Shipping weight, 8 lbs.

No. 2 Flexible Toy Transformer, 16 voltages, 1½ to 24 volts, in 1½ volt steps, (Regular price $5.50)..... **4.00**
Shipping weight, 10 lbs.

No. 3 Flexible Toy Transformer, 20 voltages, 1½ to 30 volts, in 1½ volt steps. (Regular price $7.50)..... **5.75**
Shipping weight, 13 lbs.

Spark Gaps

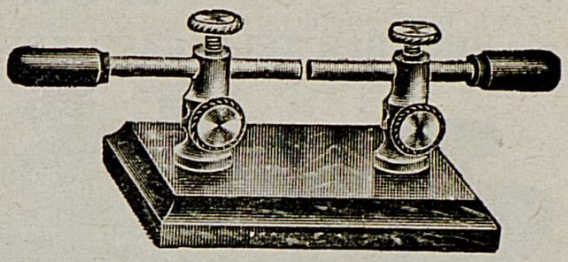
No. 60X15A ZINC SPARK GAP.



Our No. 60X15A Zinc Spark Gap is slightly smaller than No. 16X15. It has hard rubber composition base, and on small power sets will be found to answer all requirements. This spark cap was formerly sold by us at 60c, at which price it is sold by practically all other concerns.

No. 60X15A Zinc Spark Gap....60c Postage 7c

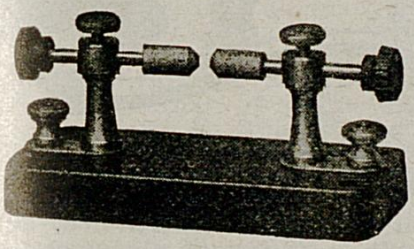
No. 60X15 ZINC SPARK GAP, WITH PORCELAIN BASE.



This zinc spark gap will be found to be much superior to Jump Spark Balls for long distance work. The peculiar properties of zinc make it particularly efficient for the electrodes of a spark gap. While the spark balls, having a capacity themselves, do not need aerial and ground for short distances, the zinc spark gap throws all the energy upon the antenna and consequently radiates the wave motions into space with considerable power. This spark gap may be used on spark coils up to 2 inches. It may also be used as an anchor gap in the antenna, which serves as an automatic switch. It has two zinc rods $\frac{3}{16}$ of an inch in diameter, and 2½ inches long, having a hard rubber handle at one end, making it possible to adjust the gap when sending. It is mounted on a heavy porcelain base, 2x3½ inches.

No. 60X15 Zinc Spark Gap.....$ .90
Postage 12c.

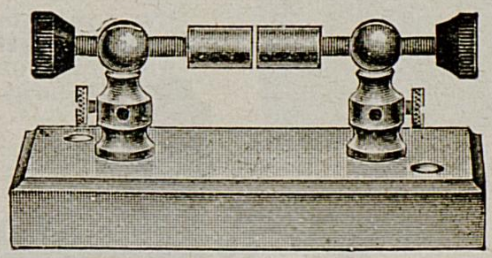
No. 44X0 SPARK GAP.



Our No. 44X0 Spark Gap represents exceptional value. It is designed for use on spark coils which will give up to 3-inch spark. or in connection with a ¼ K. W. transformer. This spark gap has hard rubber composition base with holes for screws, brass standards, adjustable arms and zinc electrodes. There is nothing like it for the price. Size 4½"x2"x1¾".

No. 44X0 Spark Gap.....$ .75
Postage, 10c.

No. A4018 SPARK GAP WITH PORCELAIN BASE.

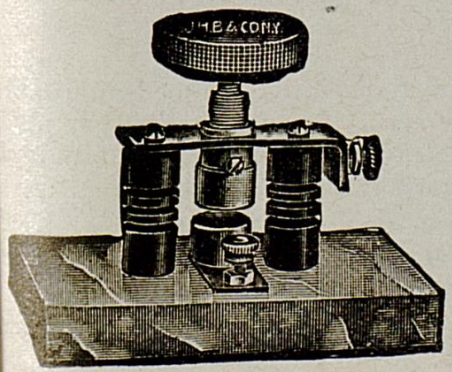


Our No. A4018 Spark Gap is suitable for ¼ K. W. stations. The Zinc Electrodes are renewable and are mounted on threaded rods, allowing very fine adjustment. The Upright Posts are finely nickeled and have split heads, thereby holding adjustment firmly, while dispensing with thumb screws, which allows operator to manipulate Gap with one hand.

No. A4018 Spark Gap $1.40
Shipping Wt. 24 oz.

Zinc Renewal Electrodes, per pair..... .35
Shipping Wt. 3 oz.

STANDARD SPARK GAP WITH PORCELAIN BASE.



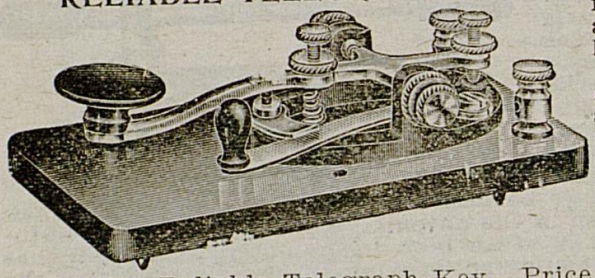
The Standard Spark Gap is of the vertical type. The standards and knob are of hard rubber, with metal parts heavily nickel plated. It is easily adjusted and has removable zinc electrodes that can be instantly renewed and used on stations up to 400 watts.

No. A4019 Standard Spark Gap $3.60
Shipping Wt. 3 lbs.

Zinc Renewal Electrodes, per pair..... .45
Shipping Wt. 4 oz.

Wireless Keys

RELIABLE TELEGRAPH KEY.

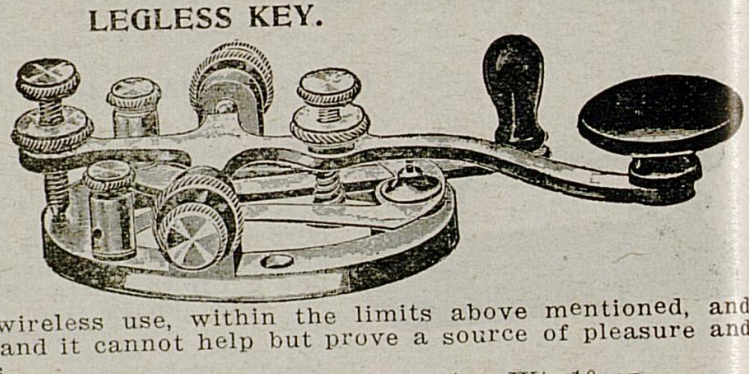


A practical and serviceable key for amateurs, private line work, or any telegraph circuit. Also excellent for experimental wireless.

The lever is the solid trunnion nickel plated type as used on standard keys. The key base is japanned and striped. All other metal parts on grained and lacquered brass. All mounted on polished wood base. This key is unquestionably the best amateur's wireless key on the market.

No. 10X1 Reliable Telegraph Key. Price.....$0.90 Postage 11c

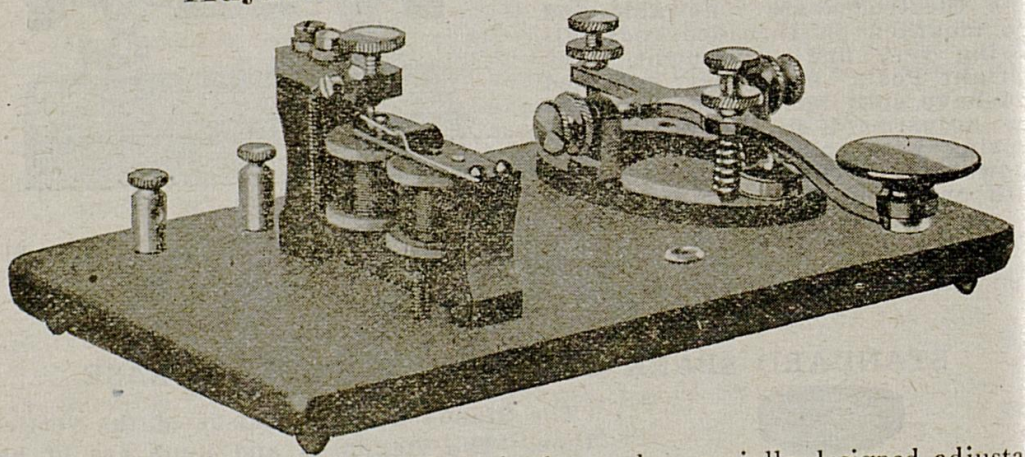
LEGLESS KEY.



Our No. 10X0 Legless Key is particularly fine for wireless work, and can be used nicely on all sets up to ¼ K. W. It has heavy platinum contacts. (The present price of this metal is $50.00 per ounce.) We have received many voluntary testimonials commending the excellence of this key for wireless use, within the limits above mentioned, and even on ½ K. W. sets, and it cannot help but prove a source of pleasure and satisfaction to its users.

No. 10x0 Legless Key.....$1.35. Shipping Wt. 10 oz.

Adjustable Buzzer Practice Set



This wireless practice set consists of a key and a specially designed adjustable buzzer, mounted on a neat mahogany base. Buzzer is adjustable to most any pitch simply by a slight touch of the thumb screw. A clear sound of exceptionally high pitch is obtaineed using only one dry cell. We regard it as a big value.

No. 1896 Adjustable Buzzer Practice Set, complete with wire and battery..$3.35
No. 1896A Adjustable Buzzer Practice Set, less battery..... 2.90
Shipping weight less battery, 2 lbs.

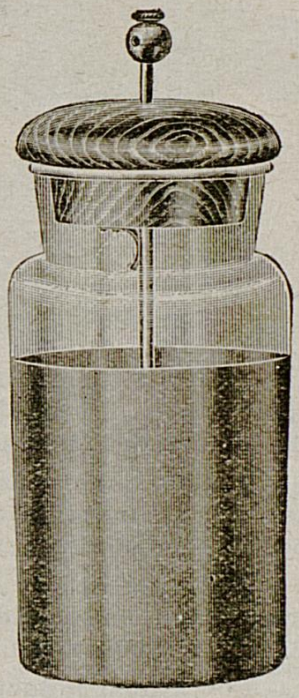
No. 231 Adjustable High Tone Buzzer, as described..... 1.25
Shipping weight, 1 lb.

Blinker Set

Blinker sets are used extensively by the boys in the army and navy. This set consists of key, socket and bulb mounted on a neat mahogany base—4½ by 7 inches. Wiring is underneath the base. We have supplied large quantities to Government institutions.

No. 1948 Blinker Set.....$2.25
Lots of fifty or more..... 2.00
No. 198A Blinker Set, wired with No. 750 (Edwards) buzzer 3.00

LEYDEN JARS.



These jars cannot be sent by mail.

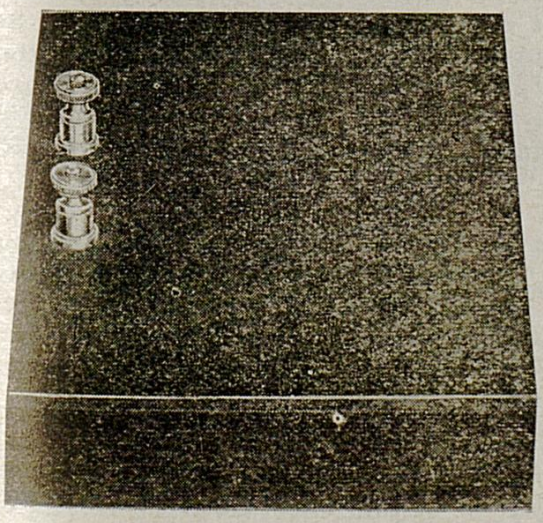
These jars embody the very best workmanship. The glass used in the jars is the very highest grade of hard Bohemian glass which is free from all harmful salts. **These jars are very hard to puncture.** The tin foil used is very heavy and will not blister. Solid brass balls are used which are mounted on an oak cover fitting snugly over the top of jar, thereby reducing the brush discharge to a minimum. The importance of this cannot be over-estimated.

Too much pains cannot be exercised in purchasing Leyden jars of a high quality. There is, perhaps, a greater number of inefficient and poorly constructed Leyden Jars on the market than any other instruments manufactured for wireless use. Our endeavor to supply our patrons with the highest quality of Leyden Jar obtainable, brought this fact very forcibly to our attention. We can unqualifiedly guarantee our Leyden Jars to stand out in a class by themselves, embodying as they do the highest quality of material and the greatest perfection in workmanship yet attainable.

It is well known that a suitable condenser will double the power of any spark coil. The spark across the gap will be twice as heavy when a suitable condenser is used. These jars can be charged with a ½-inch spark coil.

No. 60X17 Leyden Jar, ½ pint. $1.85
No. 60X10 Leyden Jar, 1 pint 2.25
No. 60X19 Leyden Jar, 1 quart 2.60
No. 60X20 Leyden Jar, 2 quart 3.00

A1916 TRANSMITTING CONDENSER.

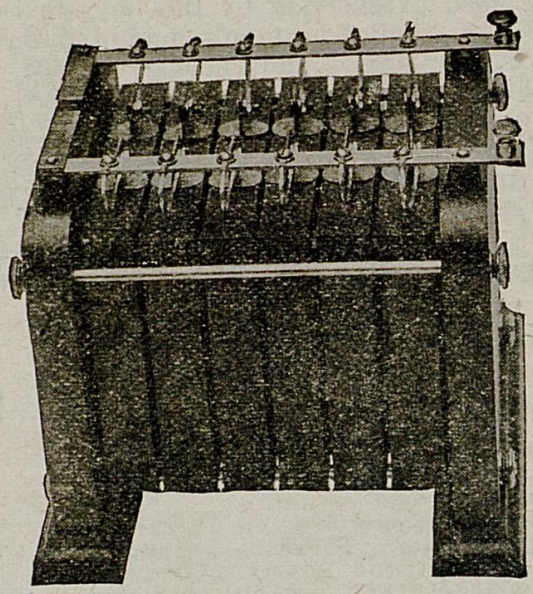


This condenser is for use as a secondary capacity for spark coils from one-quarter to two inch spark length. While it is not absolutely necessary to use a condenser with the ¼ and ½ inch spark coils where a capacity aerial is used, yet a condenser of correct capacity adds considerably to the range of the transmitting set. This condenser was designed to meet the demand for an inexpensive yet highly efficient capacity. This condenser consists of specially selected photograph glass plates coated on both sides with tin foil, mounted in a neat mahogany finished wooden case. Two binding posts are provided for connections.

No. A1916 Transmitting Condenser.....$1.00

Shipping weight, 2 lbs.

MOULDED TRANSMITTING CONDENSER No. 48X00.



The MURDOCK Moulded Transmitting Condenser is one of the most efficient types obtainable for experimental use. There is absolutely no brush in the moulded condenser.

These condensers are admirably adapted for use with rotary or quenched gaps. The installation of the moulded condenser invariably results in a noticeably increased radiation.

We suggest the following capacities of this condenser for amateur use, basing the suggestions upon the condition that no wave greater than 200 meters is to be used.

For 2 inch inductions coils, 2 sections No. 48X00, in parallel.
For ¼ KW transformer, 3 sections No. 48X00, in parallel.
For ½ KW transformer, 4 sections No. 48X00, in parallel.
For 1 KW transformer, 6 sections No. 48X00, in parallel.

In all probability, if the wave is to be kept at 200 meters or less, no greater capacity than .01 mfd., or 6 sections of No. 483 condenser in parallel could be used, with the possibility of a smaller amount being required, depending upon the inductance used in the primary circuit of the transmitter. We believe and recommend that rotary gaps with a spark discharge rate of about 1000 per second may be used with from 3 to 6 sections of condenser in parallel and keep the radiation at 200 meters with good efficiency for powers up to 1 KW.

Detail: Capacity per section .0017 mfd.; copper foil sheets completely enclosed in a specially prepared dielectric compound; sections are extra strong physically and electrically; copper lugs, brass screws and nuts on connection posts; rack, dull black finish; brass bus bars; braided wire connectors. Sections may be had separately or in rack. Overall size unit section, 6½x6½x1 inches.

No. 48X00 Moulded Sending Condenser, per section.....$2.50
Shipping weight, per section, 3 lbs.

No. A3600 Murdock Condenser Rack only, 4 section..... 6.00
For each additional section over 4, add..... .60

JUNIOR OSCILLATION TRANSFORMER

PANCAKE TYPE

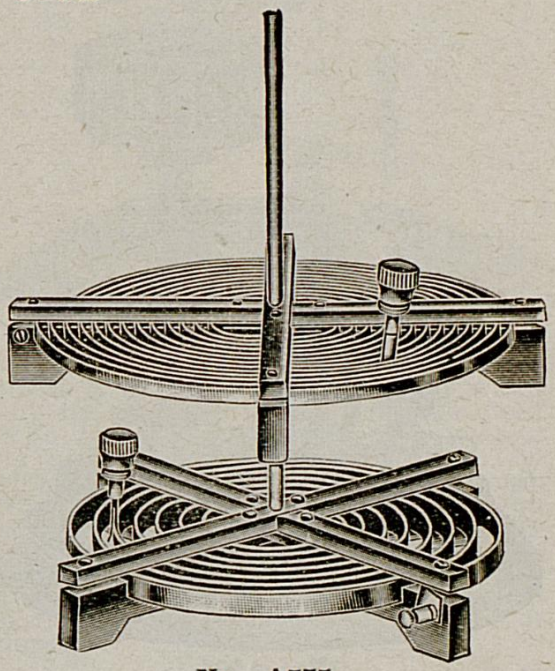
An Oscillation Transformer is necessary in order to produce a pure, well maintained wave which can be closely tuned at the receiving station.

An Oscillation Transformer is really a double helix, one coil forming a primary winding and the other a secondary. The primary is connected to the spark gap and condenser and the secondary to the ground and aerial.

It will enable you to easily obtain a wave length of 200 meters without hampering the efficiency of your station. Its use will increase your transmitting distance.

The Construction and General Efficiency of the Junior Oscillation Helix is of the Highest Order and stands distinctly by itself.

The primary and secondary windings are heavy brass ribbon wound spirally in specially slotted frames. The coupling between the two windings is variable by sliding the secondary up and down on a heavy brass rod. It may be locked in place by a set-screw. The woodwork is finished in dark mahogany. Every inch of the brass ribbon is accessible to the clips.



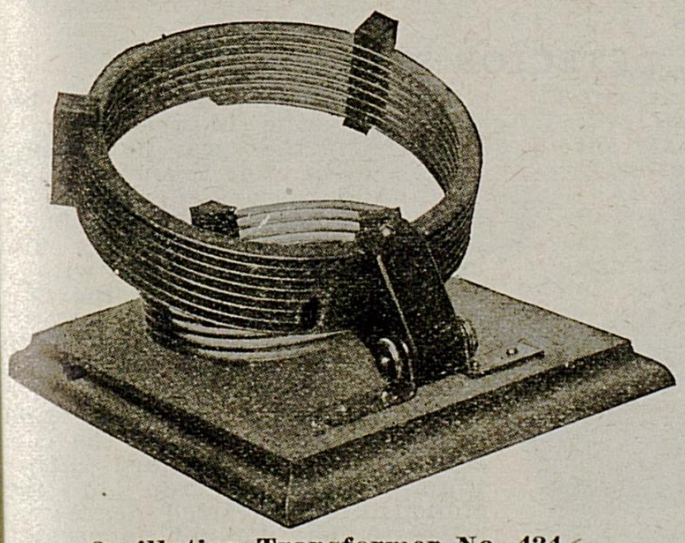
No. A555

Two clips are furnished with each instrument. The construction of the transformer is such that it may be mounted vertically on the operating bench or ceiling, or horizontally on the wall.

No. A555 Junior Oscillation Transformer.....**$3.75**

Shipping weight, 6 pounds.

OSCILLATION TRANSFORMER No. 424.



Oscillation Transformer No. 424.

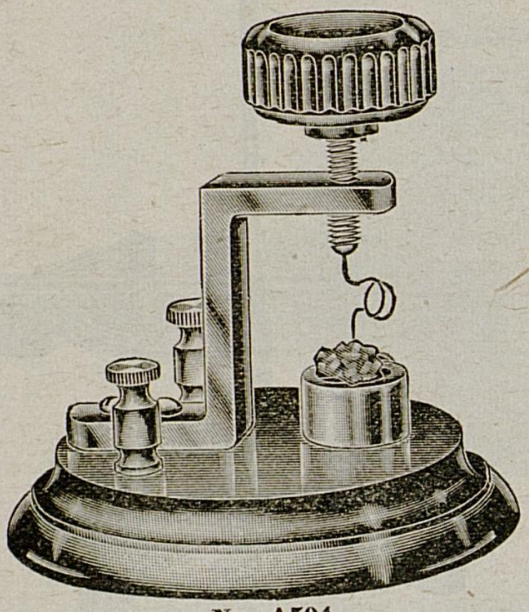
There has been a keen desire on the part of amateurs in general for a variable coupling oscillation transformer which would permit the sharp tuning so necessary under present transmitting conditions. We believe that we have succeeded in placing at the command of these amateurs an exceptionally fine instrument of the type desired at a very low price. This new oscillation transformer No. 424, is not only suitable for battery sets, but is really designed for all powers up to 1 KW. It is big and sturdy, handsome and efficient and at its price has positively no rival in real value. This instrument will do well what apparatus of double the cost will do. It will last as long and serve efficiently every requirement. It will permit the precise tuning which is required by the radio law and which should be the ideal of every experimenter.

Detail: Variable coupling; primary, six turns and secondary eight turns edgewise wound copper strip; coupling varied by hinging of secondary away from primary; mounted on mahogany finished base; four clips furnished. Overall size, 10x7½x3¼ inches.

Oscillation Transformer No. 424.....**$4.50**

Shipping weight, 8 lbs.

Detectors



No. A504.

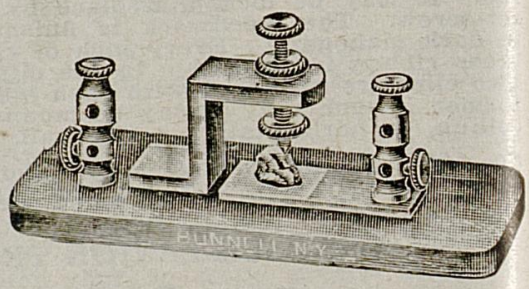
JUNIOR DETECTOR STAND

Contract with the mineral is established by a fine wire spring, the tension of which may be accurately adjusted. This provides a much more sensitive arrangement than the spring strip used on many detectors. Our detector will maintain its adjustment and is not easily disarranged by jars and jolts. The base is finished in dark mahogany, carefully polished. All metal fittings are polished brass, gold lacquered. The crystal is fastened in the cup by means of a small set-screw. The adjusting screw is provided with a large knurled composition knob.

No. A504 Junior Vertical Detector Stand, diameter 3 inches, height 3 inches. $0.85

Weight packed, 6 ounces.

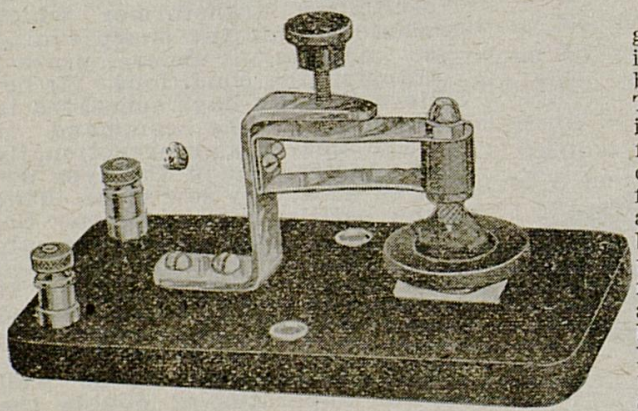
See testimonials between pages 49-57.



No. 60X12 Detector Stand is very simple in construction, and very sensitive. Any of the substances used with detectors may be used in this detector stand.

No. A6012 Detector Stand only....$0.55
Postage 11c.

CRYSTAL DETECTOR STAND.



This detector stand is the greatest value in this type of instrument that we have ever been able to offer to our patrons. The standards are of neatly polished brass, mounted on a finely finished mahogany base. The crystal cup is of brass with a fibre rim. By turning the cup, any part of the crystal may be brought in instant contact with the detector point. The cup is fitted into a brass slide, which also permits a forward and backward movement of the cup. By means of the hard rubber thumb screw on top of the standard any desired degree of pressure may be put on crystal. The detector is fitted with a fine needle contact point.

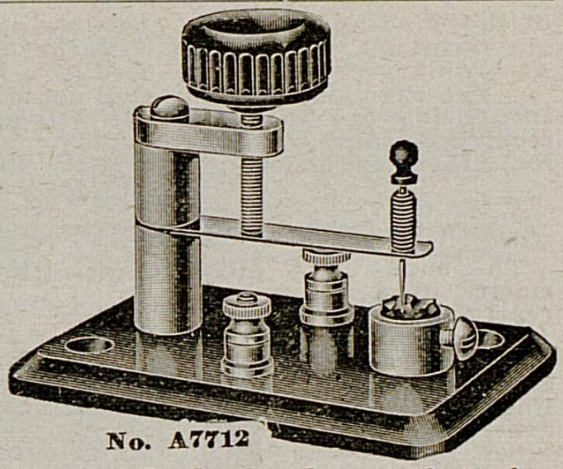
All the wiring is underneath the base of the detector. Two holes, with metal eyes, in the center of the detector stand are provided for screwing the detector to the table.

The merits of this detector stand and its general all around neatness appear to be out of harmony with the ridiculously low price at which we are offering it to our patrons. We expect an unusual demand for it. No minerals are supplied with stand.

No. A676 Crystal Detector Stand.....$1.00

Shipping Wt. 10 oz.

EVER-READY CRYSTAL DETECTOR



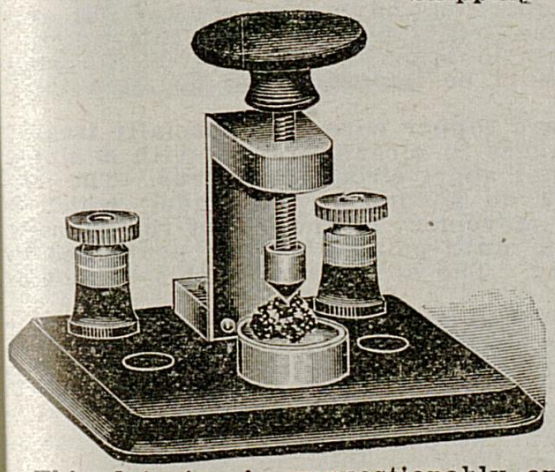
No. A7712

There is we believe, no detector stand on the market today selling for anything like the price of this instrument which can approach it, either in sensitiveness or permanency of adjustment. It may be subjected to severe jolts and jars, which would render any other detector inoperative, without losing its adjustment.

The crystal is placed in the brass cup and fastened securely in place by means of a setscrew. Sensitive contact with the surface of the crystal is secured by a slender pin. The pin "floats" in the center of a fine hair-spring which acts as a shock-absorber, so that when the detector is jarred the motion is taken up by the spring and the point will not move from its spot on the crystal. The contact pin is provided with a small rubber knob so that the metal parts do not have to be touched when adjusting the detector. The pin is arranged so that its adjustment is universal. It may be moved in any direction and brought into contact with any portion of the mineral in the cup below, so that the crystal may be easily and quickly searched for the most sensitive spot.

The base of the detector and the large knob are hard rubber composition. The metal parts are all brass, highly polished and gold lacquered. The detector is 2¾ in. high, the base measuring 3½ x 2½ in. It is a precision instrument of handsome appearance and unequalled efficiency.

No. A7712 Ever-Ready Crystal Detector.....**$1.75**
Shipping weight, 1 lb.



STANDARD DETECTOR.

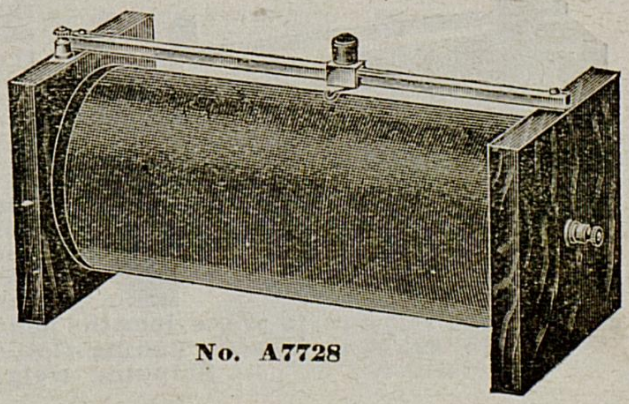
This detector permits of the very finest adjustment. It is unusually sensitive and is adapted for use with all crystals and metals. Two different types of electrodes are furnished with each instrument, one a plain conical point, the other a fine hair spring. The advantage of this will be readily appreciated by the careful experimenter. The cup will accommodate crystals of various sizes. The back of the standard is of spring brass, which permits of very fine adjustment.

All metal parts are of polished brass, finished in gold lacquer. The base and adjusting knob are moulded hard rubber composition.

This detector is unquestionably one of the very finest low priced mineral detectors on the market, and we are certain that it will give excellent satisfaction. Crystals are not supplied with detector.

No. 40X01 Standard Detector.....$1.25 Shipping wt., 8 oz.

PRECISION LOADING COIL



No. A7728

The Precision Loading Coil consists of a large diameter non-shrinkable cylinder wound with a single layer of large silk covered wire and provided with a slider. The ends of the loading coil are finished in dark mahogany and carefully polished. All metal fittings are lacquered brass.

The loading coil is connected in series with the aerial. The advantages of this form of loading coil are that it is wound in a single layer, thus reducing the effects of the distributed capacity

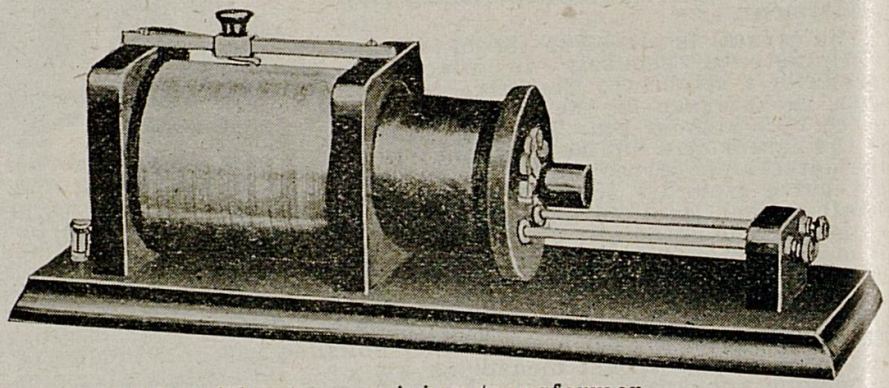
of the winding itself and also that large wire is used so that the efficiency of the receiving set is increased rather than impaired as is usually the case when an ordinary tuning coil is used as a loading coil.

The Precision Loading Coil contains approximately 300 turns of wire, each turn being one foot long. It will add all the way up to 800 meters to any receiving transformer.

No. A7728 Precision Loading Coil, single slider, length 10 inches.....$2.25
Shipping weight, 5 lbs.

RECEIVING TRANSFORMER.

"A Most Beautifully Finished Instrument."



The superiority of a receiving transformer of the variable coupling type over any other form of tuning device is very marked. In fact it is a necessity for effective tuning. A great range is, under ordinary conditions, next to impossible without a receiving transformer.

The greatest pains have been taken in the design and construction of this instrument to make it the unquestionable superior of any similar tuner of equal price now on the market. The proportions have been worked out only after the most exhaustive experiments, making it possible with this tuner to exclude under ordinary conditions any stations not wanted and at the same time to receive from others when it would be impossible to do so without its aid.

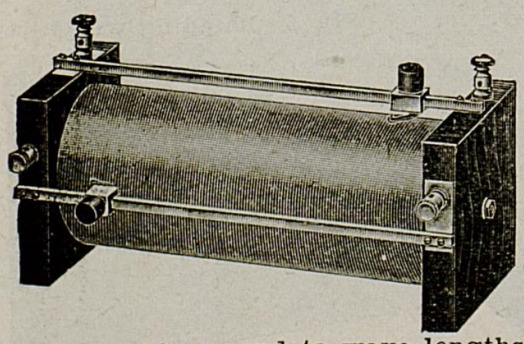
The primary is wound with No. 24 bare copper wire on a specially treated cylinder 3 inches in diameter and 9.4 inches in circumference, with a single slide contact, so arranged that it does not short circuit the turns. The secondary is wound with silk covered wire on a concentric cylinder, which is carried on two rods and slides with easy movement in and out of the primary. The secondary is variable by means of a multi-pointed switch, controlled by the same handle that varies the coupling. The advantage of this cannot be over estimated.

The instrument is beautifully finished in dark mahogany and is highly polished, with gold brass trimmings. Its real merits can only be appreciated by seeing the instrument itself. The cut does not do it justice. Size, 14x5x5 inches.

No. 71X18 Receiving Transformer, 14x5x5 inches.....$5.25
Shipping weight. 54 oz.

See testimonial among list of testimonials.

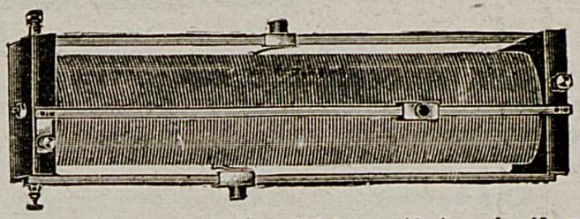
MASCOT TUNING COIL



Our No. 61X08A Mascot tuning coil is designed to greatly increase the range of any of the receiving sets for experimental use. It is far superior to the No. 6X108 tuning coil, which was listed in Catalog No. 4. The ends are of finished mahogany. The diameter of the drum is considerably greater; it is wound with bare copper wire, and in every respect is a most admirable tuning coil. With a 60-foot aerial it will respond to wave lengths up to about 800 meters, whereas with the No. 6X108 tuning coil it was impossible to tune in with any high-power station, as it would respond to wave lengths only up to 250 to 300 meters.

No. 61X08A Mascot Tuning Coil $2.00
Shipping weight, 30 oz.

STANDARD TUNING COIL.



Our No. 61X10 tuning coil is a new departure in the line of tuning coils, and we believe has advantages which are exclusive with this coil only. The additional slide is used to vary the fixed capacity of the aerial. After tuning in with the desired station, it will be observed that the signals will come in much clearer by regulating the additional slide, which varies the capacity of the aerial, thus permitting of the very finest tuning. This coil is similar in general construction to our No. 61X08A tuning coil, but is much larger and longer. It is wound with bare copper wire. The diameter of the drum is 3 inches, and the length of the instrument is 1¼ feet.

With a 60-foot aerial, it will respond to wave lengths up to 1,500 meters, and consequently it is possible to tune in with practically any high power station in the country. Too much importance cannot be attached to this point, because in receiving from a considerable distance, unless you are able to do very fine tuning, you are practically closed to all high-power stations at any distance from you.

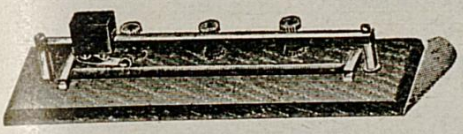
No. 61X10 Tuning Coil $3.35

See testimonials between pages 49-57. Shipping weight, 4 lbs.

TUNING COIL SLIDES AND RODS.

For Mascot Tuning Coil, 8¾ in. long, each.....$ .30 Postage, $ .05
For Standard Tuning Coil, 15 in. long, each..... .40 Postage, 05

POTENTIOMETER.

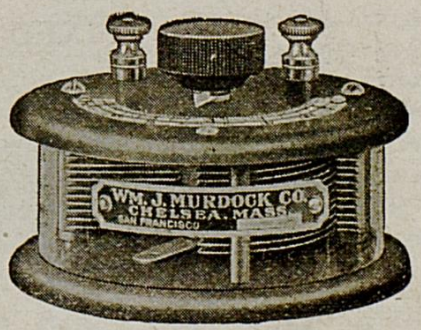


Our No. 66X82 Potentiometer has no superior for obtaining very fine variations of electro-motive force, when a battery is used in connection with the Electrolytic Detector. The exceedingly fine adjustment obtained with this instrument is much more efficient than the rheostat. In taking in messages from a considerable distance, it is practically indispensable, the fine adjustment causing the wave motions to come in clear and strong. This potentiometer is provided with an indestructible resistance rod (not graphite), which always maintains perfect contact with the slider. With many of the low-priced potentiometers on the market, graphite rods are used, and in a great many cases these rods are nothing but common carpenters' pencils, worth about two cents each, with little, if any, resistance to them. We had one of these graphite rods, where a resistance of 300 ohms was claimed, tested some time ago, and found that the resistance was only 20 ohms. Another disadvantage with graphite is that it will very easily break, and on account of its very fragile structure, it is very difficult to ship same with safety. This potentiometer will very gradually regulate either the current or the voltage. It is a necessity for long distance work with the electrolytic or carborundum detectors. Brass parts gold lacquered; base, polished oak. Size, 1½x3x10 inches.

No. 66X82 Potentiometer.....$1.10 Postage, 15c

Note—See page 37 for description of our Precision Potentiometer.

ROTARY VARIABLE CONDENSER No. 368.

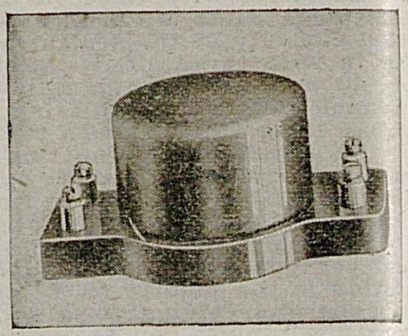


This condenser has a capacity of .0005 mfd., and will be found suitable for use as a secondary multiple condenser for the average wave lengths. It is in every way, a handsome, splendidly operating instrument and offers the best value obtainable for the price.

Detail: One-half size of No. 367; 11 movable plates, 12 stationary; interior construction similar to No. 366; transparent case, hard rubber composition top with scale. Size, 4 inches diameter, 2¾ inches high.

Our latest catalog mailed for 12c in stamps or coin.

FIXED CAPACITY CONDENSER



Neatness, convenience, reliability and compactness characterize this Condenser and commend it for all purposes where an instrument of small capacity with small losses and constant value is desired.

The conducting surfaces are copper discs insulated with highest grade mica dielectric; capacity .001 M.F. approximately.

Those who have experienced the difficulty of connecting two wires, or one wire and a telephone cord tip to one binding post, will appreciate the two pairs of binding posts joined in parallel, drilled sufficiently large for a telephone cord tip.

Size 2¾ inches long, 1⅝ inches extreme width, ⅞ inch high. Weight 1 oz.
Cat. No. W745 Condenser.....$1.50 Shipping weight 4 oz.

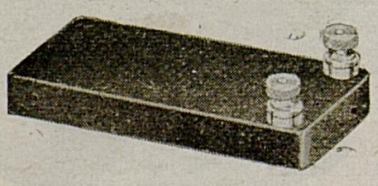
HIGH FREQUENCY BUZZER

(Note: Exterior identical to No. W745 Condenser above.)

This Buzzer will operate on one dry cell and exactly simulates the pitch or note of high spark frequency radio transmitters. It will operate continuously for hours at constant amplitude without changing its period. It is easily adjustable over a wide range. It is compact, measuring 2¾ inches long by 1⅝ inches extreme width by 1⅛ inches high, weight 1½ ounces. The two pairs of binding posts (one pair for battery connection and one pair for connection across the break) are arranged outside the case so that connections can be made without removing the cover and no holes need be bored for bringing out wires when mounted on a cabinet or table. A condenser and inductance connected across the contact points of this buzzer provide a source of oscillations of constant amplitude and constant wave length for laboratory and testing purposes.

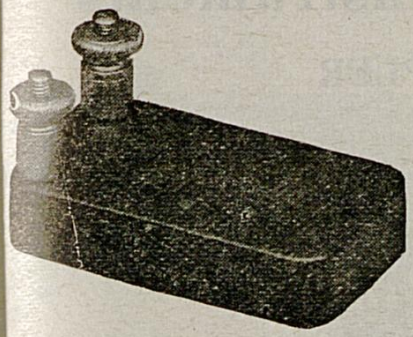
No. W744 Buzzer $2.00
Shipping weight 4 ounces.

FIXED RECEIVING CONDENSER.



This condenser is an exceedingly efficient and high-grade instrument with respect to both workmanship and material. The condenser itself is entirely contained within the rubber composition base. The material used to space the tinfoil has a very high dielectric strength and will not easily puncture. The condenser is of correct capacity.

No. 77X81 Fixed Condenser.....$0.70 Shipping wt., 8 oz.



JUNIOR FIXED CONDENSER.

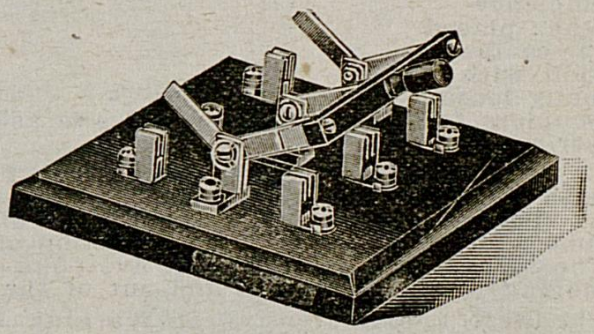
This condenser is made entirely of hard rubber, and has hard rubber binding posts. This type is used mostly to shunt across the telephone receivers, and when used in connection with Ferron, Silicon or Carborundum Detectors will cause the signals to come in much stronger and clearer. The capacity is .0165 M. F. Size, 2⅝ x 1½x1¼ inches.

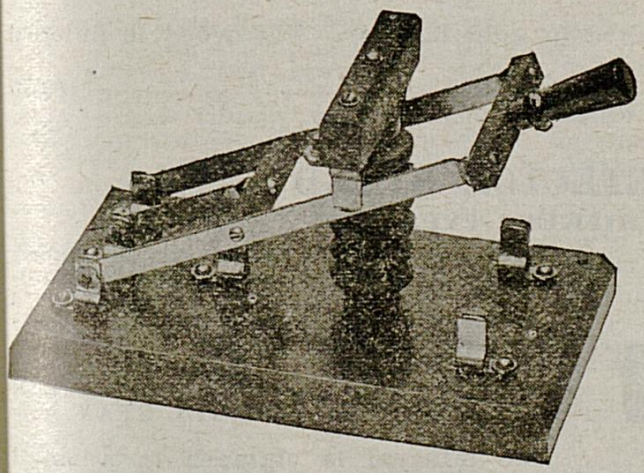
No. A962 Junior Fixed Condenser.....$0.60
Shipping Weight, 6 oz.

Antenna Switches

This Antenna Switch is a three pole, double throw switch. The handle of this switch is of hard rubber. This switch will stand the discharge of a 4 inch coil without jumping across. It is well made, the best material being used throughout in its construction.

No. 60X16 Antenna Switch $2.50
Postage, 30c.





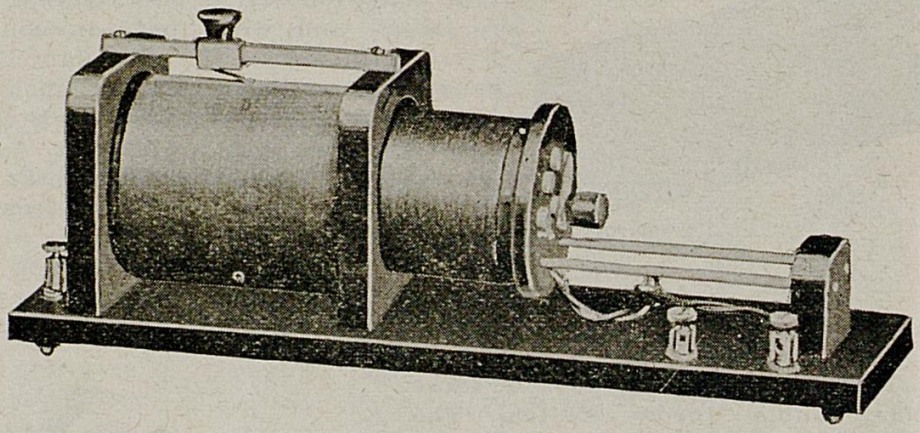
This instrument is a decided inovation in aerial switches, and possesses superior merit for the rapid and sure transfer from receiving to sending or vice versa. It is mounted on a well seasoned base, finished in dark mahogany and polished. The contact clips and the blades are flexible rolled copper, insuring a perfect connection and making sticking an impossibility. The blades are very long, over 8 inches, and the separation between very large. The throw from either position of the switch is made by a 4½ inch up or down motion. A third auxiliary blade and contacts are provided, operated by the same throw and arranged to either automatically short-circuit the detector while sending, or cut off the transmitting power while receiving. The switch is thoroughly well built in every respect, and will prove a handsome and extremely useful part of any station. The change from receiving to transmitting can be made in a shorter space of time and more conveniently than with any other switch. It is without rival in appearance or efficiency.

No. 89X89 Aerial Switch, made in one size up to ½ K. W.....$3.50
Shipping weight, 3 lbs.

Our Junior Wireless Instruments

JUNIOR LOOSE COUPLER

The Junior Receiving Transformer places a high - class instrument embodying the finest materials and workmanship within the reach of all experimenters. It will perform with equal efficiency when placed in competition with many loose couplers for which a higher price is asked, and in most cases will show superior results.



No. A520

THE LOUD SIGNALS AND SELECTIVE TUNING it is possible to obtain with this instrument has made it a general favorite.

The primary consists of 150 turns of wire wound over a specially treated tube which will not shrink. Variation of the primary is by means of a slider. The secondary is varied by a five-point switch. The coupling is changed by moving the secondary in and out of the primary on the two horizontal rods.

The Best Looking and Best Working Receiving Transformer at Anywhere near the price.

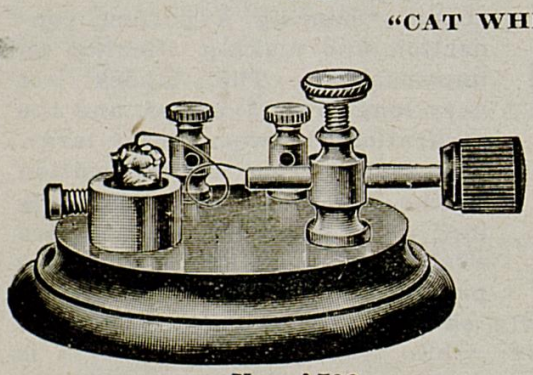
This instrument has earned enthusiastic praise by its splendid service and efficiency. It makes very selective tuning possible and enables the experimenter to tune out any unwanted station and bring that desired in loudly and clearly.

All metal parts are brass, finished in gold lacquer. The wood is finished in dark mahogany.

No. A520 Junior Loose Coupler.....**$3.75**
Shipping weight, 3 pounds.

JUNIOR DETECTOR STAND

"CAT WHISKER" TYPE



No. A500.

This detector has proven extremely popular because of its excellent appearance and high efficiency. Although of simple design, it may be quickly adjusted to a degree of sensitiveness that is often hard to obtain with many higher priced instruments. WHEN ONCE ADJUSTED IT WILL STAY ADJUSTED.

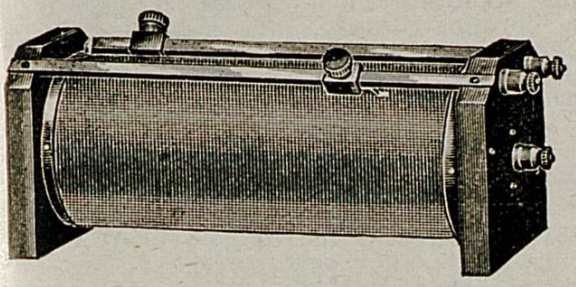
The mineral is clamped in a small brass cup by means of a set-screw. Contact is made with the surface of the crystal by means of a "feeler" or "cat whisker" made from a special composition which has been found to give the best results. The tension is adjustable through a wide range by turning the knob. This is important, for the most sensitive adjustment is only secured when the tension is right. The construction of this detector is such that the point may be brought into contact with any portion of the mineral surface and the latter thoroughly searched for the most sensitive spot.

No. A500 Junior Detector, diameter of base 3 inches.....**$0.75**
Shipping weight, 5 oz.

our latest catalog mailed for 12c in stamps or coin.

JUNIOR TUNING COIL

DOUBLE SLIDE



A514

This is the best-looking and most efficient low priced tuner on the market. In fact it is such a fine little instrument that it has been widely imitated. It is properly designed and very carefully constructed. An inferior tuning coil will go far towards weakening signals and reducing the general efficiency of a station.

The cylinder is wound with over three hundred turns of wire. The cylinder is also specially treated to prevent warping, and the construction of the winding is such that it is impossible for any of the turns to short circuit. Our method of winding gives the maximum amount of inductance it is possible to obtain in a given space. The wave length of this coil is as great as that of many coils almost twice as large. The coil ends are polished wood finished in dark mahogany. The metal parts are all brass finished with gold lacquer. The coil is provided with two sliders which move very smoothly and make contact with each turn independently.

No. A514 Junior Double Slide Tuning Coil.....**$1.75**

Shipping weight, 2 pounds.

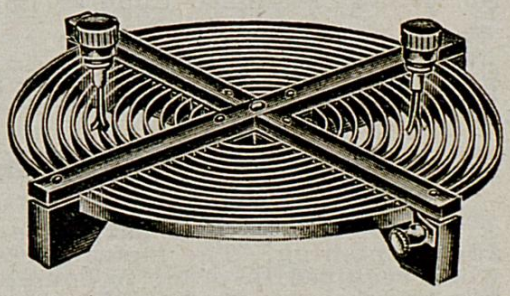
JUNIOR HELIX

PANCAKE TYPE

This is a strong, well designed Helix, and is unquestionably the best instrument for the purpose ever offered at anywhere near the price.

A Helix is used to tune the transmitting apparatus of a wireless station. When properly tuned with a helix the range of the station will be greatly increased.

INCREASE THE RANGE OF YOUR COIL by using a Junior Helix. It is properly designed and carefully made. The inductance is in the form of a spiral of heavy brass ribbon wound in a slotted hardwood frame. The woodwork is finished in dark mahogany.



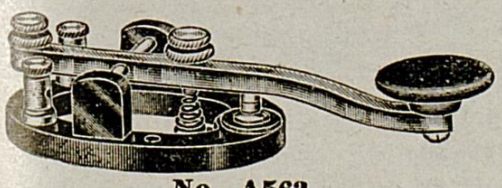
No. A560

Every Inch of the Inductance is Accessible to the Clips, making it possible to tune very closely. The construction of the helix is such that it may be mounted either on the wall or directly on the operating table. Fitted with heavy brass binding posts and two clips.

No. A560 Junior Helix **$1.40**

Shipping weight, 3 pounds.

JUNIOR WIRELESS KEY



No. A562

This is a standard sized telegraph key with no circuit breaker and with very large extra heavy points, especially for wireless telegraphy and experimental purposes. The bushings are of mica, which will stand the heat caused by breaking extra heavy currents. An ordinary key is worthless for such purposes because the points burn off and stick. The base of the key is enameled. The lever is solid brass. The trunnions, screws, etc., are brass, carefully polished and lacquered. Connections are made to two binding posts so that the key can be mounted on desks and tables without boring holes as required for a leg pattern key.

No. A562 Junior Wireless Key.....**$1.25**

Shipping weight, 1 pound.

80 OHM WATCH CASE RECEIVER FOR WIRELESS USE



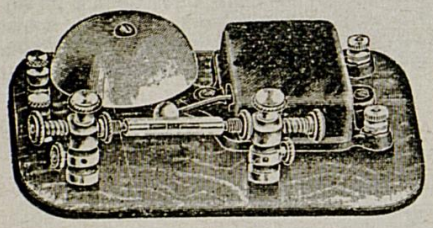
Our No. 40 Murdock Watch Case Receiver is particularly recommended for use with amateur wireless receiving sets. It is the regular telephone type, solid construction, double pole, hard rubber composition case and is wound with silk covered copper wire. The resistance is 80 ohms. It is we believe the only type of double pole watch case receiver on the market and will give more than ordinary satisfaction.

No. 40 Murdock Watch Case Receiver ..... $ .65
Shipping weight 1 lb.

No. 40 Murdock Watch Case Receiver with 3 ft. cord ..... .85

No. 41 Murdock Watch Case Receiver with cord and leather covered head band 1.50
Shipping weight 2 lbs.

STANDARD COHERER AND DECOHERER..



No. 60X13.

These coherers are made of the very best material throughout. They are fitted with micrometer screws, and permit of a very fine adjustment. They are used in receiving from distances 10 to 20 miles away. The decohering device consists of an electric bell, the tapper of which, striking the coherer tube, causes the filings to decohere, and at the same time the bell is rung, giving warning that signals are being received. The coherer and decoherer shown in cut is designed for use in connection with relay and sounder.

No. 60X13 Standard Coherer and Decoherer complete 2.00
Postage, 22c.

Glass tube only $0.15
Filings, per pkg. ..... .25

PARTS FOR No. A7721 LOOSE COUPLER

Note—All wooden parts are drilled and ready for sandpapering, staining and varnishing. The metal parts are all drilled, tapped, etc., so that the only work required in order to complete the instrument in addition to staining the woodwork is to wind on the wire and assemble.

		Price
No. M320	Hardwood Base, 15x6x¾ inches	$ .45
No. M321	Two Hardwood End Pieces for Primary, 4½ in. square	.60
No. M322	Two Turned End Pieces for Secondary	.40
No. M323	Hardwood Support for Rods	.15
No. M53	Impregnated Primary Tube	.15
No. M24	Impregnated Secondary Tubes	.25
No. M324	Eight Brass Contacts, 5c each	.40
No. M27	Two Bushings for Secondary	.14
No. M325	Two Guide Rods for Secondary with Binding Posts	.40
No. M29	Switch Arm, Knob and Stem	.30
No. M326	Slider Rod and Slider	.45
No. M327	Wire for Primary	.40
No. M328	Silk Covered Wire for Secondary	.45
No. M329	Two Primary Binding Posts	.10
No. M330	Large Blueprint Drawings	.50
No. M331	COMPLETE SET OF PARTS	4.00

Shipping weight, 8 lbs.

See testimonials among letters on pages 49-56.

PARTS FOR LOOSE COUPLER No. 71X18

No. M20	Hardwood Base, 13½" x 5" x ⅝"	$ .35
No. M21	Two Hardwood End Pieces for Primary 3¾" x 3¾" x ⅝"	.40
No. M22	Two Hardwood End Pieces for Secondary, 2½" and 3" dia	.35
No. M23	Hardwood Support for Rods, 2" x 1¾" x ⅝"	.15
No. M24	Cardboard Tube for Primary	.15

	Cardboard Tube for Secondary	.15
No. M25	Contact Points for Secondary, each	.05
No. M26	Bushings for Secondary, each	.07
No. M27	Guide Rods for Secondary, with binding posts, each	.15
No. M28	Large Knurled Composition Knob, fitted with Switch Arm and threaded shank	.30
No. M29	Slider Rod and Slider, with Screws	.30
No. M30	Wire for Primary	.25
No. M31	Wire for Secondary	.25
No. M32	Two Binding Posts	.10
No. M33	Blueprint for Assembly	.25
No. M34	Complete parts with blueprint	3.25

Postage extra on any of above parts.

MISCELLANEOUS DETECTOR PARTS

			Postage
No. M2	Hard Rubber Composition Base, 4½" x 2⅛" x ⅝"	.15	.05
No. M3	Large Brass Cup, diam. 1⅛"	.20	.03
No. M4	Small Brass Cup, diam. ⅝"	.7	.02
No. M5	Shallow Brass Cup, diam. ½"	.05	.02
No. M6	Brass Bracket	.25	.02
No. M7	Adjustment Bushing, consisting of sloted barrel, provided with plunger fitted with chuck to receive Woolaston wire threaded attachment stud complete, same as on No. 7718 Detector	.25	.02

HELIX CLIPS, KNOBS, SLIDERS, CUPS, SWITCHES AND SCALES

No. M8	Knurled Composition Knob with threaded brass shank 8-32	$ .15
No. M10	Large Helix Clip to snap on round wire	.35
No. M11	Large Helix Clip to snap on brass ribbon	.35
No. M12	Medium Helix Clip to snap on round wire	.26
No. M13	Medium Helix Clip to snap on brass ribbon	.25
No. M14	Large Composition Knob, fits 10-32 screw	.20
No. M15	Knurled Rubber Composition Knob, fits 12-32 screw	.20
No. M16	Composition Rubber Binding Post, 8-32 screw	.05
No. M17	Turned Brass Cup, 1⅛ inch in diameter with three 8-32 screws to hold crystal	.35
No. M17a	Same as above, nickel plated and polished	.45
No. M18	Offset Cup, set on brass rod fitted with composition rubber knob. May be used on detectors of the Perikon type	.50
No. M29	Large Knurled Composition Knob fitted with switcharm and threaded shank for loose couplers, etc	.30
No. M43	Brass Slider, fitted with Composition Rubber Knob and Phosphor Bronze Spring. Fits 3-16 inch square brass rod	.18
	Same as above to fit ¼ inch square rod	.25
No. M47	Large Engraved Celluloid Scale for Variable Condensers, etc	.45
No. M71	Any above parts by mail, two cents extra	

NOSPLICE" LEAD-IN CONNECTOR.

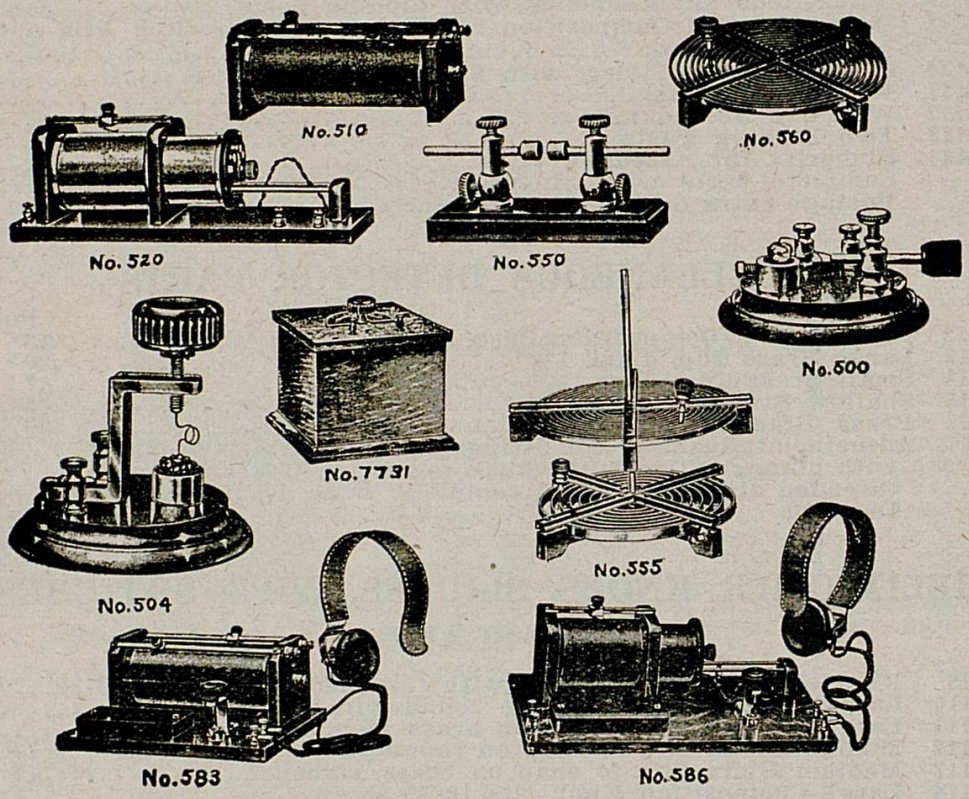


A simple, ingenious device which does away with the necessity of soldering lead in joints and at the same time secures a better connection. Especially recommended for splicing aluminum wire, as it entirely eliminates inefficient and unreliable soldered connections. Splicing is unnecessary as the connector is set in a weatherproof jacket which at the same time effectually insulates the connection.

"Nosplice" will hold 3 No. 12, 4 No. 14, or smaller wires on each end. Also a very handy device for use in electrical construction, fixture installation, etc.

No. A7162 "Nosplice" Lead-in Connector, prepaid.....15c

YOU CAN BUILD ANY OF THESE INSTRUMENTS



WE SUPPLY THE PARTS AND FULL DIRECTIONS

Consists of all the woodwork, metal parts, wire, tubes, rods, contacts, sliders, clips, binding posts, knobs, cups, screws, etc., complete with drawings and full directions for building any of the "Junior" Instruments. All that you have to do is finish up and assemble. Any boy can do it. A screwdriver and a pair of pliers are all that is required as tools. Nothing has to be purchased elsewhere. All the parts and materials are complete.

Anyone is now easily able to derive the pleasure and knowledge obtained by building wireless instruments. By purchasing these parts you get the benefit of our knowledge and experience. You are thereby enabled to obtain beter instruments than by following your own designs and using hap-hazard materials.

No. M580	Complete Parts and directions for building the Junior Double Slide Tuner Receiving Set	**$3.00**	6 lbs.
No. M586	Complete Parts and directions for building the Junior Loose Coupled Tuner Receiving Set	**4.50**	8 lbs
No. M520	Complete Parts and directions for building a No. A520 Junior Loose Coupler	**2.75**	3 lbs.
No. M510	Complete Parts and directions for building a No. A510 Junior Tuning Coil	**1.25**	2 lbs.
No. M500	Complete Parts and Directions for building a No. A500 Junior Detector	**.60**	5 ozs.
No. M504	Complete Parts and directions for building a No. A504 Junior Detector	**.75**	6 ozs.
No. M560	Complete Parts and directions for building a No. A560 Junior Helix	**1.50**	3 lbs.
No. M555	Complete Parts and directions for building a No. A555 Junior Oscillation Helix	**3.00**	6 lbs.

Please do not ask us for prices on the parts of any instrument where parts are not listed. We do not provide them, neither do we supply individual parts of instruments or sets except when listed.

"Electrose" Lead-Ins Bushings and Connectors



No. 62X04.



No. 62X06.



No. 62X22.



No. 68X24.



No. 68X15.



No. 68X11.

The Only Safe High-Tension Lead-ins.

The importance of having an efficient and safe lead-in is too well known to need comment. "Electrose" lead-ins are universally conceded to be the best in the world. It will be observed that these lead-ins are provided with hole through center to permit of lead-in wire passing through; or with copper rod, to each end of which the lead-in wire should be connected.

"Electrose" Lead-in Bushings

No.	Diameter, inches	Over-all Length, ins.	Diam of Hole, ins.	Electrical value, dry test, volts	Prce each
60X65	2	$4\frac{9}{16}$	¼	30,000	$0.60
*62X04	2	$4\frac{9}{16}$	¼	30,000	.73
*62X05	$2\frac{15}{16}$	$4\frac{31}{32}$	½	50,000	1.48
*62X06	2½	6¼	½	60,000	1.48
60X27	$2\frac{13}{16}$	15	½	75.000	2.60
*62X22	$2\frac{13}{16}$	15	½	75,000	3.70

"Electrose" Lead-Insulated Connectors

68X24	2	$5\frac{9}{16}$	¼ (rod)	30,000	$0.90
68X15	2½	$6\frac{7}{8}$	⅜ (rod)	60,000	1.85
68X11	$2\frac{13}{16}$	17	½ (rod)	75,000	5.10

*With patented locking ring for attaching bushing or insulated connector to the wall.

TIN FOIL.

We sell three grades of tin foil. Our highest grade is the purest genuine tin foil obtainable, and will go as far as four pounds of the next thickest grade. It comes in pound packages only, 12 inches wide.

No. 60X71. Tin Foil (6500 sq. in. to lb.), per lb.....$0.70 Postage 20c
No. 60X72. Tin Foil (1600 sq. in. to lb.), per lb..... .27 Postage 20c
No. 60X73. Tin Foil (600 sq. in. to lb.), per lb..... .27 Postage 20c

ELECTROSE KNOBS, HANDLES AND CONNECTORS.

We list below various sizes and types of handles, knobs and connectors which will be found very convenient for use in wireless construction.

Under cuts of the knobs and bushings we list the size of thread in which they can be supplied. For example, No. 771 can be supplied in 6/32 and 10/32 thread only. In ordering it is absolutely necessary to specify size of thread.

No order can be accepted for any of these parts amounting to less than 25c. The postage is extra, and can readily be estimated by purchaser.



No. 771
6/32 - 10/32
Ea., 3½c



No. 809
8/32
Ea., 4c.



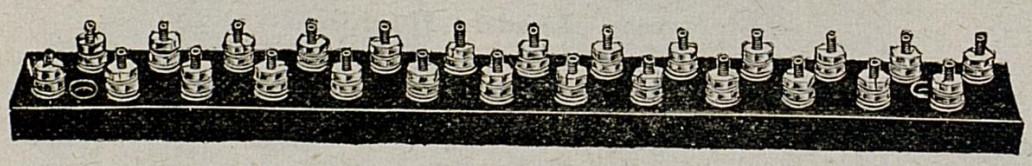
No. 945
6/32 - 8/32
Ea., 5c.



No. 808
8/32
Ea., 4c.



No. 728
Ea. 6c.

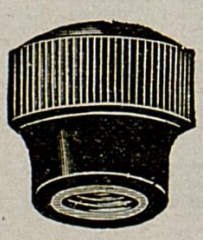


Double Line Binding Post Strip. Furnished in 7-10-11-16-21 and 26 pairs.

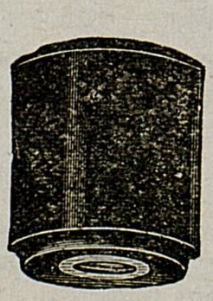
No.	Pairs	Length	Price each
849	7	5⅝	$ .45
850	10	8⅝	.65
851	11	8⅝	.70
853	16	12⅜	1.00
854	21	16⅛	1.35
855	26	16⅛	1.60



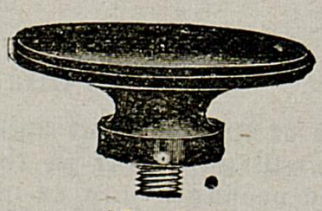
No. 836
6/32 - 8/32
Ea., 5c.



No. 810
6/32 - 8/32 - 10/32
Ea., 5c.



No. 832
8/32
Ea., 5c.



No. 807
6/32 - 8/32
Ea., 5c.



No. 1041
(Full Size) 15c each

No. 1042 same size as No. 1041, except larger. Outside diameter 1 2/16 in.

NOTICE

BE SURE TO:

See the 3 pages listing the equivalent of 1000 pages of special electrical equipment and novelties (Refer to "Miscellaneous" in index.)

Look for the addenda among last pages of catalog, listing wireless instruments too late for insertion in regular place in catalog.

Look for the many excellent wireless books listed on different pages. See index. Subscribe for the Wireless Age. See back cover. See revised price list before ordering.

CONDENSERS

The following condensers are for use with telephones, wireless spark coils and transformers. The small size can be used in home made spark coils to prevent sparking at vibrator contracts. Should be shunted around vibrator. Two No. 136, 2 M. F. condensers connected in series across the line current and grounded at their central point constitute an excellent kick back preventer, in conformity with the rules of the underwriters, for use with all sizes of spark coils.

These condensers are enclosed in a tin box, finished in white enamel, and are fully guaranteed.

No. 130, ½ M. F., size 4½ in. x 2 in. x ¾ in., Shipping Wt. 8 oz., Price..$ .50
No. 132, 1 M. F., size 4½ in. x 2 in. x ⅞ in., Shipping Wt. 10 oz., Price.. .70
No. 134, 1½ M. F., size 4½ in. x 4½ in. x ¾ in., Shipping Wt. 15 oz., Price 1.00
No. 136, 2 M. F., size 4½ in. x 4½ in. x ⅞ in., Shipping Wt. 17 oz., Price 1.20

INDUCTION COILS.

These Induction Coils are wound to any possible ohmage. The cores are Norway, double annealed iron. Black fibre heads. They are made in three sizes as noted. There is no difference in price for any particular size. The price is determined by the ohmage. Always be sure to specify the number, which gives the size of the coil, and the ohmage.



No. 138, size 4 in. x 1½ in.
No. 140, size 3½ in. x 1 in.
No. 142, size 3 in. x 1 in.

75 Ohms, Shipping Wt. 1 lb., Price .....$ .50
150 Ohms, Shipping Wt. 1½ lbs., Price ..... .52
175 Ohms, Shipping Wt. 2 lbs., Price ..... .56
250 Ohms, Shipping Wt. 2 lbs., Price ..... .76
500 Ohms, Shipping Wt. 2 lbs., Price 1.00

FORMICA.

Formica possesses the hardness, flexibility, machining qualities, polish and general appearance of hard rubber; the toughness of hard fibre; one-third the strength of steel; and infusibility, which makes it a competitor of mica for many applications. It will not swell, warp, become brittle or otherwise deteriorate with age or exposure to weather.

The type of material has practically entirely replaced hard rubber for use in radio apparatus during the past few years, due to the fact that it possesses the highest possible dielectric qualities; is not affected by the most severe at-

mospheric changes; has extremely high tensile strength, and has a glossier and neater surface.

Thickness	Price per sq. foot	Weight per sq. foot	Price per sq. inch	Postage per sq. inch
1/16 inch	$0.90	8 oz.	$0.01	$0.01
1/8 inch	1.80	1 lb.	.01½	.01
1/4 inch	3.60	2 lbs.	.03	.01
3/8 inch	5.40	3 lbs.	.04½	.02
1/2 inch	7.20	4 lbs.	.06	.02
1 inch	14.00	8 lbs.	.12	.04

NOTE: Minimum charge 25c, regardless of size.

ALUMINUM WIRE.

The following voluntary testimonials amply corroborate the claims we have at all times made for this wire:

"Athens, Ga., July 16, 1912.

"I find your wire superior to others I have seen. No matter how long same remains exposed to the weather, it never turns black, and oxidizes but very little. I noticed some aluminum wire about town that has corroded so badly that it is practically worthless." "W. B. POPE."

"Williamsport, Pa., Apr. 21, 1912.

"* * * I also wish to state that two amateurs happened to be at our station when the wire (aluminum) arrived, and they were surprised to find it of a higher quality than that which they had purchased of another firm. I gave them your address. JOSEPH S. MERK."

ABOUT MR. POPE'S TESTIMONIAL.

Athens, Ga., November 27, 1912.

Gentlemen:—I saw W. B. Pope's testimonial relative to your aluminum wire. I know Pope well and back up his statement that your aluminum wire is the "best ever." I had some that I purchased from a concern in N. Y. and it got so badly oxidized that it was practically worthless. I got some of yours and have had it several months, and it is as bright and clean as the day I got it. A. S. BRADBERRY.

The above letters are illumining in considering the reasons, as stated in catalog of a certain concern in the East, as to why they were forced to discontinue the sale of their aluminum wire.

No. 14 Highest Grade Aluminum Wire (268 ft. to lb.), per lb.....$1.00
No. 12 Highest Grade Aluminum Wire (168 ft. to lb.), per lb..... 1.00
No. 6 Highest Grade Aluminum Wire (40 ft. to lb.), per lb..... 1.10
No. 14 Bare Copper Wire (about 66 ft. to lb.), per lb..... .70
Seven-strand No. 21 Copper Antenna Wire (about 55 ft. to lb.), per lb.. .80
Seven-strand No. 20 Phosphor Bronze Wire, as used in commercial stations, per foot..... .02½
Seven-strand No. 22 Bronze Wire, per hundred feet..... 1.40

Note.—There are a few concerns that advertise bronze wire as **phosphor bronze** wire. It is misrepresentations like this which do incalculable harm towards the fostering of a closer relationship between legitimate houses and their patrons. Bronze wire has abundant merit without claiming for it qualities which it does not possess, and is unnecessary to possess for efficient service for antennas. Our phosphor bronze wire cost us, in large quantities, $1.45 per hundred feet.

ALUMINUM SOLDER.

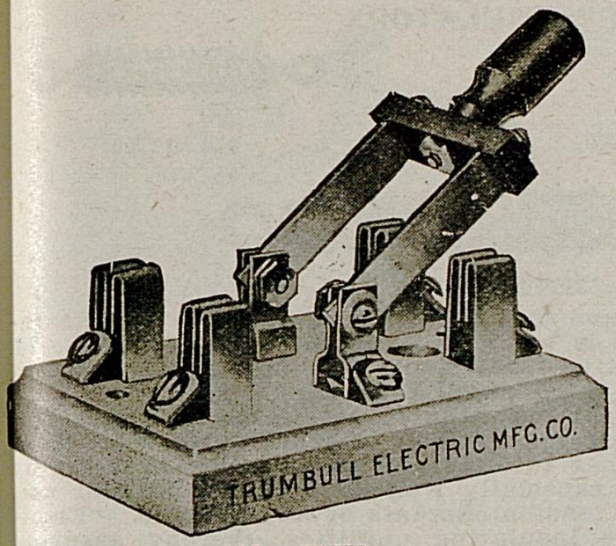
To satisfactorily solder aluminum wire it is necessary to use a special solder. We supply the best solder obtainable. Per 4-inch stick.....$0.15

COPPER CLAD WIRE.

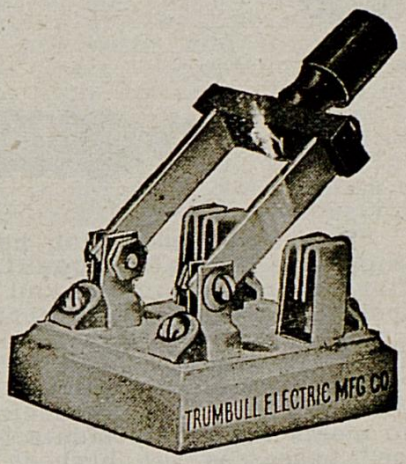
Copper Clad Wire is the latest wire being used for wireless antennas. It combines all the essential qualities for a first class antenna. It is much stronger than copper, and also much lighter, and also possesses great conductivity. It is made by a special process adopted by the Duplex Metals Company, and is the only perfect "duplex" metal manufactured. It is made by covering steel billets with copper and iron alloy, and then casting pure copper over this billet, producing a perfect weld, without disturbing the union between the two metals. The copper covering cannot in any manner be peeled off. It is made in various grades of conductivity. We sell the highest grade, viz., 47% conductivity. No. 14 contains 85 feet to the pound, and possesses three times the tensile strength of aluminum wire, and has an elastic limit of 165 pounds. Approximate breaking weight, 330 pounds. No. 12 wire contains approximately 53 feet to the pound.

No. 14. Copper Clad Wire (47% conductivity), per lb.....$0.70
No. 12. Copper Clad Wire (47% conductivity), per lb..... .70

PORCELAIN BASE SWITCHES.



No. 71X0.
Base 3¾x2⅝.



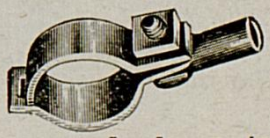
No. 70X9.
Base 2⅝x2.

This style and quality of switch is in general use by wireless experimenters, in connection with receiving sets, and transmitting sets where not in excess of a one-inch spark coil is used. They are the celebrated "Trumbull" switch, and are copper mounted on porcelain. The jaws are self-adjusting, insuring perfect contact with blades under all conditions. Hinge screws are spun over to prevent loosening of the nuts. Trumbull switches are excelled by none manufactured, and are everywhere noted for their dependable qualities. They must not be confounded or put in competition with some of the imported switches that are sold for a few cents less, and which are in every way without that which so distinctively emphasizes "Trumbull" switches.

	Price	Postage
No. 70X7 S. P. S. T.	$0.20	$0.06
No. 70X8 S. P. D. T.	.32	.08
No. 70X9 D. P. S. T.	.35	.09
No. 71X0 D. P. D. T.	.50	.13

GROUND CLAMP.

The importance of having a good ground cannot be overestimated. Poor results with transmitting and receiving outfits are very often due to an imperfect ground. We list two styles of ground clamps, which are in general use not only for wireless purposes, but in practically all kinds of electrical installations. The ground clamp, which we list in various sizes, is in quite general use. It is made of copper, and has a projecting lug, into which the ground wire may be soldered, insuring a good and permanent ground. The New York ground clamp is also quite extensively used, and is designed to fit any pipe from ½ in. to 2½ in.



No. 90X77.	⅜	in.	$0.20	No. 90X91.	1	in.	$0.25
No. 90X78.	½	in.	.20	No. 90X92.	1¼	in.	.28
No. 90X79.	¾	in.	.22	No. 90X94.	1½	in.	.30

Postage on any of above, 4c.

NEW YORK GROUND CLAMP.

No. 90X67. New York Ground Clamp.....$0.15
Postage, 8c.

THE MOST EFFICIENT INSULATORS IN EXISTENCE.

"ELECTROSE" INSULATORS.



No. 71X0.



No. 73X0.



No. 17X0.



No. 20X0.

"Electrose" insulation has attained a world-wide recognition for its incomparable insulating qualities, and is being used in all parts of the world. After expensive, careful and exhaustive tests made by some of the foremost experts in electrical engineering, it is conceded that "Electrose" is the best insulating material now obtainable. It has been in practical use a sufficient number of years to give it thorough service and weather tests, under the severest possible conditions; and it has fulfilled all requirements in a highly satisfactory manner. "Electrose" is especially well adapted for outdoor use, and meets the requirements for high tension currents of any voltage. "Electrose" possesses the highest possible insulating qualities, thereby assuring efficiency and reliability. It possesses great strength, hardness, density, toughness, a fine smooth polished surface and is absolutely moisture and waterproof, thereby assuring durability.

No. 71X0. "Electrose" Strain Insulator, 4 inch, electrical value, 30,000 volts, each $0.27

No. 73X0. "Electrose" Ball Insulator, electrical value, 45,000 volts, each .18

No. 17X0. "Electrose" Strain Insulator, 10½ inch, electrical value, 75,000 volts, tensile strength, 1,000 lbs., each ..... .48

No. 45X20 "Electrose Strain Insulator, 11¾ in. long, 2½ in. diameter (No. 17X0 is 1½ in. diameter), electrical value 90,000 volts, tensile strength 1,500 lbs., each ..... .90

No. 20X0. "Electrose" Strain Insulator, 21½ inch, electrical value, 120,000 volts, tensile strength, 1,500 lbs., each 2.00

HIGH TENSION CABLE.

For use as leading-in wire to wireless instruments. This is the highest grade of braided cable manufactured and is in use throughout the United States in all electrical installations, where an efficient and durable cable for withstanding high secondary discharges is required. It will stand a secondary discharge up to approximately 20,000 volts. This cable should always be used as a lead-in from the wireless station to the open air. The diameter is $\frac{7}{16}$ inch.

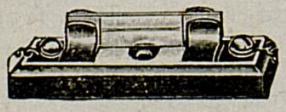
No. 92X42 High Tension Cable $\frac{7}{16}$-inch, diameter, per foot.....$0.10

Postage, per foot, 4c.

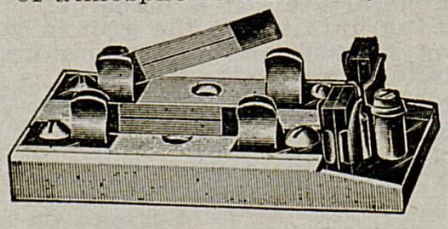
We do not sell less than five feet of this cable.

W. U. TYPE FUSIBLE CUT-OUTS.

We advise the use of fuses on all receiving outfits, which will protect the instruments from destructive charges of atmospheric electricity.



No. 91X8.



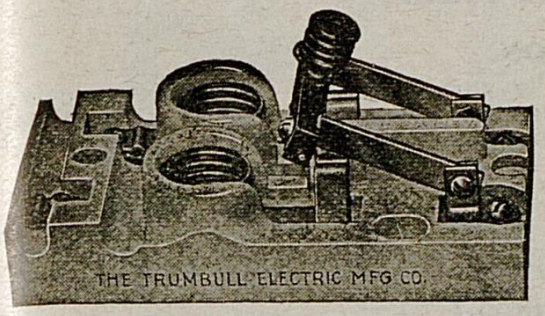
No. 95X1.

No. 91X8. Single-pole Fuse Block and Lightning Arrester, with two fuses, each.....25c Postage 6c

No. 95X1. Double-pole Fuse Block and Lightning Arrester, with two fuses, each.....30c Postage 10c

Extra Fuses for Nos. 91X8 and 95X1, prepaid..... 5c

D. P. SINGLE BRANCH PANEL CUT-OUT.



This cut-out is practically indispensable when it is desired to use our transformer coil and electrolytic interrupter off the line current of 110 or 220 volts, and in all cases where direct connection is made with a high voltage. If the current should become too strong, the fuse will blow out and the circuit will consequently be open. If a cut-out is not used, your entire set of instruments may be seriously injured.

These panel cut-outs are of the standard "Trumbull" make. Shipping weight, 25 oz.

No. 71X4. D. P. Single Branch Panel Cut-out, with two 10-ampere Edison fuse plugs.....$1.00

Postage 25c.

ALUMINUM HELIX WIRE.

Aluminum Wire is quite extensively used in the making of helices of the spiral type. Our aluminum wire is of the same high quality as that which we sell for aerial purposes. It is English stock, and is in direct competition with the American product. It will not oxidize or turn black as does practically all of the American product. (See further description of this wire under list of antenna wire.

No. 83X92. Aluminum Helix Wire, No. 6 B. & S. (about 40 ft. to lb.) per lb.$1.10

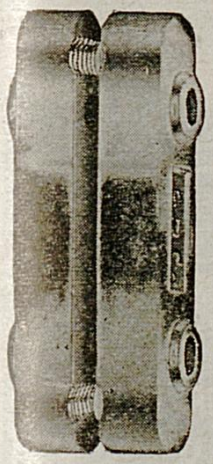
Postage, 22c per lb.

Discount of 10% in 5-lb. lots.

No. 4 Rubber Covered Copper Wire is very excellent for running to ground connections.

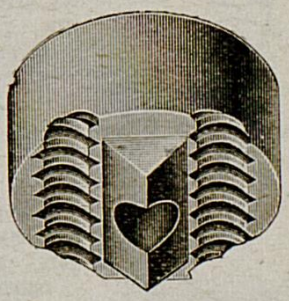
No. 4 R. C. Copper Wire, per ft.....$0.13

In lots of 20 ft. or more, per ft..... .11½



2—WIRE CLEATS.

2-wire cleats are often used for insulating small aerials. Our cleats are of the best quality of porcelain, and are made by one of the foremost concerns in the country engaged in the manufacture of porcelain products. They are almost universally used in standard electrical work. A glance at the cut will convince you of their high quality.

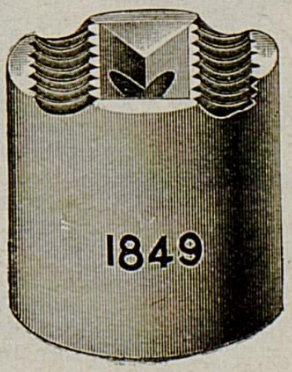


No. 33X4. Porcelain Cleats, per pair 2c

Postage, 4c.

10% discount in lots of 12 or more.

PORCELAIN SPLIT KNOBS.



Our porcelain split knobs are made by one of the foremost concerns in the country engaged in the manufacture of porcelain products, and are of a very high quality. These insulators are used for a great many purposes in electrical work, and in insulating the leads of an aerial from walls to other structures, will be found to be very excellent.

No. 33X5. Porcelain Insulator, each.....2c Postage 3c

10% discount in lots or 12 or more.

Minerals

SILICON.

Our fused silicon is 98% pure, and is very sensitive. We have received hundreds of enthusiastic letters praising the great qualities of this silicon. It may cost a few cents more than some other grades, but when quality is considered, it is really cheap.

No. 63X24. Silicon, per oz. .....50c. Postage 2c.
Small piece .....20c. Postage 2c.

MINERAL SET OF ZINCITE, COPPER, AND BORNITE PYRITES.

(Perikon.)

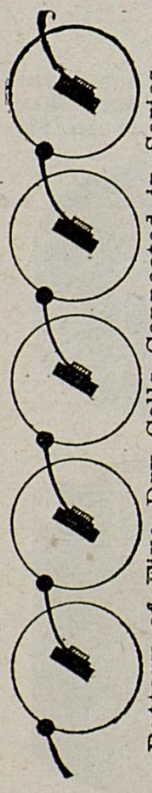
Our Zincite Pyrites are 100% pure. These pyrites are listed by one of the largest chemical houses in the country from whom we purchase them, at from 10% to 100% pure, the price varying accordingly. We mention this so that our patrons may know that in purchasing these pyrites from us they are getting the very best and most sensitive that money can buy. There is a difference of over 800% in the cost of zincite 10% pure and that 100% pure.

No. 63X25.	Mineral Set, per set (two zincite, one bornite, and one copper pyrite)	$0.50	Postage 2c
No. 63X26.	Carborundum, per oz	.25	Postage 2c
	Small piece	.10	Postage 2c
No. 63X27.	Zincite, per oz.	1.00	Postage 2c
No. 63X28.	Bornite, pure, per oz	.25	Postage 2c
No. 63X29.	Iron Pyrites, per oz	.20	Postage 2c
No. 63X30.	Galena, (not less than 2 ounces sold), per oz	.15	Postage 2c
No. 63X31.	Molybdenite, pure, per oz	.25	Postage 2c

ROPE FOR AERIAL.

This rope is a very excellent quality of Manilla rope. It is of the same grade as is used on boats, and is supplied to us by one of the largest boat supply houses in the country.

No. 77X87. Rope, ¼ inch thick, in lots of 50 ft.....$0.65
Not less than 50 feet sold.



Battery of Five Dry Cells Connected in Series. Voltage about 7½. Amperage about 20.

No. 14 GALVANIZED IRON GUY WIRE

No. 14 iron wire is very serviceable and at the same time economical for guy wire.

No. 77X88. No. 14 Galvanized Iron Guy Wire (about 59 feet to pound), per lb. 10c
20% discount on 3 lbs. or more.

PULLEYS.

Single groove, swivel, galvanized iron pulley for ¼-in. rope.

No. 77X89. Pulley, as described, each $0.08
Postage, 3c.

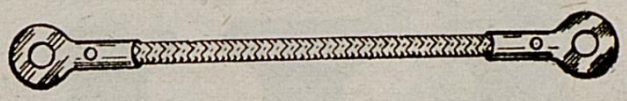
DRY BATTERIES.

The Red Seal Battery has absolutely no superior. There are more of these batteries sold than of all other types combined. It has a very high initial amperage and great recuperative power; 1½ volts, 20 amperes (minimum). Weight of each cell, 2 2/5 pounds. These prices not in effect during the war.

Red Seal Dry Battery, each.....$ .35
Per dozen 3.60
Per barrel (125 in barrel)..... 35.00







BATTERY CONNECTORS.

No. 20X1.	Each	$0.02
	Postage on ten connectors	.03
No. 20X1.	Per hundred	1.75
	Postage on one hundred connectors	.25

BATTERY TERMINALS.

No. 30X1.	Each	$0.02½
	Postage on ten terminals	.04
No. 30X1.	Per hundred	2.00
	Postage on one hundred terminals	.30

"STAY-THERE" BATTERY CONNECTOR.

Stay-there Battery Connector. Snapped on in second, and as easily removed. Cannot become loose. The most efficient connector made.

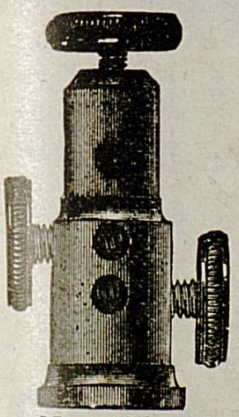
No. 78X0. "Stay-There" Battery Connector ..... $0.05 Postage 1c
Per Dozen ..... .50 Postage 4c

Binding Posts

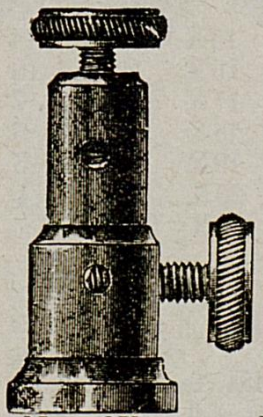
In lots of 100 assorted, 10% discount.
In lots of 500 assorted, 15% discount.
In lots of 1000 assorted, 20% discount.
In lots of 2000 assorted, 25% discount.

Note Our Attractive Prices.

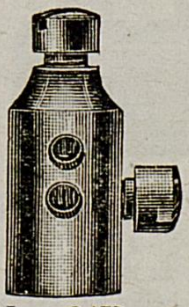
These articles are made of brass with a bright finish, holes accurately bored, screws well fitting, and can be supplied with either wood or machine screws in bottom. Binding Posts can also be furnished lacquered or nickel plated. The cuts show original size and type. **Other styles made to sample or sketch.**



No. 1X
Ea. $0.35



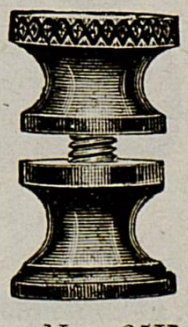
No. 2X
Ea. $0.28



No. 24X
Ea. $0.24



No. 5X
Ea. $0.14



No. 25X
Ea. $0.24



No. 8X
Ea. $0.16



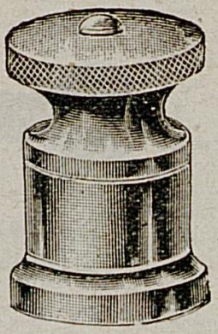
No. 26X
Ea. $0.15



No. 27X
Ea. $0.14



No. 28X
Ea. $0.13



No. 37X
Ea. $0.35



No. 9X
Ea. $0.16



No. 11X
Ea. $0.15



No. 33X
Ea. $0.14



No. 10X
Ea. $0.14



No. 12X
Ea. $0.11



No. 13X
Ea. $0.08



No. 29X
Ea. $0.10



No. 30X
Ea. $0.09



No. 6X
Ea. $0.09



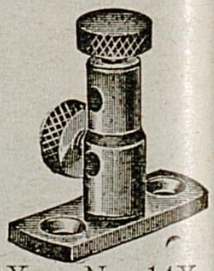
No. 31X
Ea. $0.22



No. 3X
Ea. $0.14

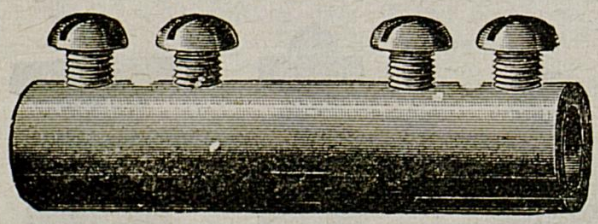


No. 4X
Ea. $0.09



No. 14X
Ea. $0.35

Wire Connectors



No.	Wire Screws		Lgth.	Price ea.
15X	12 and 14	2	1¼-in.	$0.07
16X	8 and 10	2	1¼-in.	.08
17X	6 and 7	2	1¼-in.	.10
18X	4 and 5	4	1⅞-in.	.14
19X	2 and 3	4	1⅞-in.	.17
20X	0 and 1	4	2¼-in.	.19
21X	00	4	2½-in.	.25

Cord Tips



No. 34X. Ea. $0.05 No. 35X. Ea. $0.02
No. 36X. is like No. 35X. but shell and pin Separate. Each.....$0.03



Brass Washers

To fit machine screws. The following sizes carried in stock. Special sizes made to order.

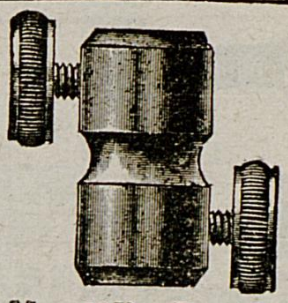
Note—Prices 50% advance over following.

SMALL PATTERN

Size of Machine Screw	Outside Diameter	Inside Diameter	Thickness	Price per Pound	Approximate Number to the Pound
No. 4	9/32	.125	.025	$1.50	2500
No. 6	3/8	.150	.032	1.00	1100
No. 8	3/8	.170	.032	1.00	1170
No. 10	7/16	.195	.036	.90	760
No. 12	1/2	.228	.040	.80	525
No. 14	9/16	.260	.040	.80	420
No. 16	5/8	.285	.040	.75	340
No. 18	11/16	5/16	.051	.75	230
No. 20	3/4	11/32	.064	.75	150
No. 24	7/8	.385	.064	.75	110

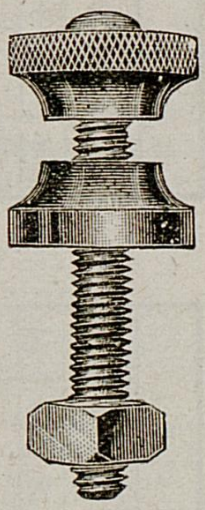
LARGE PATTERN

No. 8	7/16	.170	.036	$0.90	725
No. 10	1/2	.195	.040	.80	480
No. 12	9/16	.228	.040	.80	380
No. 14	11/16	.260	.051	.75	210
No. 16	3/4	.285	.064	.75	135
No. 18	7/8	5/16	.064	.75	100
No. 20	7/8	11/32	.064	.75	103
No. 24	1	.385	.081	.70	64



No. 22X Double Connectors.
Each $0.16
No. 23X Single Connectors.
Each $0.08

In asking for discounts state quantities desired

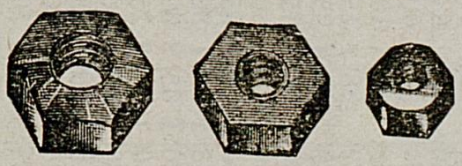


No. 7X
Ea. $0.28

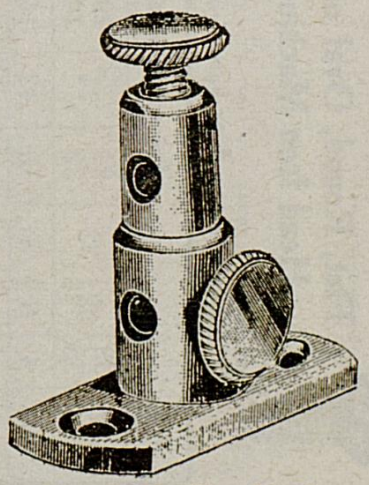


No. 41X
Ea. $0.23

MACHINE MADE BRASS HEX. NUTS.



Diameter	Thick	Threads	Price per 100
3/16	3/32	2/56 3/48	$0.81
1/4	3/32	4/36 4/41	.86
5/16	1/8	6/32 8/32	.95
3/8	1/8	10/32 10/24 12/24	1.20
7/16	3/32	14/20 14/24 1/4/20	1.68
1/2	3/16	1/4/20 16/20 16/18	2.25
9/16	3/16	5/16/18 18/18 3/8/16	2.97
5/8	3/16	24/16 7/16/14	3.75
11/16	1/4	1/2/12 1/2/13	5.17
3/4	1/4	1/2/12 1/2/13	6.60



No. 45X, Ea. $0.35



Flat, Round, Oval and Fillister Head Iron Machine Screws



(List adopted by all Manufacturers March 1, 1911)

Price Per Gross										
Thr'ds to inch	32 36	32	32	24 32	24	20 24	18 20	16 18	16 18	16
Nos.	4	6	8	10	12	14	16	18	20	24
Length										
3/16	.33	.35	.40	.45	....	....	....	....	....	....
1/4	.33	.35	.40	.45	.54	.64	....	....	....	....
5/16	.35	.37	.44	.47	.54	.64	.95	....	....	....
3/8	.35	.37	.44	.49	.56	.68	.96	1.25	1.50	1.75
7/16	.37	.39	.46	.51	.58	.72	.97	1.30	1.60	1.90
1/2	.37	.39	.48	.54	.60	.76	.98	1.40	1.70	2.05
9/16	.40	.43	.50	.58	.64	.80	1.00	1.50	1.80	2.20
5/8	.42	.45	.52	.62	.68	.84	1.10	1.65	1.90	2.35
3/4	.44	.48	.54	.66	.72	.88	1.15	1.80	2.10	2.50
7/8	.47	.51	.58	.70	.78	.94	1.25	1.95	2.30	2.65
1	.50	.54	.62	.74	.80	1.00	1.35	2.10	2.50	2.80
1 1/8	.54	.58	.66	.82	.90	1.10	1.50	2.25	2.70	2.95
1 1/4	.54	.60	.72	.90	1.00	1.25	1.65	2.40	2.90	3.25
1 3/8	.58	.66	.78	1.00	1.15	1 45	1.80	2.55	3.10	3.55
1 1/2	.64	.74	.86	1.10	1.30	I 65	2.00	2.70	3.30	3.90
1 3/4	...	.80	.94	1.25	1.50	1.85	2.25	2.85	3.50	4.25
2	...	.90	1.05	1.50	1.80	2.10	2.50	3.00	3.75	4.60
2 1/4	...	...	1.30	1.70	2.10	2.30	2.75	3.25	4.15	4.95
2 1/2	...	...	1.60	1.90	2.45	2.65	3.00	3.65	4.55	5.30
2 3/4	...	...	1.90	2.20	2.85	3.05	3.50	4.15	4.75	5.90
3	...	...	2.30	2.50	3.50	3.70	4.50	5.15	5.75	7.45
3 1/4	...	...	.....	2.90	4.25	4.45	5.50	6.50	7.00	8.80
3 1/2	...	...	.....	3.30	5.00	5.25	6.50	7.50	8.25	10.10
3 3/4	...	...	.....	.....	5.75	6.00	7.50	8.40	9.25	12.55
4	...	...	.....	.....	6.40	6.75	8.50	9.60	10.25	13.50

Note.—Magnet w
as follow

No.	S.
Fee	
per l	
S.C	
12	...
14	...
16	12
18	20
20	31
21	38
22	49
23	62
24	77
25	95
26	118
27	153
28	190
29	246
30	289
31	348
32	441
33	568
34	640
35	839
36	984
38	...
40	...

Shipp
spools, 3

Note.—
except for



Flat, Round, Oval and Fillister Head Brass Machine Screws



(List adopted by all Manufacturers March 1, 1911)

Price Per Gross										
Thr'ds to inch	32 36	32	32	24 32	24	20 24	18 20	16 18	16 18	16
Nos.	4	6	8	10	12	14	16	18	20	24
Length										
3/16	.40	.48	.65	.95	....	....	....	....	....	....
1/4	.40	.48	.65	.95	1.20	1.70	2.05	....	....	....
5/16	.43	.52	.70	1.00	1.25	1.75	2.05	....	....	....
3/8	.43	.54	.74	1.05	1.30	1.80	2.15	3.15	4.25	5.50
7/16	.47	.58	.78	1.10	1.35	1.85	2.25	3.25	4.35	5.60
1/2	.48	.60	.82	1.15	1.40	2.00	2.40	3.40	4.50	5.75
9/16	.53	65	.86	1.20	1.45	2.15	2.55	3.60	4.75	6.30
5/8	.57	.70	.92	1.30	1.55	2.30	2.70	3.80	5.00	6.50
3/4	.62	.80	.96	1.40	1.70	2.60	3.00	4.00	5.25	6.70
7/8	.70	.90	1.10	1.60	1.90	2.90	3.30	4.20	5.50	7.40
1	.80	1.00	1.20	1.80	2.20	3.20	3.60	4.50	5.75	8.50
1 1/8	.90	1.20	1.35	2.00	2.45	3.50	3.90	4.85	6.10	9.00
1 1/4	1.00	1.30	1.50	2.20	2.65	3.80	4.10	5.15	6.50	9.90
1 3/8	1.25	1.50	1.65	2.50	2.90	4.10	4.40	5.45	6.80	11.50
1 1/2	1.50	1.75	1.90	2.60	3.15	4.40	4.70	5.60	7.00	12.00
1 3/4	....	2.00	2.30	3.00	3.45	4.70	5.00	6.00	7.50	12.70
2	....	2.50	2.80	3.60	4.00	5.00	5.75	6.50	8.25	13.50
2 1/4	....	....	....	4.20	4.80	5.80	6.65	7.50	9.25	14.90
2 1/2	....	....	....	5.00	5.80	6.80	8.00	9.00	10.50	15.50
2 3/4	....	....	....	6.00	7.00	8.00	10.00	11.00	12.00	17.00
3	....	....	....	7.50	8.50	9.50	11.00	12.50	14.00	19.00
3 1/4	....	....	....	9.00	10.50	11.50	15.00	17.50	18.50	22.50
3 1/2	....	....	....	11.00	13.00	15.00	18.00	19.50	22.00	25.50
3 3/4	....	....	....	13.50	16.00	18.50	20.00	22.50	25.00	28.00
4	....	....	....	16.50	19.00	23.00	25.00	26.50	28.00	32.00

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Magnet Wire

COTTON AND SILK INSULATED. ENAMEL.
ANNUNCIATOR. GERMAN SILVER.

All of Our Magnet Wire Is Made by the Foremost Wire Company in the United States.

OUR LARGE PURCHASES OF MAGNET WIRE ENABLE US TO QUOTE THE LOWEST PRICES.

Our enormous sales of magnet wire enable us to sell this product at prices that mean a substantial saving in money to our patrons. We desire to impress upon our patrons that our low price on this wire does not mean that there has been the slightest deviation in the high standard of quality upon which we insist, not only in magnet wire, but in all of our electrical products.

Our magnet wire is made of carefully annealed copper wire. Great care is taken to secure accuracy to gauge and uniformity in the thickness of insulation. All the magnet wire and other kinds of wire sold by us is made by the largest wire company in the United States, and the quality cannot be excelled. In purchasing magnet wire it is of more than ordinary importance to assure yourself that you are getting a high quality of wire as a poor quality of magnet wire (low grade of copper, poor insulation, uneven insulation, etc.) can cause you more damage and trouble than the cost of the wire.

See note about advance.

SINGLE AND DOUBLE COTTON WIRE.

Note.—Account increase in cost of raw material the prices below on magnet wire, and the prices on all other kinds of magnet wire are increased as follows: Add 20c to lb. spools; 10c to ½-lb. spools and 5c to 5-oz. spools.

S. C. and D. C. mean Single Cotton or Double Cotton Insulation.

No.	Feet per lb. S.C.	Price per lb. S.C.	Price ½ lb. S.C.	Price 5 oz. S.C.	Price 1 oz. S.C.	Feet per lb. D.C.	Price per lb. D.C.	Price ½ lb. D.C.	Price 5 oz. D.C.	Price 1 oz. D.C.
12	....	$0.67	$0.40	....	....	....	$0.70	$0.45	....	....
14	....	.67	.40	....	....	....	.75	.45	....	....
16	125	.70	.40	....	....	122	.76	.45	....	....
18	200	.75	.45	....	....	192	.82	.48	....	....
20	311	.83	.48	....	....	298	.87	.50	....	....
21	389	.84	.51	....	....	370	.96	.54	....	....
22	491	.85	.52	....	....	461	.97	.55	....	....
23	624	.88	.56	....	....	584	1.04	.60	....	....
24	778	.90	.58	$0.37	....	754	1.07	.65	$0.40	....
25	958	.92	.59	.40	....	903	1.09	.67	.45	....
26	1188	1.00	.62	.40	....	1118	1.13	.68	.48	....
27	1533	1.05	.64	.41	....	1422	1.20	.70	.52	....
28	1903	1.11	.68	.45	$0.18	1759	1.26	.74	.55	$0.18
29	2461	1.12	.70	.47	.18	2207	1.32	.84	.56	.18
30	2893	1.23	.73	.50	.18	2534	1.42	.85	.58	.18
31	3483	1.32	.79	.53	.20	2768	1.50	.87	.60	.20
32	4414	1.42	.82	.56	.20	3737	1.53	.90	.62	.20
33	5688	1.50	.87	.60	.22	4697	1.75	.98	.69	.24
34	6400	1.54	.98	.69	.24	6168	2.17	1.10	.79	.26
35	8393	2.00	1.12	.74	.24	6737	2.45	1.40	.96	.28
36	9846	2.20	1.20	.81	.26	7877	2.74	1.50	1.00	.28
38	....	2.90	1.85	1.30	.45	....	4.50	2.50	1.90	.49
40	....	4.25	2.35	2.05	.58	....	6.75	3.50	2.95	.69

Shipping weight, 1 lb. spools, 2 lbs.; ½ lb. and 5 oz. spools 1 lb.; 1 oz. spools, 3 oz. If postage is not remitted, wire will be sent by express.

Note.—All wire is furnished wound on spools. No different size spools sold except for greater quantities than one pound.

SILK COVERED WIRE.

Silk covered wire is often used in the winding of spark coils, magnets, telephones, etc. A greater number of ampere turns can be obtained than with cotton insulation, and it is also more durable and lasting.

SILK COVERED WIRE.

Note.—See note on page 136, showing advance before ordering this wire.

S. S. C. and D. S. C. mean Single and Double Silk Insulation.

Note.—All wire is furnished wound on spools. No different size spools sold, except for greater quantities than one pound.

No.	Price per lb. S.S.C.	Price ½ lb. S.S.C.	Price 5 oz. S.S.C.	Price 1 oz. S.S.C.	Price per lb. D.S.C.	Price ½ lb. D.S.C.	Price 5 oz. D.S.C.	Price 1 oz. D.S.C.
16	$1.02	$0.65	....	....	$1.12	$0.71	....	....
18	1.05	.67	....	....	1.15	.73	....	....
20	1.08	.69	....	....	1.28	.81	....	....
21	1.10	.70	....	....	1.30	.83	....	....
22	1.12	.71	....	....	1.36	.86	....	....
23	1.15	.73	....	....	1.40	.89	....	....
24	1.20	.75	$0.48	....	1.48	.94	$0.60	....
26	1.36	.85	.52	....	1.72	1.08	.67	....
28	1.52	.98	.59	$0.23	2.00	1.25	.78	$0.2
30	1.76	1.15	.68	.24	2.45	1.53	.95	.2
32	2.13	1.38	.82	.27	3.12	1.95	1.21	.3
34	2.72	1.75	1.05	.31	4.08	2.60	1.59	.4
36	3.64	2.27	1.37	.39	5.18	3.29	2.01	.5
38	4.96	3.09	1.88	.49	7.14	4.50	2.78	.6
40	7.00	4.37	2.83	.66	9.72	6.07	3.75	.8

Shipping weight of 1 lb. spools, 2 lbs.; ½ lb. and 5 oz. spools, 1 lb.; 1 oz. spools, 3 oz. If postage is not remitted, wire will be sent by express.

BLACK ENAMEL WIRE.



Since the efficiency of an electrical machine depends very largely on the conductivity of the copper used in its windings, and the reliability of the machine depends, in a great measure, on the insulation of its windings, great care should be taken in selecting magnet wire.

In addition to the regular cotton insulated wire listed, we direct your attention to the new black enamel insulation. This enamel is a firmly adhering, elastic film, which is applied to the wire by machines especially constructed for this purpose. It will stand without injury, conditions of heat that would char silk or cotton insulation. It is not affected by moisture, and a coil wound with this black enamel wire may be immersed in water without becoming short-circuited. The dielectric strength of this black enamel insulation is much greater than that of silk or cotton, so that, for the same insulating strength, a much thinner insulation is required. This property permits an increased number of ampere turns in the same winding space, and makes black enamel wire less expensive to use than silk or cotton insulations, as there are a greater number of feet to the pound of black enamel wire than of any other insulated wire. The enamel is inert to chemical reagents, and any chemical that will not destroy the wire itself will have no effect on the insulation. It will also successfully undergo the mechanical abrasion incidental to the manufacturing of insulated wire into electrical apparatus.

Black Enamel Wire.

Note.—See note on page 136 showing advance before ordering this wire.

Winding Area and Feet per lb. of Enameled Insulated Wire Compared with Single Cotton Insulated Wire.

No.	—Feet per lb.— Single Cotton	Enamel	Approximate turns Per square inch Single Cotton	Enamel	Price per lb.	Price ½ lb.	Price 5 oz.	Price 1 oz.
14	....	.....	....	.....	$0.74	$0.44	.....	.....
16	....	.....	....	.....	.74	.44	.....	.....
18	....	.....	....	.....	.74	.44	.....	.....
20	311	319	....	.....	.78	.48	.....	.....
22	488	503	....	.....	.84	.50	.....	.....
24	763	810	1586	2162	.93	.55	$0.35	.....
25	953	1019	1810	2750	.95	.58	.....	.....
26	1201	1286	2356	3460	.98	.58	.38	.....
27	1500	1620	2954	4270	1.00	.61	.....	.....
28	1860	2042	3340	5406	1.06	.63	.44	$0.20
29	2370	2570	3508	6608	1.12	.74	.....	.....
30	2860	3240	4626	8264	1.20	.76	.48	.20
31	3482	4082	5240	10832	1.25	.79	.....	.....
32	4234	5132	5482	13428	1.27	.81	.54	.24
33	5141	6445	6400	16832	1.40	.90	.....	.....
34	6317	8093	7440	21002	1.54	.92	.68	.31
35	7755	10197	9420	26014	1.70	1.12	.....	.....
36	9511	12813	9802	31822	1.98	1.22	.78	.33
38	....	20490	....	.....	2.95	1.65	1.25	.43
40	....	32560	....	.....	4.10	2.25	2.00	.58

Shipping weight of 1 lb. spools, 2 lbs.; ½ lb. and 5 oz. spools, 1 lb.; 1 oz. spools, 3 oz. If postage is not remitted wire will be sent by express.

Note.—All wire is furnished wound on spools. No different size spools sold, except for greater quantities than one pound.

ANNUNCIATOR WIRE.

Our annunciator wire is made of selected copper wire, and is insulated with two winds of cotton, applied in opposite directions. These insulations are saturated with a paraffin compound and given a high polish. Put up in 8-pound spools, 1-pound spools, and 1-pound coils.

No. 18. Single conductor, 155 feet to pound, per lb.....$0.60
No. 20. Single conductor, 238 feet to pound, per lb..... .60
Shipping weight, 2 lbs.

BARE AND COTTON COVERED GERMAN SILVER RESISTANCE WIRE.

German silver is more extensively used for resistance than any other material. It is more desirable from the standpoint of economy than any other of the resistance metals, where a simple resistance is required. Eighteen per cent. alloy has approximately 18.3 times the resistance of copper, and a temperature coefficient of .00016 per degree Fahrenheit. Eighteen per cent. German silver is considered the standard in electrical work.

No.	per lb. Feet	per lb. S. C. C.	per lb. D. C. C.	per lb. Bare	per ½ lb. Bare
16	131.3	$1.33	$1.70	$1.02	$0.64
18	208.8	1.33	1.70	1.04	.65
20	332.1	1.35	1.72	1.08	.67
22	527.9	1.45	1.80	1.19	.75
24	839.5	1.60	2.00	1.26	.84
25	1058.0	1.86	2.17	1.35	.90
26	....	1.98	2.34	1.41	.95
28	....	2.27	2.85	1.60	1.00
30	....	2.65	3.00	1.85	1.20

Shipping weight 1 lb. spools, 2 lbs.; ½ lb. spools, 1 lb. No orders accepted for less than one-half lb. **We do not sell less than one lb. of the insulated German silver wire.**

PORCELAIN TUBES.

The tubes listed are of such external and internal diameters that Nos. 60X72 and 60X74 will fit snugly into Nos. 60X73 and 60X75.

A very efficient leading-in insulator may be constructed by inserting a piece of No. 6 rubber covered wire into the smaller tube, inserting this, in turn, into the larger one, and immersing the nest in a melted insulating compound. The aerial is connected to one end of the No. 6 wire, and the receiving apparatus to the other end.

No. 60X72.	Length 8 in., Internal dia. ½ in., External dia. $\frac{13}{16}$ in.	Each	$0.16
	Postage		.08
No. 60X74.	Length 12 in., Internal dia. ½ in., External dia. $\frac{13}{16}$ in.	Each	.23
	Postage		11
No. 60X73.	Length 8 in., Internal dia. 1 in., External dia. $1\frac{7}{16}$ in.	Each	.23
	Postage		11
No. 60X75.	Length 12 in., Internal dia. 1 in., External dia. $1\frac{7}{16}$ in.	Each	.30
	Postage		.16

All sizes of porcelain tubes carried in stock. Prices on application.

BABY TORCH.



The BABY Torch is a necessity for electricians, jewelers, dentists, machinists, and automobile repair men. No pump or complicated parts. The heat of a match generates it. Burns without air pressure. Throws an extremely hot four-inch flame. Absolutely safe and reliable. Over 10,000 in use.

No. 13X2 Price.....$1.40

Postage, 5c.

Note.—For soldering paste, see index.

BLACK FRICTION TAPE.

The adhesive qualities of this tape renders it particularly desirable for those uses where a superior product is demanded.

No. A382.	Black Friction Tape, per lb.	$0.35
No. 383.	Black Friction Tape, per ½ lb.	.20

RAW MATERIALS.

METAL SHEETING, TUBING AND RODS.

Brass.

BAKELITE DILECTO.

Bakelite Dilecto Sheet is an insulating material combining many desirable qualities not found in other products offered for this purpose. This material is hard, tough and homogeneous, being at the same time fairly flexible. It is absolutely moisture proof and will not warp, swell or deteriorate. Can be used wherever fibre or hard rubber is used and wherever fibre and hard rubber have failed to give satisfaction. This material is absolutely the best insulator manufactured. Supplied in black and natural. The natural color is of a brownish hue.

Thickness	Price per sq. foot	Weight per sq. foot	Price per sq. inch	Postage per sq. inch
1/64 inch	$0.60	3 oz.	$0.01	$0.01
1/32 inch	1.20	6 oz.	.02	.01
1/16 inch	1.90	12 oz.	.02½	.01
1/8 inch	2.25	1 lb.	.03	.01
¼ inch	3.75	2 lbs.	.03½	.01
⅜ inch	6.00	2¾ lbs.	.05	.01
½ inch	7.25	3¾ lbs.	.06	.02
¾ inch	9.75	5¾ lbs.	.07½	.02
1 inch	14.00	7½ lbs.	.10	.02

Note.—A minimum charge of 25c is made for any order for Bakelite. The handling of order and cutting make this charge absolutely necessary.

WOLLASTON WIRE.

This is a very fine grade of platinum wire, and is used in connection with electrolytic detectors. It is so fine as to be barely visible to the naked eye.
No. 62X89. Wollaston wire, .0001 thick, per inch.....$0.25 Postage, 2c
Three inches, prepaid..... .65

BRASS SHEETING. Cut to any dimension. For less than ½ sq. ft. the price is figured per sq. inch. Not less than 25c of one size sold.

Thickness	Price per sq. foot	Postage per sq. foot	Price per sq. inch	Postage per sq. inch
1/64 inch	$0.48	$0.14	$0.01	$0.01
1/32 inch	.77	.23	.01	.01
1/16 inch	1.43	.48	.02	.01
1/8 inch	2.70	....	.03	.02

BRASS TUBING. Seamless. Cut to any length. For less than ½ ft. the price is figured per inch.

Inside Diameter	Outside Diameter	Price per foot	Postage per foot	Price per inch	Postage per inch
⅛ inch	5/32 inch	$0.21	$0.03	$0.02	$0.01
3/16 inch	7/32 inch	.24	.03	.03	.01
¼ inch	5/16 inch	.27	.03	.03	.01
5/16 inch	3/8 inch	.30	.04	.03	.01
⅜ inch	1/2 inch	.32	.07	.05	.01
½ inch	9/16 inch	.40	.07	.05	.01
¾ inch	13/16 inch	.48	.07	.06	.01
1 inch	1⅛ inch	.86	.15	.10	.02
1⅛ inch	1 3/16 inch	1.04	.10	.11	.01
1½ inch	1⅝ inch	1.23	.22	.14	.02

BRASS TUBING. Square. Seamless, for constructing tuner sliders. One size on hand only. Outside measurement 5/16 in., inside measurement ¼ in. Fits all standard Tuner rods. For less than ½ ft. the price is figured per inch.

Price per foot .....45c Postage per foot 4c
Price per inch ..... 6c Postage per inch 1c

BRASS ROD. Round. Cut to any length. For less than ½ ft., the price is figured per inch. Over 2 ft. discount 10%. Not less than 20c of one size sold.

Diameter	Price per ft.	Postage per ft.	Price per inch	Postage per inch
3/32 inch	$0.10	$0.01	$0.01½	$0.01
⅛ inch	.10	.01	.01½	.01
3/16 inch	.12	.02	.01½	.01
¼ inch	.15	.03	.02	.01
⅜ inch	.36	.04	.04	.01
½ inch	.42	.14	.05	.01
⅝ inch	.60	.22	.07	.02
¾ inch	.84	.30	.09	.03
⅞ inch	1.14	.40	.12	.04
1 inch	1.58	.54	.18	.05

BRASS RODS. Square. Cut to any length. For less than ½ ft. price is figured per inch. Not less than 20c of one size sold.

Size	Price per ft.	Postage per ft.	Price per inch	Postage per inch
¼ in. x ¼ in.	$0.30	$0.04	$0.04	$0.01
⅜ in. x ⅜ in.	.45	.06	.06	.01
7/16 in. x 7/16 in.	.60	.08	.08	.01

BRASS STRIP. (Ribbon.) Cut to any length. For less than ½ ft. the price is figured per square inch. Not less than 20c of one size sold.

Thickness	Width	Price per foot	Postage per foot	Price per inch	Postage per inch
1/64 inch	1 inch	$0.14	$0.02	$0.02	$0.01
1/64 inch	2 inch	.24	.04	.03	.01
1/32 inch	½ inch	.15	.02	.02	.01

Copper.

COPPER SHEETING. Cut to any dimension. For less than ½ sq. ft. price is figured per sq. inch.

Thickness	Price per sq. foot	Postage per sq. foot	Price per sq. inch	Postage per sq. inch
No. 28	$1.15	$0.10	$0.02½	$0.01
1/32 inch	1.90	.30	.02½	.01
1/16 inch	3.55	.60	.05	.01

Not less than 25 cents of one size sold.

COPPER RODS. Round. Cut to any length. For less than ½ ft. price is figured per inch.

Diameter	Price per foot	Postage per foot	Price per inch	Postage per inch
⅛ inch	$0.18	$0.02	$0.$2½	$0.01
¼ inch	.40	.04	.05	.01
⅜ inch	.65	.10	.10	.01
½ inch	1.18	.18	.15	.02

Not less than 20 cents of one size sold.

COPPER BAR. Used for switch board bus-bars, making knife switch blades, and other apparatus parts. Cut to any size. For less than ½ ft. the price is figured per inch.

Thickness	Width	Price per foot	Postage per foot	Price per inch	Postage per inch
1/16 inch	½ inch	$0.15	$0.02	$0.02½	$0.01
1/16 inch	1 inch	.25	.05	.05	.01
⅛ inch	½ inch	.25	.05	.05	.01
⅛ inch	1 inch	.55	.10	.10	.01

Not less than 20 cents of one size sold.

Phosphor Bronze.

PHOSPHOR BRONZE STRIP, is well known for its springy qualities. It is used in all places where a spring strip is required, such as in detectors, tuning coil slides, mechanical movements, etc. The very best material for flat motor and dynamo brushes, and also for spark coil vibrators, etc.

Thickness B. & S. Gauge	Width	Price per foot	Postage per foot
No. 34	5/16 inch	$0.24	$0.01
No. 34	3/16 inch	.20	.01
No. 28	⅛ inch	.20	.01
No. 28	5/16 inch	.24	.01

HARD RUBBER.

HARD RUBBER SHEETING. Used for all high grade electrical apparatus where perfect insulation or neatness is desired. Cut to any size. For less than ½ sq. ft., price is figured per sq. inch. 10% discount on sheets over 2 sq. ft.

Not less than 25c. of one size sold.

Thickness	Price per sq. foot	Postage per sq. foot	Price per sq. inch	Postage per sq. inch	Weight per sq. foot
1/16 inch	$1.10	$0.12	$0.01½	$0.01	7 ounces
⅛ inch	1.75	.20	.02	.01	14 ounces
3/16 inch	2.75	.30	.03	.01	21 ounces
¼ inch	3.40	.35	.03½	.01	23 ounces

HARD RUBBER TUBING. Used for insulating high tension current. Largely used in highest grade induction coils to insulate secondary from primary. Comes in 24-in. lengths. Cut to any size. For less than ½ ft. price is figured per inch. O. D.—Outside Diameter. I. D.—Inside Diameter.

O. D.	I. D.	Price per foot	Postage per foot	Price per inch	Postage per inch
⅛ inch	1/16 inch	$0.12		$0.02	**Not less than**
¼ inch	⅛ inch	.20	Postpaid	.04	**20c. of one**
½ inch	⅛ inch	.40		.06	**size sold.**
½ inch	3/16 inch	.35		.06	
½ inch	¼ inch	.40		.07	
⅞ inch	⅝ inch	.60		.10	

Hard Rubber Rod. Not less than 25c worth of one size sold.

Diam.	Price Per Foot	Postage Per Foot	Price Per Inch	
⅛ inch	$0.10		$0.02	
5/16 inch	.15	Prepaid	.03	Not less than 25c of
⅜ inch	.18		.03	any one size sold.
7/16 inch	.23		.03	

FIBRE.

VULCANIZED FIBRE SHEETING. (BLACK AND RED.) Best grade fibre. Cut to any dimension. For less than ½ sq. ft., price is figured per sq. inch. 10% discount on sheets over 1½ sq. ft.

Thickness	Price per sq. foot	Postage per sq. foot	Price per sq. inch	Postage per sq. inch	Weight per sq. foot
1/64 inch	$0.38	$0.02	$0.01	$0.01	2 ounces
1/32 inch	.50	.04	.01	.01	4 ounces
1/16 inch	.64	.08	.01	.01½	8 ounces
1/8 inch	.88	.16	.01	.02	15 ounces
1/4 inch	1.38	.32	.01	.02½	1⅞ lbs.
1/2 inch	3.00	.64	.02	.03	3¾ lbs.

VULCANIZED FIBRE TUBING. Used largely for insulating primary from secondary to induction coils. Cut to any length. For less than ½ ft. price is figured per inch. Over 1½ ft. discount 10%. I. D.—Inside Diameter.

I. D.	Thickness of wall	Price per foot	Postage per foot	Price per inch	Postage per inch
⅛ inch	1/16 inch	$0.30	$0.02	$0.03	$0.01
¼ inch	1/16 inch	.24	.02	.02	.01
⅜ inch	⅛ inch	.32	.02	.04	.01
½ inch	⅛ inch	.40	.03	.04	.01
¾ inch	⅛ inch	.41	.05	.04	.01
1 inch	⅛ inch	.62	.06	.07	.01

Not less than 15c of any size sold.

EMPIRE PRODUCTS.

EMPIRE CLOTH. Used throughout the country for insulating high tension transformers, insulation on motor and dynamo armatures and fields, and other electrical work. Has great mechanical strength. Will withstand 7,500 volts without puncturing.

Empire Cloth, per sq. yard No. 78x32.....$0.60

Can only be sold in pieces 3 ft. long; not less than ½ ft. wide.

BLACK EMPIRE CLOTH.

This is similar in quality to our No. 78X32, but has a higher insulation value. It is used principally for spark coil and transformer work; also for high tension condensers. It withstands 10,000 volts without puncturing. Comes in one thickness only, .010 inch.

No. 78X43 Black Empire Cloth, as described, per square yard.....$0.72

Not less than ½ square yard sold.

EMPIRE VARNISHED BOND PAPER (TRANSPARENT).

This is a very useful article where extremely high insulation is not required, such as in receiving condensers for wireless, to insulate core and primary of small spark coils and transformers, **for spark coil condensers, etc.**

No. 78X34 Empire Varnished Bond Paper, per square yard.....$0.36

Not less than 1 square yard sold.

EMPIRE BLACK VARNISHED BOND PAPER.

This is similar to No. 78X34 varnished bond paper, except that it has about 30 per cent. higher insulating strength. Puncture test, 1,500 volts per .010 inch thickness. It has also great mechanical strength and feels oily and smooth to the touch. It is used for spark coil condensers, core insulation, receiving condensers, etc. One thickness furnished, .010 inch.

No. 78X35 Empire Black Varnished Bond Paper, per square yard.....$0.42
Not less than 1 square yard sold.

TIN FOILS.

(See Index.)

PARAFFINE PAPER.

PARAFFINE PAPER. We carry the best grade of paper, especially manufactured for electrical condensers. This paper comes in three different thicknesses listed below. Guaranteed to be without flaws.

No. 60X0. OUR HEAVIEST GRADE. This paper will withstand high voltage and may be used in any condenser subjected to same. This size is suitable as a primary condenser of a spark coil.

Price per sheet, 24 in. x 36 in. $0.08
Postage Extra, up to three sheets ..... .05
Postage Extra, each additional sheet ..... .02

No. 92X1. OUR MEDIUM GRADE. This paper is used in manufacturing condensers for telephones, wireless outfits, and for all other purposes.

Price per sheet, 24 in. x 36 in. $0.06
Postage Extra, up to three sheets ..... .05
Postage Extra, each additional sheet ..... .02

No. 14X3. OUR THINEST GRADE. This paper is very thin and is used for condensers where an extremely high capacity is desired in a small space. Recommended for wireless telegraph receiving set condensers.

Price per sheet, 24 in. x 36 in. $0.05
Postage Extra, up to three sheets ..... .04
Postage Extra, each additional sheet ..... .02

FLEXIBLE MICANITE.

Sold only in full size sheets.

For Condenser Dielectric.

No.	Thickness	Size of Sheets	Weight of Sheet	Price lb.
60X87	.005	36 x 36	½ lb.	$3.00
60X88	.010	36 x 36	1 lb.	2.25
60X89	.015	36 x 36	1½ lb.	2.25
60X90	.020	36 x 36	2 lb.	2.25
60X91	.025	36 x 36	2½ lb.	2.25
60X92	.030	36 x 36	3 lb.	2.25
60X93	.032	36 x 36	3¼ lb.	2.25

Express additional.

No. 80X23 INSULATING COMPOUND. A composition, specially prepared for filling transformer boxes, and insulating transformers. Melts at 220° F. and does not soften or crack in any weather.

	Price	Ship. Wt.
No. 80X23. Insulating Compound, per lb.....	$0.20	2 lbs.

No. 80X25 SEALING WAX. Used for excluding moisture and water in the building of spark coils, etc.

No. 88X25. Sealing Wax. price per stick.....$0.05 Postage 2c

SHELLAC. Used for insulating and painting electro-magnets, tuning coils, armatures, wooden work, and many other things. The orange shellac is used for electrical work, while the white shellac is used for finishing high grade polished wood work.

No. 80X26. Orange Shellac, ½ Pint bottle.....$0.35
No. 80X27. White Shellac, ½ Pint bottle..... .35

Cannot be mailed.

LAMP CORD.

No. 90X01. No. 18 Standard Covered Lamp Cord, price per ft...0.04 Post. 1c

RUBBER COVERED WIRE.

No. 90X03. Single Braid, Rubber Covered No. 14 Wire. Price per 100 ft..$2.00
No. 90X04. Double Braid, Rubber Covered No. 12 Wire. Price per 100 ft.. 3.25
No. 90X05. Rubber Covered Fixture Wire No. 16. Price per 100 ft..... 1.25
Postage Extra ..... .10

COPPER WIRE. soft drawn. Used largely for winding tuning coils. **Only sold in 1-lb. spools.** Nos. 14, 16, 18, 20 or 22, any size, price per lb., 80c. Postage 20c.

ZINC RODS. Used in making spark gaps and battery zincs. For less than ½ ft. price is figured per inch. Over 1½ ft. lengths discount 10%.

Diameter	Price per foot	Postage per foot	Price per inch	Postage per inch
⅜ inch	$0.60	$0.06	$0.07	$0.01

SILVER WIRE. Purest obtainable. Used by many experimenters and instrument makers for key contacts. Not less than 3 inches sold.

No. 16 per ft. .52 Postage .04 No. 28 per ft. .33 Postage .03
No. 22 per ft. .33 Postage .04 No. 33 per ft. .29 Postage .02

Iridum Platinum Wire for Contacts for Keys, Relays, Vibrators, Magnetos, Etc.

Diameter	Price Per Inch	Price Per ½ Inch	Price Per ¼ Inch	Price Per ⅛ Inch
1-16	$ 3.37	$1.95	$1.12	$ .65
3-52	8.62	4.50	2.50	1.25
1-8	12.00	6.50	3.50	1.75

Note.—Not less than ⅛ inch of any one size sold.

CAT WHISKER DETECTORS WIRE.

For Cat Whisker detectors No. 28 phosphor bronze wire, correctly tempered, is universally used. On account of the expense of entering and filling small orders we do not sell less than 8 inches.

No. 28 Phosphor Bronze Wire (8-inch piece).....$0.15

HELIX CLIPS.

No. 48X36. Helix Clip, same as used on No. 424 Oscillation Transformer, each .10. Postage 1 c.

NORWAY IRON CORE WIRE.

Many experimenters desiring to build their own coils are greatly hampered by being unable to obtain the genuine Norway Iron Core Wire.

This wire which we place on the market now is used in all our spark coils and transformer coils. It is directly imported from Norway, and guaranteed to be annealed twice. The size is No. 22 B. and S. The wire is perfectly straight, machine-made and comes in the following lengths: 6, 8, 10, 12, 14, 16, 18, 20, 22 and 24 inches.

If you need a high efficiency coil you cannot afford to do without this wire. Only sold by the pound.

No. 52X0. Induction Coil Core Wire, per lb.....$0.28

DIMENSIONS AND WEIGHTS OF SOFT IRON WIRE CORES.

Number of pounds per complete core in decimal fractions of poundss.

Length in Inches / Diameter	8	10	12	14	16	18	20	22	24
½ inch	.33	.41	.50	.58	.66	.75	.83	.....	.....
⅝ inch	.52	.65	.78	.91	1.04	1.17	1.30	1.43	.....
¾ inch	.75	.94	1.13	1.31	1.50	1.69	1.88	2.06	2.25
⅞ inch	1.02	1.28	1.52	1.79	2.04	2.30	2.55	2.81	3.07
1 inch	1.33	1.67	2.00	2.38	2.67	3.00	3.33	3.67	4.00
1⅛ inch	1.69	2.11	2.53	2.95	3.38	3.80	4.22	3.64	5.06
1¼ inch	2.08	2.60	3.13	3.65	4.17	4.69	5.21	5.73	6.25
1⅜ inch	2.52	3.15	3.78	4.41	5.04	5.67	6.30	6.93	7.56
1½ inch	3.00	3.75	4.50	5.25	6.00	6.75	7.50	8.25	9.00
1¾ inch	4.08	5.11	6.13	7.15	8.17	9.19	10.20	11.20	12.30
2 inch	5.33	6.67	8.00	9.34	10.70	12.00	13.30	14.70	16.00
2¼ inch	6.75	8.44	10.10	11.80	13.50	15.20	16.90	18.60	20.30
2½ inch	8.33	10.40	12.50	14.60	16.70	18.80	20.80	22.90	25.00
2¾ inch	.....	12.60	15.10	17.60	20.20	22.70	25.20	27.70	30.30
3 inch	.....	15.00	18.00	21.00	24.00	27.00	30.00	33.00	36.00

Silicon Steel for Transformer Cores.

Thickness .017 in.; averages 60 pieces to 1 in. thickness; weight ¼ lb. per cu. in. Price per lb..... $0.15

Cut to any size at 50c per 100 pieces extra.

Secondary Coils for High Frequency Work.

Armstrong Circuits and Tuning Coil Cylinders.

Cardboard cylinder 13 in. long, 8 in. diameter, wound 300 turns No. 30 wire..... $1.65

Cardboard cylinder 8 in. long, 6 in. diameter, wound 200 turns No. 30 wire..... 1.20

Cardboard Cylinder, 13 in. long, 8 in. diameter, without winding..... .48

Cardboard Cylinder, 8 in. long, 6 in. diameter, without winding..... .40

Cardboard Cylinder, 10 in. long x 8 in. diameter, without winding..... .40

Cardboard Cylinder, 10 in. long x 7 in. diameter, without winding..... .40

Cardboard Cylinder, 12 in. long x 8 in. diameter, without winding..... .48

Cardboard Cylinder, 12 in. long x 7 in. diameter, without winding..... .48

Cardboard Cylinder, 8 in. long x 6 in. diameter, without winding..... .40

Cardboard Cylinder, 8 in. long x 5½ in. diameter, without winding..... .40

Cardboard Cylinder, 18 in. long x 3 in. diameter, without winding..... .48

Shipping weight of any of above cylinders, 2 lbs.

Tuning Coil Cylinders.

Cardboard cylinder, 4 in. long, 5¼ in. diameter, wound 128 turns No. 28 bare wire..... $0.70

Cardboard cylinder, 4 in. long, 5¼ in. diameter, without winding..... .18

Concentric cylinders for receiving transformer—

Inside cylinder, 4 in. long, 4½ in. diameter, wound 160 turns No. 28 bare wire.

Outside cylinder, 4 in. long, 5¼ in. diameter, wound 128 turns No. 28 bare wire. Per pair..... 1.30

Cardboard cylinders as above, without winding, per pair..... 35

Postage, 10 cents each.

Edgewise-Wound Copper Strip for Helices.

Thickness of Copper Strip	Width of Copper Strip	Inside diameter of Helix	Turns per lb.	Price per turn
1/16 in.	5/16 in.	5 in.	11	$0.15
1/16 in.	½ in.	7½ in.	4	.23

Copper Ribbon for Oscillation Transformers, Etc.

Thickness	Width	Ft. Per lb.	Price per foot
.005 inches	⅛ inch	About 500	$0.01
.005 inches	½ inch	About 125	.03
.016 inches	1 inch	About 16	.14
.015 inches	1½ inch	About 10	.18

UNIVERSAL STORAGE BATTERIES.

The storage batteries listed on this and the following pages are not an untried product but a proved success. The manufacturers of these batteries are pioneers in the battery business, and have for a long time made batteries for special large consumers. Their lighting and starting and ignition batteries have been well known for many years and are now standard equipment on a number of automobiles. We were made a very attractive proposition to list these batteries in our catalog, and we are giving our patrons the full benefit of the exceedingly inviting prices quoted to us. In listing these high grade, batteries at such attractive prices, we are simply following our policy of giving to our patrons the very best in every line at the lowest price. No matter in what part of the United States you may live, we can deliver these batteries to your door at a substantial saving.

On the following pages you will find a complete line of storage batteries for every possible use. We are in a position to furnish a replacement for any make automobile, a complete list of which will be found on the following pages. For the convenience of our patrons we have given a list of the various makes and models of cars, together with the proper type of replacement battery to be used. These batteries are listed on page 143 with their dimensions, assembly, price, etc. On page 144 are diagrams of assembly which it will be well to consult before ordering. In case you do not find the proper battery for your car listed, write us. We can supply it.

We also list a complete line of replacement parts. We have listed those parts for which there is the most frequent demand but can promptly supply any type of plate manufactured. We guarantee quick service.

IGNITION AND LIGHTING BATTERIES

We recommend these types particularly for automobile ignition, motor boat lighting and ignition, gas engine ignition, fire and burglar alarm systems, etc.

Type I, 4 volt, 40 ampere hours (shipping weight, 19 lbs.)	$10.85
Type I, 6 volt, 40 ampere hours (shipping weight, 26 lbs.)	12.00
Type I, 6 volt, 60 ampere hours (shipping weight, 35 lbs.)	15.00
Type I, 6 volt, 80 ampere hours (shipping weight, 45 lbs.)	22.50
Type I, 6 volt, 100 ampere hours (shipping weight, 55 lbs.)	24.75
Type I, 6 volt, 120 ampere hours (shipping weight, 66 lbs.)	27.25

NOTE—The 4 volt and 6 volt 40 ampere hour batteries are recommended for use in connection with Panel Detector Sets and Audio Tron Bulbs. Batteries are shipped fully charged, ready for use.

UNIVERSAL BATTERIES IN GLASS JARS—SEALED TYPE.

For House and Boat lighting, Fire alarm systems, Telegraph systems, House telephone systems, Gasoline stationary engines, Automatic clock systems.

The battery is the most important part of any lighting system. The Universal Electric Sealed Glass Storage Battery requires less time in charging, will hold its power longer, is simple in construction, is easier kept clean and requires less attention than any other battery manufactured.

NO POSSIBILITY OF SHORT CIRCUIT.

The plates are assembled in glass jars, an especially treated grooved, wooden separator is put between each pair of plates and prevents any possibility of short circuit. The batteries are filled with electrolyte and sealed. The sealing compound is of our own manufacture, will not crack and adheres closely to the glass and to the lead terminals. The fact that the cells are sealed prevents rapid loss of electrolyte due to evaporation. No dirt or other substance can fall into the Universal cells or injure the battery.

All Universal Electric Sealed Storage Batteries are sent from the factory fully charged. As soon as the Universal Battery arrives you can have electric light by just connecting the wires to the battery. They do not require assembling of the plates and separators and a long first charge of fifty to eighty hours which the open or couple types of batteries require. This is a great saving of money and time to the purchaser and assures him that the work has been properly done. Every Universal Battery has a rigid inspection and test before it leaves the factory.

The glass jar is a perfect insulator and permits the height of the electrolyte and the condition of the contents of the cell to be seen at a glance.

The Plates of the Universal Battery Company are not an experiment but are the result of nine years of experience in the manufacture of battery plates. The manufacturers put out over fifty different types of battery plates and the plate used in the Universal Lighting System is particularly adapted for lighting purposes. The Universal Plates have proved much longer life than any other type of lighting plant on the market and are not equaled by any.

The name is on every battery. Do not be deceived by dealers claiming to sell you the genuine Universal Electric Sealed Storage Battery unless the name is on the battery.

A complete 16-cell Type 60, 32 volt Battery will furnish enough current from the batteries to light fifteen 12-candle power Tungsten lamps for eight hours, or one light for one hundred and twenty hours.

DESCRIPTION AND PRICE PER CELL

Type	Capacity Discharge for 8 Amp. Hrs.	Amp.	Outside Dimensions Including Terminals Width	Length	Height	Shipping Weight Pounds	Price per Cell
10	8	1	2½	4	10½	10	$2.53
20	16	2	2½	4	10½	11	4.37
40	36	4½	3	6¼	15	22	5.52
60	56	7	3	6¼	15	24	6.90
80	80	10	5	6⅝	16¼	33	8.74
100	100	12½	5	6⅝	16¼	35	10.12

We cannot furnish this type of battery in sizes other than above specified. Prices upon other types and sizes of batteries will be furnished upon application.

OUTSIDE DIMENSIONS	CAPACITY IN AMPERES Continuous Discharge at	Momentary

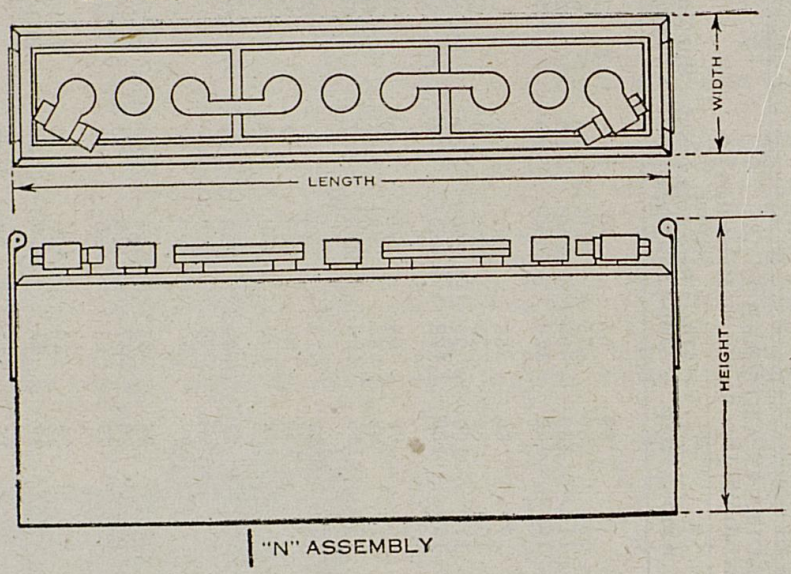
UNIVERSAL STARTING BATTERIES FOR AUTOMOBILES

Type	OUTSIDE DIMENSIONS Assembly B Length	Width	Height	Assembly N Length	Width	Height	Plate per Cell	CAPACITY IN AMPERES Continuous Discharge at 3 Amp.	5 Amp.	7½ Amp.	10 Amp.	Momentary Starting Rate-Amp. Discharge	Net Wt.	Special Price
LS-611	9 3/8	7 7/16	9	20 3/16	3 13/16	9	11	84	72	60	55	200	42	$18.50
LS-613	10 1/8	7 7/16	9	20 3/16	4 1/4	9	13	108	100	80	75	250	50	21.60
LS-615	12	7 7/16	9	20 3/16	4 11/16	9	15	126	115	100	90	300	59	24.30
LS-619	14 5/8	7 7/16	9	20 3/16	5 1/8	9	19	165	160	139	120	380	69	29.00
HS-611	9 3/8	5 15/16	10 3/8	15 11/16	3 13/16	10 3/8	11	84	72	60	55	200	42	18.50
HS-613	10 1/8	5 15/16	10 3/8	15 11/16	4 1/4	10 3/8	13	108	100	80	75	250	50	21.60
HS-615	12	5 15/16	10 3/8	15 11/16	4 11/16	10 3/8	15	126	115	100	90	300	59	24.30
HS-619	14 5/8	5 15/16	10 3/8	15 11/16	5 1/8	10 3/8	19	165	160	139	120	380	69	29.00
MS-611	9 3/8	7 7/16	9 3/8	----	----	----	11	96	83	69	64	230	49	20.90
MS-613	10 1/8	7 7/16	9 3/8	----	----	----	13	124	115	92	87	290	58	23.60
MS-615	12	7 7/16	9 3/8	----	----	----	15	145	132	115	104	345	67	27.65
BS-611	9 3/8	7 7/16	11 1/2	----	----	----	11	121	103	87	79	285	50	23.60
BS-613	10 1/8	7 7/16	11 1/2	----	----	----	13	155	144	115	108	360	59	28.35
BS-615	11 7/8	7 7/16	11 1/2	----	----	----	15	181	165	144	129	430	64	31.75
LS-127	12 3/8	7 7/16	9	20 3/16	5	9	7	45	35	31	30	100	58	27.00
LS-129	15	7 7/16	9	20 3/16	5 3/4	9	9	66	50	45	41	150	70	32.40
LS-1211	17 5/8	7 7/16	9	20 3/16	7 7/16	9	11	84	72	60	55	200	82	35.10
MS-127	12 3/8	7 7/16	9 3/8	----	----	----	7	62	41	36	35	115	68	29.70
MS-129	15	7 7/16	9 3/8	----	----	----	9	76	58	52	47	173	82	33.75
MS-1211	17 5/8	7 7/16	9 3/8	----	----	----	11	96	83	69	64	230	96	37.80
LS-167	16 1/8	7 7/16	9	----	----	----	7	45	35	31	30	100	76	36.45
LS-169	19 7/8	7 7/16	9	----	----	----	9	66	50	45	41	150	90	40.50
HS-245	19 3/4	6 5/16	10 1/2	10 5/8	9 5/8	10 1/2	5	34	20	16	15	75	85	40.50

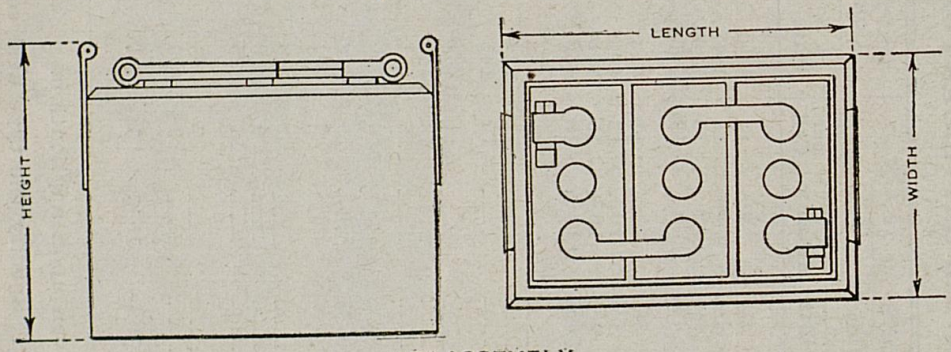
Prices on batteries not listed will be given upon application.

Prices on all batteries include treminals. Specify the type desired. Read page 144 before ordering.

DIAGRAM OF ASSEMBLY DESIGN



"N" ASSEMBLY



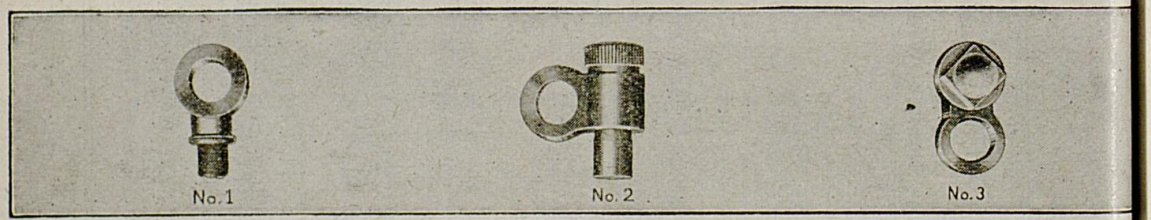
"B" ASSEMBLY

If these diagrams do not show the exact assembly wanted, make a rough sketch of the assembly and send it in with your order. Show all leads and terminals.

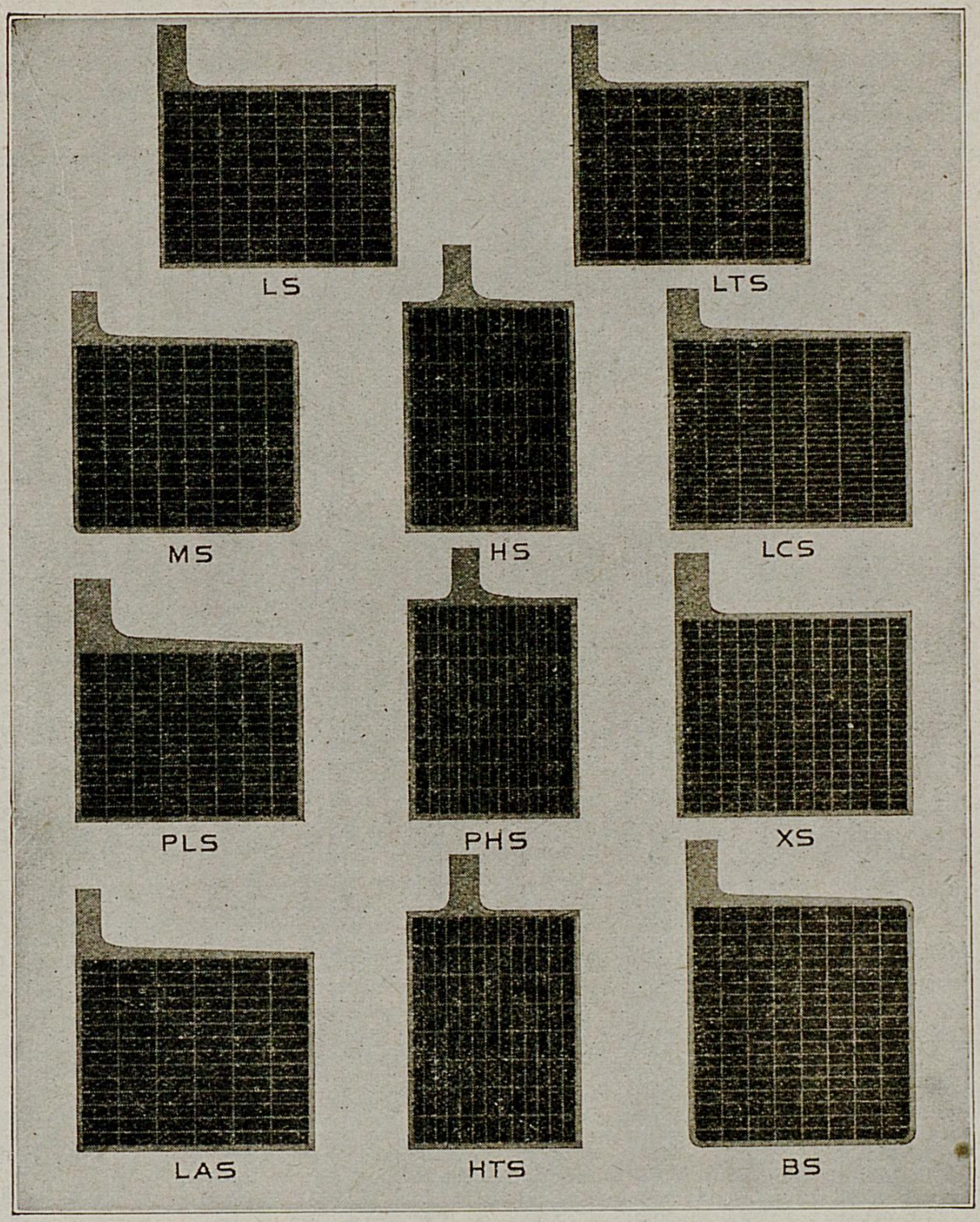
HOW TO ORDER

When ordering a battery to replace one in service, give the outside dimensions of the battery, the type and designation as shown on the name plate and the make, model and year of the car on which it is to be used.

SPECIFY TYPE NUMBER OF TERMINALS DESIRED.



No. 1 with 12 in. of No. 2 Cable	$1.20
No. 1 with 12 in. of No. 4 Cable	.80
No. 2 Positive	.80
No. 2 Negative	.78
No. 3 Positive or Negative	.60



TYPE	WIDTH	HEIGHT	THICKNESS	PRICE
BS	5 9/16	6	1/8	$0.56
XS	5 11/16	4 7/8	3/32	.44
MS	5 5/8	4 3/4	1/8	.46
LS	5 5/8	4 1/8	1/8	.42
LTS	5 5/8	4 1/8	7/64	.40
HS	4 1/8	5 5/8	1/8	.42
HTS	4 1/8	5 5/8	7/64	.40
PLS	5 5/8	4 1/8	9/64	.46
PHS	4 1/8	5 5/8	9/64	.46
LAS	5 3/4	4 1/2	7/64	.45
LCS	5 3/4	4 1/2	7/64	.45

PARTS FOR STARTING BATTERIES

All the parts listed herein are identical in size with the parts of other standard makes of batteries. In other words, if we list the battery for your car, these parts are interchangeable with your battery.

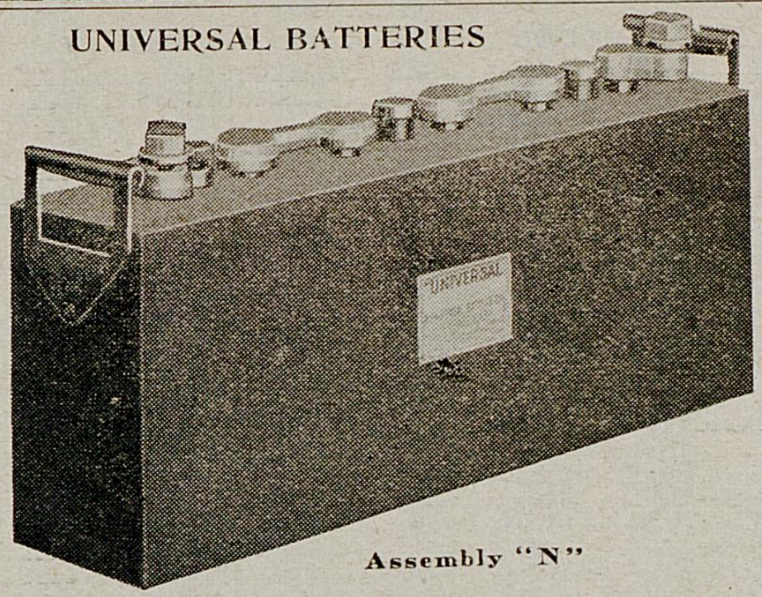
TYPE	Wood Box Complete	Cell Unit Complete	Element with Separator	Rubber Jar	Inside Cover	Top Cover	Plate Strap	Top Connector	Positive or Neg. Plate	Positive Group	Negative Group
LS-611	$1.60	$6.88	$5.04	$1.28	$0.22	$0.22	$0.38	$0.38	$0.42	$2.20	$2.53
LS-613	1.68	7.84	5.81	1.44	.24	.24	.40	.42	.42	2.55	2.88
LS-615	1.80	8.80	6.58	1.57	.26	.26	.42	.48	.42	2.90	3.24
LS-619	1.88	10.48	8.12	1.65	.30	.28	.46	.52	.42	3.40	3.94
HS-611	1.60	6.96	5.04	1.36	.18	.22	.38	.38	.42	2.20	2.53
HS-613	1.68	7.92	5.81	1.52	.20	.24	.40	.42	.42	2.55	2.88
HS-615	1.80	8.88	6.58	1.65	.22	.26	.42	.48	.42	2.90	3.24
HS-619	1.88	10.56	8.12	1.73	.28	.28	.46	.52	.42	3.40	3.94
MS-611	1.70	7.36	5.39	1.44	.22	.22	.38	.38	.46	2.35	2.72
MS-613	1.80	8.24	6.15	1.50	.26	.24	.40	.42	.46	2.74	3.02
MS-615	1.88	9.12	6.90	1.58	.28	.26	.42	.48	.46	3.04	3.41
BS-611	1.76	8.48	6.27	1.70	.22	.22	.38	.38	.56	2.75	3.20
BS-613	1.86	9.60	7.28	1.76	.26	.24	.40	.42	.56	3.22	3.46
BS-615	1.94	9.80	8.26	1.87	.28	.26	.42	.48	.56	3.68	4.12
LS-127	1.68	5.20	3.48	1.22	.18	.20	.32	.34	.42	1.47	1.81
LS-129	1.92	6.08	4.27	1.25	.20	.20	.36	.36	.42	1.84	2.18
LS-1211	2.00	6.88	5.04	1.28	.22	.22	.38	.38	.42	2.20	2.53
MS-127	1.86	5.52	3.70	1.34	.18	.20	.32	.34	.46	1.56	1.94
MS-129	2.00	6.48	4.56	1.41	.20	.20	.36	.36	.46	1.97	2.34
MS-1211	2.13	7.44	5.39	1.44	.22	.22	.38	.38	.46	2.35	2.72
LS-167	2.40	5.20	3.47	1.22	.18	.20	.32	.34	.42	1.47	1.81
LS-169	2.64	6.08	4.27	1.25	.20	.20	.36	.36	.42	1.84	2.18
HS-245	2.40	4.48	2.70	1.28	.16	.20	.28	.32	.42	1.15	1.42

No.		Price
700	Pos. & Neg. groups (see prices above.)	
701	Pos. taper terminal, .705 opening	$0.30
702	Neg. and Pos. taper terminal, .6605 opening	.30
703	Neg. taper terminal, .632 opening	.30
704	Pos. cable terminal plug, brass	.40
705	Pos. and Neg. cable terminal plug, brass	.38
706	Neg. cable terminal plug, brass	.38
707	Round head terminal screw	.18
708	Square head terminal screw	.18
709	Screw terminal	.40
710	Screw terminal nut	.20
711	Flexible terminals with 12 in. of No. 2 wire	1.20
712	Flexible terminal with 12 in. of No. 4 wire	.80
713	Gasket	.05
714	Neg. plate strap	---
715	Pos. plate strap	---

CELL CONNECTORS

No.	No. of Plates	Length C to C	Pr.
716	5	$1\frac{9}{16}$	$0.32
716	7	$1\frac{7}{8}$	.34
716	9	$2\frac{5}{16}$	.36
716	11	$2\frac{3}{4}$	.38
716	13	$3\frac{3}{16}$	.42
716	15	$3\frac{5}{8}$	.48
716	19	$4\frac{1}{2}$	.52
716	LL-End to End	$3\frac{11}{16}$	.42
716	HN-End to End	$1\frac{7}{8}$	.34
717	5 Neutral	$1\frac{9}{16}$	.50
717	7 Neutral	$1\frac{7}{8}$	.52
717	9 Neutral	$2\frac{5}{16}$	.56

UNIVERSAL BATTERIES



Assembly "N"

MAKE	MODEL	YEAR	TYPE
Allen	33, 34, 35, 37	1915-16	HS-613-B
"	37, 41	1917-18	LS-613-B
Apperson	6-17, 8-17	1917	LS-613-B
Auburn	6-46, 34L, 4-41, 6-45	1913-14	LS-613-B
"	4-40, 6-40	1914-15	LS-619-B
"	6-40A, 6-44	1916-17	MS-613B
"	6-40, 4-38, 6-38, 4-39	1915-16-17	MS-611-B
"	6-39, 6-398	1917-18	MS-611-B
Austin	12 cyl.	1917-18	MS-615-B
Briscoe	14, 15, 4-38, 8-38	1914-15-16	LS-127-B
		1915	HS-127-B
	4-24	1917	MS-613-N
Buick	B-37, B-54, B-55, B-24, B-25, B-36	1914	
"	C-24, C-25	1915	LS-613-N
"	C-36, C-37, C-54, C-55, C-4	1915	MS-613-B
"	D-44, 45, 46, 47, 54, 55	1916	MS-611-B
"	All	1917-18	MS-611-B
Cadillac	14-51-53	1914-15-16	HS-619-N
"	55-57	1917-1918	HS-619-N
Carter Car	7, 9	1914-15	HS-613-B
Case	R	1914-15	HS-613-B
"	S, O, M-35	1914-15	HS-615-B
"	13, 14	1914-15	HS-619-B
"	T	1916	HS-611-B
"	T	1917	LS-613-B
"		1918	MS-611-B
Chalmers	32, 6-30	1916-17-18	MS-613-Spec.
Chandler	10,000 series	1913-14-15	HS-613-B
"	17 series	1916	LS-613-B
"	5-18	1917-18	MS-611-B
Chevrolet	H-4, L-6	1914-15	LS-615-B
"	H-4, Baby Grand	1916-17-18	LS-613-B
"	490	1916-17-18	MS-611-B
"	D-4, D-5, D	1918	MS-613-N
"	FA-2, Royal Mail	1918	MS-613-B
Cole	9-4, 9-6, Big 6	1914	HS-619-N
"	10-4, Standard 4, Little 6	1915	MS-613-B
"	4-40, 6-66, 8-50	1916	MS-613-B
"	8-60, 8-71, 8-72	1917-18	MS-613-B
Crawford		1915-16	LS-613-B
"	6-40	1917-18	MS-611-B
Crow-Elkhart	CE-33, CE-35	1917	MS-611-B
"	CE-36	1918	MS-611-B
Daniels	A & B	1916-17-18	HS-615-N
Dodge		1915 to '18	MS-127-B
Dorris	1A4, 1A6, 1B6	1916-17	MS-613-B
Fiat	All	1918	MS-129

MAKE	MODEL	YEAR	TYPE
Ford	Splitdorf	1915	LS-127-B
"	Westinghouse	1915-16	MS-127-B
"	Gray & Davis	1915	HS-611-B
Dyneto	Dyneto	1916	LS-127-B
"	North-East	1915	HS-129-B
"	Disco	1916-1917	MS-613-B
"	Berns Starter	1917	MS-611-B
"	Gray & Davis	1918	MS-611-B
Franklin	6-7-8	1914-15-16	HS-129-B
"	9	1916-17-18	MS-127-B
Grant	U	1916	MS-611-N
"	K, A	1917-18	MS-611-B
Haynes	30, 31, 32	1914-15	HS-615-B
"	30-33	1915	HS-615-B
"	All models	1916-17-18	MS-615-B
Hudson	640	1914-15-16	MS-613-B
"	6-54	1914-15	HS-619-N
	Super-six	1917-18	MS-613-B
Hupmobile	HA	1914	LS-615-B
"	N, Q, L, R, N, 1-2-3	1915-16-17	MS-613-B
Interstate		1915	LS-613-B
"	T	1916	MS-611-B
"	6-40-A	1916	MS-613-B
"		1917	MS-611-B
Jackson	34, 44, 54	1913-14	LS-167-B
"		1914	LS-129-B
"	Olympic 44, 46	1914-15	LS-615-B
"	Majestic	1914-15	HS-619-B
"	Sultanic	1914-15	HS-619-B
"		1915	MS-613-B
Jeffrey	C, H, 6	1915-16	LS-615-B
"	4-Jeffrey	1916	MS-613-B
"	All	1917	LS-615-B
King	C	1915	MS-613-B
"	E	1916	MS-611-B
"	D & E	1917	MS-611-D
"	8 & EE	1918	MS-611-D
Kissel		1913	HS-1211-B
"		1914	LS-619-B
"		1915	LS-615-B
"	432, 642	1916	MS-611-B
"	100 point 6	1917	MS-611-B
Lexington	R	1918	MS-611-B
Liberty	10-A	1916	MS-611-B
Liberty	10-A	1916-17	MS-611-B
"	10-B	1918	MS-611-B
Locomobile	R-2, R-3, N-3, N-4	1912-13-14	HS-619-B
"	38LD, R4, M5. 48-LD, R7, M7, R23, 8 M, 248	1915-16-17	HS-619-B
Lozier	30-32-34	1916-17	MS-613-B
Marmon		1914-15-16	LS-129-B
"	41-34		LS-129-B
"		1918	MS-615-B
Maxwell	50-6	1913-14	MS-611-B
"	35	1913-14	LS-615-B
"	25	1915-16-17	LS-127-B
"	All	1918	LS-127-B
Mitchell	A-550, A540, DeLuxe Spec. 6	1914-15	MS-129-B
"	Light 4	1915	MS-129-B
"	Light 6	1915	BS-129-B
"	60F and 16	1916	MS-129-B
"	Eight	1916	LS-619-B
"	C-42	1916-17-18	MS-613-B
"	D-40	1916-17-18	MS-611-B
Moon	39-48	1913	LS-129-B
"	4-42—6-50	1914	HS-619-N
"	4-38, 6-40	1915	LS-613-B
"	6-40	1916	MS-611-B
"	6-66, 6-43	1917	MS-613-B
Nash		1918	MS-611-B
National	AA, AB, Highway 12, Newport 6	1915-16	LS-615-N
"	AE, AF, High 6, AC	1916-17-18	MS-613-N

MAKE	MODEL	YEAR	TYPE
"	Highway 12, AD, AH, AK	1917-18	LS-615-N
Oakland	35, 36, 37, 49	1913-14-15	LS-613-B
"	38, 50, 32	1916	MS-611-B
"	50	1916-17	MS-613-B
"	34B	1918	MS-611-B
Oldsmobile	43, 44	1916-17	MS-611-B
Overland	Autolite	1914	MS-613-N
"	80, 81, 82, 83, 84, 86, 87, 884	1915-16	MS-613-N
"	75	1916	MS-611-B
"	90	1917	MS-611-B
"	86B	1917	MS-613-N
"	83B, 83, 85, 85-6, 86B, 89, 89T	1918	LS-613-N
Packard	All	1914-15-16-17-18	LS-619-B
Paige-Detroit	36, 25	1913-14-15	BS-611-B
"	36	1914	MS-613-B
"	6-38, 6-46	1916	LS-613-B
"	J, K, Series 18-39, 6-17	1917-18	MS-613-B
Pan-American	C Series	1917	LS-613-B
Peerless	54-44-DD-EE	1915	LS-613-B
Pierce Arrow	All	1915-16	MS-613-B
"	All	1917-18	MS-617-B
Pullman	Junior	1915-16	HS-129-B
"	424 Series	1917	MS-611-B
Saxon	56, Second Series 57	1916-17	MS-613-B
"	A	1915	LS-611-B
"	6	1915	LS-613-B
"	S, S2	1916	MS-611-B
"	S, 4-B, 5, B-14, Electric 4, Y-18	1917-18	MS-611-B
Reo	R & S	1914-15	BS-611-B
"	R & S, M & N	1916-17-18	MS-613-B
Scripps-Booth	C	1915	LS-127B
"	C-4, D-8	1916-17-18	MS-611-B
Stearns		1913	LS-129-B
"	SK-4	1913-14-15	BS-611-B
"	SK-6	1913-14-15-16	BS-615-B
"	Light 4	1914-15	LS-613-N
"	SK, L4	1915	MS-129-N
"	SK & 8	1916-17-18	MS-1211-N
Studebaker		1913	LS-129-B
"		1914	LS-615-B
"	E, C & S, P	1915	LS-615-B
"	50	1916	MS-613-B
"	E, D, F & S, 7-Series 19	1917-18	MS-613-B
Stutz		1913	LS-615-B
"		1914-15	HS-619-B
"		1914-15-16	LS-619-B
"	E, F & C, R-4, Series S	1914-15-16-17-18	LS-619-B
Velie	9, 10, 11, 12 14, 15	1913-14-15	MS-613-B
"	R-6	1914	BS-613-B
"	15	1916	MS-613-B
"	22	1915-16	MS-611-B
"	Builtwell, 28 series	1917	MS-611-B
"	38	1918	MS-611-B
"	39	1918	MS-613-B
Wescott	0-30	1914	LS-613-B
	0-35, U-50	1915	MS-613-B
"	41, 51	1916	MS-613-B
"	S-17-18	1917-18	MS-613-B
White	GA, GAB, GAC, GAD GAE, GAF, GAG, GAR	1913-14	HS-187-N
White	GE, GEC, GEB, GF, GFB, GFD	1913	HS-1811-N
"	30, 45	1915	HS-187-N
"	60	1915	HS-1811-N
"	GAH, GED	1916	HS-187-N
"	G, M, S-17	1917-18	MS-129-N
Willys-Knight	84, 88-4, 88-8	1917	MS-615-N
Winton	21	1915-16	HS-619-N
"	21A, 22A, 22	1915-16	HS-615-N
"	22	1917	HS-619-N
"	22A	1917	HS-615-N
"	All	1918	HS-615-N

"STANDARD" STORAGE CELLS IN HARD RUBBER JARS.



In hard rubber battery jars more than in any other article of hard rubber, it is almost impossible for even the expert to tell the difference between first quality and the great mass of cheap, inferior grades, but defects always show up in the end. They may not be observed for a period of two or three months, but they will ultimately appear with expensive results to the user. The jars may contain one per cent. of metal, which the acid slowly but surely attacks. There may be over-curing or under-curing of the rubber. These jars have so consistently and conclusively proven their merit and quality, that they should need no introduction to the users of storage batteries. They are impervious to the action of the acid electrolyte and do not deteriorate with time.

No. 55X10. 12 ampere hours, 2 volts, size over all, 7½x3½x1½ $1.75
No. 55X12. 25 ampere hours, 2 volts, size over all, 7½x6½x1½ 2.80
No. 55X14. 40 ampere hours, 2 volts, size over all, 7½x6½x2 ..... 4.90

STANDARD STORAGE BATTERY SETS.

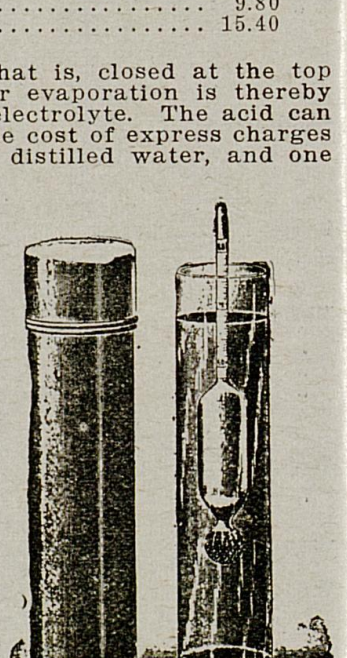
Encased in neat oak box with locked corners. Fitted with strong rubber handles. Each cell separately removable for examination. Prices for larger sets furnished upon application.

	Capacity	Voltage	Jar	Price
No. 55X22.	12 ampere hours,	6 volts,	rubber.....	$ 6.30
No. 55X26.	25 ampere hours,	6 volts,	rubber.....	9.80
No. 55X28.	40 ampere hours,	6 volts,	rubber.....	15.40

Express additional.

Note.—"Standard" storage cells are SEALED; that is, closed at the top save for a small vent. The nuisance of spilling or evaporation is thereby avoided. They are shipped "dry" without the acid electrolyte. The acid can be procured for a few cents. In fact, far less than the cost of express charges thereon. The correct solution is four parts rain or distilled water, and one part chemically pure sulphuric acid.

HYDROMETER



A Hydrometer is an instrument for determining the specific gravity of solutions. It is very necessary to know the specific gravity of the electrolyte, when preparing it for storage batteries, etc. Our Hydrometers are packed in a strong wooden box and provided with an acid glass as shown in the cut. A necessity for every laboratory.

No. A5530. Acid Hydrometer, each....$ .50
By mail, extra..... .04

NEW YORK POLARITY INDICATOR.



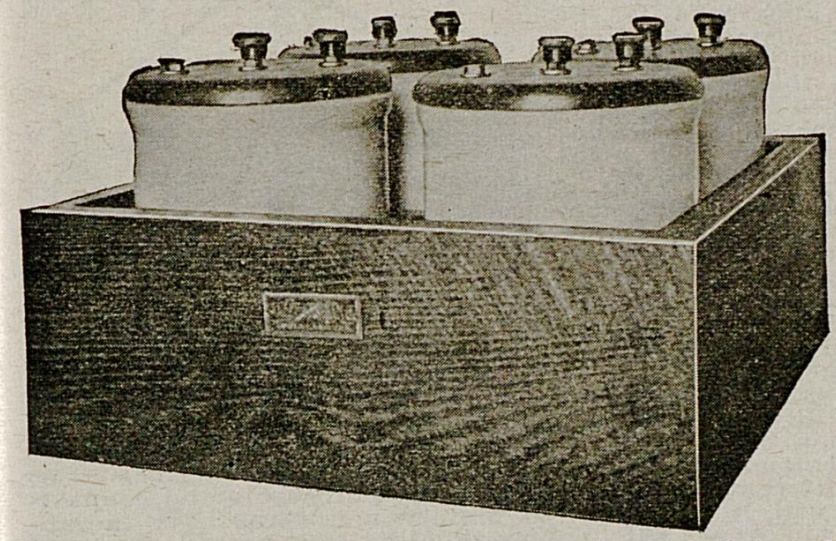
Size 3½ in. by 1 in.

This indicator can be carried in the vest pocket. The nickel-plated shell will cover and protect the glass tube from injury while being carried in the pocket or tool bag.

No. 46X43. For use with battery.....$1.25
No. 46X44. For 50 to 600 volts, direct current..... 1.25

Postage, 6c.

BLITZEN ELECTROLYTIC RECTIFIER.



Many of you who have alternating current in your house or workshop frequently need a source of direct current for charging a storage battery, performing experiments, and operating many devices which require direct current for their use. The Electrolytic Rectifier shown above is designed to fill such a need and will operate on alternating current of 110 volts and practically any frequency. The outside or lead electrode extends entirely around the central electrode, thus utilizing both sides of the center one and giving the greatest possible output for its size. The containing jar is heavy glazed stoneware, almost indestructible, and measuring six inches high and five and three-quarters inches in diameter. The wooden cover is impregnated with a black insulating compound, and rubber composition covered binding posts are provided.

The single cell rectifier will pass about one ampere without overheating and may be used up to two amperes for short periods of time. The temperature of the rectifier must be kept below 120 degrees Farenheit for satisfactory operation. The single cell rectifier is connected directly across the 110-volt circuit with the device to be operated in series with the line and the rectifier. If such a device has not in itself sufficient resistance to limit the current to the above amount, an additional resistance such as a rheostat must be used to limit the current.. A 100-watt lamp makes a fine resistance and allows just about one ampere to flow. The four-cell rectifier is recommended by us and will operate continuously at 2 amperes.

The difference between the single and four-cell rectifier lies not only in the increased output of the latter, but also in the rectified current, the four-cell type utilizing both positive and negative sides of the alternating current wave, giving pulsating direct current, while the single cell type rectifiers give only one-half the wave and gives intermittent undirectional current.

The four-cell rectifier is furnished with a 200-watt resistance lamp wired in the alternating current side of the line, which always limits the direct current to about two amperes and renders the use of any outside regulating device unnecessary.

Each jar of the rectifier should be filled with clean water to within about one and one-half inches of the top and the contents of one package of rectifier salts dissolved therein. Before using the plates must be "formed" by operating the rectifier for a short period, after which it will act as a rectifier of about 75% efficiency.

A light film of machine oil poured over the surface of the liquid will greatly increase the life of the rectifier, preventing evaporation of the liquid and creeping of the salts.

These outfits are ideal for charging small storage batteries in the laboratory or garage at very small expense and for a multitude of other purposes requiring a small amount of direct current, such as electroplating, operating direct current motors, etc.

The Electrolyte is inexpensive and may be easily renewed when required, which is very seldom.

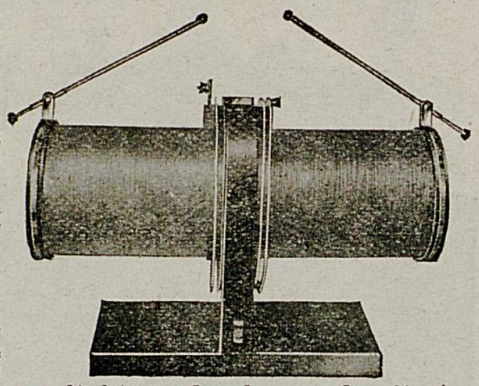
No. W 617 Blitzen Electrolytic Rectifier complete as above, including one change of chemical salts. Single cell..... $2.50

No. W 618 Blitzen Electrolytic Rectifier, four cell, complete as above with chemical salts, resistance lamp, porcelain socket, and wooden rack. Price 10.00

No. W 619 Renewal charge of chemical. Price per cell..... .35

No. W 620 Ten-foot double cord and attachment plug to fit any standard lamp socket. Price each..... .75

BLITZEN TESLA HIGH FREQUENCY COILS.



Probably the most amazing and spectacular of all electircal apparatus is the Tesla Coil and no experimental laboratory is complete without such an equipment. Your friends will open their eyes in astonishment when they see you draw coiling, flaming, burning sparks nine inches or more in length through your body without the slightest injury or discomfort.

You can perform hundreds of the most interesting experiments such as lighting large numbers of vacuum tubes of various brilliant colors by merely holding them in your hand near the coil without any wires whatever. The ordinary incandescent lamp when held near the coil or connected to it, will glow with a pale greenish light. Various minerals and many precious stones will glow with strange lights and colors under its influence. Its sparks when occurring over large flat areas produce a large quantity of ozone. By balancing a wire bent in the shape of a letter "S" so that it will rotate from its center on the point of a pin or needle and connecting it to one pole of the coil, it will rotate as a static motor and have the appearance of an electric pin wheel with flames shooting in a stream from revolving points. All of these experiments and many more may be performed without the slightest danger, as the frequency of the current is so high as to render it harmless. You cannot even feel the spark when it is allowed to jump to a piece of metal held in the hand, but where the spark jumps directly to the skin it gives a pricking sensation only on the spot where the spark strikes.

These coils are built by us in several sizes, the smallest of which may be used on any spark coil or transformer up to ¼ K. W. capacity, and is designed to operate on a condenser of .01 M. F. capacity. It has a movable contact on the primary for tuning the primary and secondary which is very necessary for securing the greatest spark length.

The ¼ K. W. Tesla Coil will give a nine-inch purple flame when operated at its full capacity and when the electrodes are separated at a greater distance, each is surrounded by a fan of coiling sparks several inches in length. The next larger size may be used on any spark coil or transformer up to 1 K. W. capacity and is listed below with both ½ and 1 K. W. outfits. It gives a spark 16 inches long and is designed to operate on a condenser of .02 M. F. capacity.

The larger coils of 2 and 3 K. W. capacity are designed to operate on a condenser of .03 M. F. capacity, will produce sparks thirty inches or more in length and are designed principally for lecture and stage performances.

These Tesla coils are well constructed and particular attention is given to guarding against breakdown from the very high potentials present.

The entire frame work is of well seasoned wood covered with a black insulating paint, the primary coil is edgewise wound copper ribbon, the secondary coils are wound on special smooth paper drums with a wire especially made for this purpose. The terminals carrying the discharge rods have ball and socket joints for adjusting the length of the spark gap.

The workmanship and entire construction of this apparatus is high grade and should not be confused with much smaller coils giving feeble sparks and intended only for use on spark coils operating from dry cells.

The central point of the secondary coil is brought out to a small spring binding post on the back of the central upright support, and **it is very important that this binding post be grounded** by means of a wire connected to a water pipe, radiator, or other ground such as a metal plate buried in the earth. Care should also be taken not to allow the high frequency current to jump from the secondary coil to any part of the primary circuit, as such a spark is very apt to cause a burned-out transformer or a broken-down condenser.

All of this apparatus is positively as well constructed as it is possible to make it and will not break down electrically if properly used, but owing to the impossibility of our guarding against careless use, we cannot make any guarantee except that it leaves our factory in perfect condition and will give the utmost satisfaction if properly used.

No. W 600 ¼ K. W. Tesla High Frequency Coil as above, suitable for any transformer or spark coil of not over ¼ K. W. capacity. Price $10.00

No. W 601	1 K. W. Tesla High Frequency Coil as above, suitable for any transformer or spark coil of not over 1 K. W. capacity. Price	16.00
No. W 602	Complete ¼ K. W. High Frequency Outfit, consisting of the Blitzen ¼ K. W. Tesla Coil, ¼ K. W. Spark Gap, Blitzen ¼ K. W. Transformer and ¼ K. W. Glass Plate Condenser. Price	35.00
No. W 603	Complete High Frequency Outfits consisting of the Blitzen ¼ K. W. Tesla Coil, ¼ K. W. Spark Gap, ¼ K. W. Glass Plate Condenser, Blitzen Electrolytic Interrupter and Blitzen Spark Coil. Price	45.00
No. W 604	Complete High Frequency Outfit consisting of 1 K. W. Tesla Coil, ½ K. W. Blitzen Transformer, ½ K. W. Glass Plate Condenser, and ½ K. W. Spark Gap. Price	55.00
No. W 605	Complete High Frequency Outfit consisting of 1 K. W. Tesla Coil, 1 K. W. Blitzen Transformer, 1 K. W. Glass Plate Condenser and 1 K. W. Spark Gap. Price	89.50
No. W 606	2 K. W. Tesla High Frequency Coil as above, suitable for any transformer or spark coil of not over 2 K. W. capacity. Price	50.00
No. W 607	Complete High Frequency Outfit consisting of 2 K. W. Tesla Coil, 2 K. W. Transformer, 2 K. W. Glass Plate Condenser, and 2 K. W. Spark Gap. Price	195.00
No. W 608	3 K. W. Tesla High Frequency Coil as above, suitable for any transformer or spark coil of not over 3 K. W. capacity. Price	75.00
No. W 609	Complete High Frequency Outfit consisting of 3 K. W. Tesla Coil, 3 K. W. Transformer, 3 K. W. Glass Plate Condenser and 3 K. W. Spark Gap. Price	310.00

BLITZEN X-RAY TUBES.

The X-Ray presents one of the most interesting and wonderful fields open to the electrical experimenter, but we believe nearly, if not all of the equipments offered for general use, except those intended for the medical profession, are mere toys, and not of sufficient power to fully demonstrate the many marvels of this science in a satisfactory manner. The Blitzen X-Ray tubes should not be confused with very small imported tubes sometimes offered, as they are made in America by skilled workmen who for many years have made nothing but the highest grade X-Ray tubes for physicians, hospitals, etc. These tubes will make excellent photographs of the hand, wrist, forearm, toes, etc., as well as of small animals, and will show the bones, joints, and other parts very clearly. They will also take pictures of coins or other metal objects through several inches of hard wood. No camera is required, the object to be photographed being merely laid on top of the plate holder or envelope containing an ordinary dry plate or film and the rays projected from above for a sufficient time to make the exposure, which a few experiments will quickly determine. As the X-rays are invisible themselves, it is necessary to use a fluorescent screen, called a fluoroscope, when it is desired to actually see through the hand or other object without making a photograph. Our fluoroscope is made with a screen coated with the best grade of Platinum Barium Cyanide crystals, and for those who wish to construct their own fluoroscopes we also supply the screen only, which may be mounted in any box or holder to suit the purchaser. While the above material is the best and will give the most brilliant image, screens coated with Tungstate of Calcium will give satisfactory service for all ordinary purposes. Our No. W 727 Tube is intended for use on spark coils only and will operate on any coil giving a spark three inches or more in length. It has a bulb four inches in diameter and will give a very powerful ray for all laboratory purposes. Our No. W 728 Tube is a double focus tube and is intended only for use on Tesla High Frequency Coils. It has a bulb four inches in diameter and will give a very powerful ray on any of your high frequency coils. The No. W 728 Tube is also equipped with a vacuum regulator for lowering the vacuum when it becomes too high, as it will do in time. The vacuum of the No. W 727 Tube may also be lowered by carefully heating the tube in an oven for a short time, but it is not equipped with the vacuum regulator.

We wish to caution the purchaser of these tubes against continuously exposing themselves to these rays, as they produce very serious burns which often do not appear for several weeks after the exposure. There is no danger, however, in short exposures such as required for making a picture, and where the rays are to be used for considerable periods of time a lead shield will protect the operator from all harm.

The addition of a Tesla Coil and X-Ray Tube will quickly transform any wireless telegraph set operating with a transformer into a complete X-ray outfit for making pictures and will greatly add to the pleasure and fascination of your electrical laboratory.

As X-Ray Tubes are extremely fragile, we cannot guarantee either their safe arrival or their life except that they may be sent by express insured at three times the usual first class rate.

No. W 727 X-Ray Tube for use on Spark Coils giving a three-inch spark or more. Price.....$ 5.00

No. W 728 X-Ray Tube for use on Tesla High Frequency Coils giving a three-inch spark or more. Price..... 10.00

No. W 729 Complete X-Ray Outfit for use on 110-volt lighting circuit consisting of No. W 616 Spark Coil, No. W 611 Electrolytic Interrupter, No. W 615 Knife Switch and Fuses, and No. W 727 X-Ray Tube. Price 30.00

No. W. 730 Complete X-Ray and High Frequency Tesla Coil Outfit consisting of our No. W 602 outfit together with one of our No. W 728 X-Ray Tubes. Price..... 45.00

Clamp for holding X-Ray Tube to any upright rod. It will hold the tube securely and will be found a great convenience.

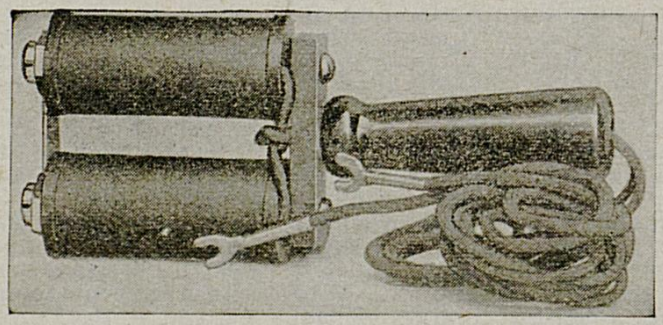
No. W 731 Special Tube Clamp. Price.....$ 2.00

No. W 732 Platinum Barium Cyanide Fluoroscope with 5 x 7 screen. Price $17.00

No. W 733 Screen only. Price per square inch..... .40

No. W 734 Screen only, of Tungstate of Calcium. Price per square inch.. .15

HAND ELECTRO MAGNETS.



No. 671—No. 1 Single Coil Style, $1.60
Shipping weight, 2 lbs.

No. of Batteries	Lifting Power	No. of Batteries	Lifting Power
1	6 lbs.	1	1¼ lbs.
2	14 lbs.	2	6 lbs.
3	16 lbs.	3	8 lbs.
4	19 lbs.	4	9½ lbs.
5	22½ lbs.	5	11 lbs.
6	23½ lbs.	6	12 lbs.
10	24½ lbs.	10	13½ lbs.
20	26½ lbs.	20	14 lbs.

Three feet of flexible cord with each style.

A removable iron extension point, for removing small pieces of steel from the eye, furnished with each single coil magnet.

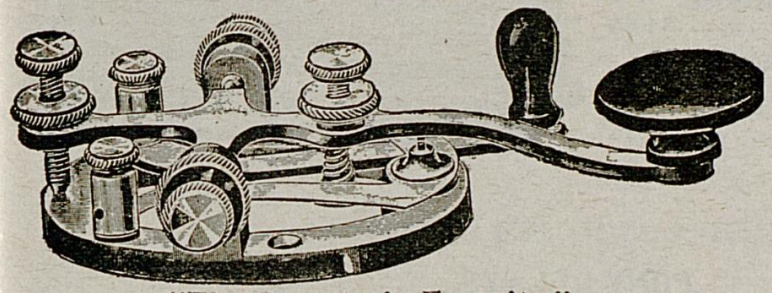
TELEGRAPH INSTRUMENTS AND PARTS.

These instruments are made by the foremost concern in the United States engaged in the manufacture of telegraph instruments.

For the past 30 years they have supplied 90 per cent of the telegraph instruments used by the Western Union and Postal Telegraph Companies.

You are assurred of getting the best when you purchase our instruments. Our prices are the only cheap thing about them.

STEEL LEVER SOLID TRUNNION KEYS.



"The Operator's Favorite."

This key is more durable and in every respect better than any other for rapid and perfect Morse sending, for the following reasons:

The lever is only one-half the weight of the ordinary brass lever. The lever and trunnions being made of but one piece of fine wrought steel, the common defect of loose trunnions is avoided. Strength is obtained with much less weight of metal, and by the perfect bearing, which the solid trunnion gives, together with the use of **hardened platina points,** sticking is absolutely prevented.

The size and proportions are such as to make it the most perfect operating key possible to obtain, either for the hand of the skilled and rapid expert or the beginner.

No. 10X0 Solid Brass frame legless key is also admirably adapted for wireless work on all sets up to ¼ K. W. Particularly suitable for use on fine desks, or wherever a legless key is preferable. It has Nickel-plated lever, Gutta Percha Knobs, and Brass work highly polished.

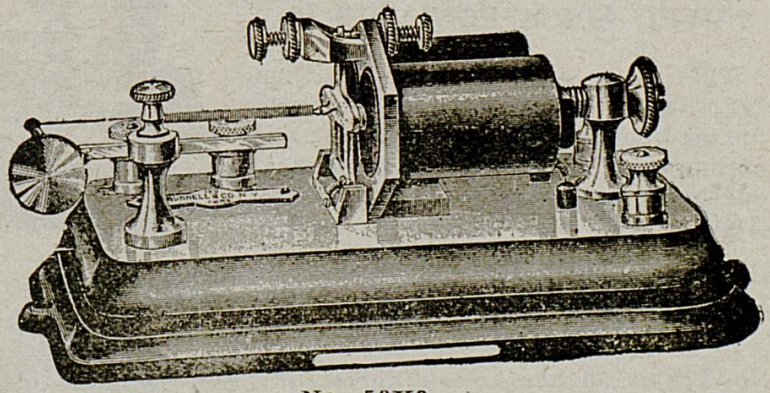
The No. 10X0½ is the same as No. 10X0, only equipped with brass screw legs, with thumb screw tightener.

No. 10X0 .....$1.10 Shipping Wt. .....10 oz.
No. 10X0½ ..... 1.30 Shipping Wt. .....12 oz.

RELAYS

STANDARD No. 1 RELAY.

Wound with Silk Covered Wire, Polished Rubber Covered Coils, Mahogany Base, Mounted on Ornamental Sur-base, with Extension Adjustment. In addition to the excellent merits of these relays, in all the usual details of construction and finish, their special advantages consist in the armature and lever, which is all struck from a single piece of finest iron, the improved form of trunnion seat, the improved magnet adjustment, etc., etc., making them the finest type of relay ever constructed.



No. 53X3.

No. 53X3. 150 Ohms Resistance $5.75
No. 53X4. 150Ohms Resistance 6.00
For Nickel-Plated Relay add..... .60

First Class Main Line Relays—Solid Trunnion, Single Piece Armature.

STANDARD MAIN LINE RELAY No. 2.

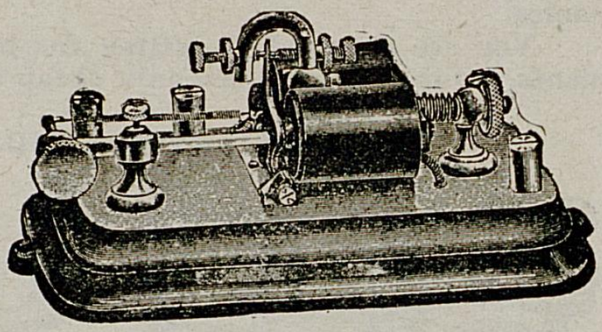
Goose Neck Pattern

Adopted by the Postal and Western Union Telegraph Companies.

No. 53X6. 150 Ohms Resistance $4.65

No 53X7. 250 Ohms Resistance 5.08

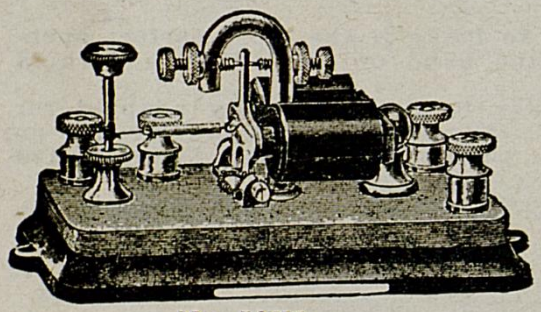
For Nickel-Plated Relay add to list ..... .85



No. 53X6.

PONY RELAYS.

THE "NONPAREIL" PONY RELAY.



No. 56X7.

This relay is mounted on a finely finished base with polished sur-base. It has platinum contacts, and is in every way a most admirable relay for the price.

No. 56X7. 20 ohms, Non-adjustable Cloth Covered Magnets..... $2.70

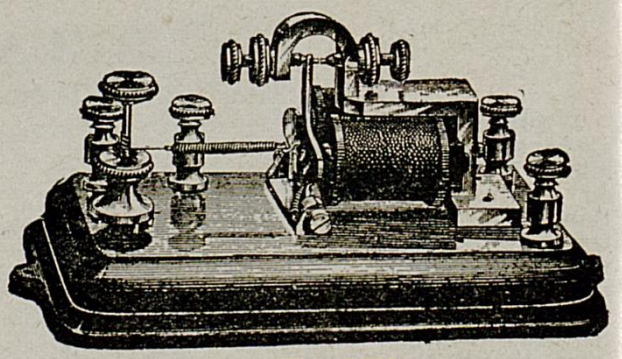
No. 56X8. 20 ohms Non-adjustable Rubber Covered Magnets..... 3.00

No. 56X9. 20 ohms Adjustable Rubber Covered Magnets..... 3.30

Sent by prepaid express or mail for 35c

NOVEL FORM PONY RELAY.

This relay is for lines of less thna 75 miles in length. It is elegantly finished, being mounted on polished mahogany base with ornamental sur-base. Size of base, 6½ in. by 3½ in.



No. 57X0.

No. 57X0. 20 ohms resistance or under, for lines up to 15 miles in length $2.40

No. 57X1. 50 ohms resistance, for lines 20 to 40 miles long..... 2.65

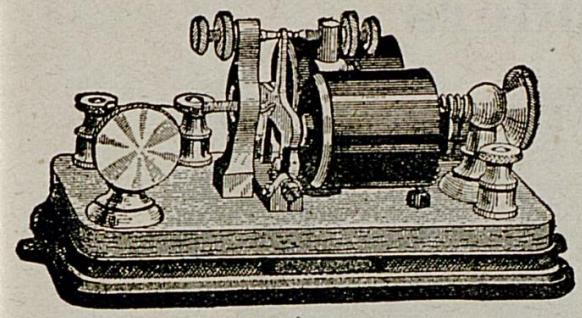
No. 57X2. 75 ohms resistance 2.75

No. 57X3. 100 ohms resistance, for lines of 75 miles..... 3.25

No. 57X4. With polished rubber magnets, extra..... .25

Sent by prepaid express or mail for 45c.

THE "1900" MODEL PONY RELAY.



No. 57X5.

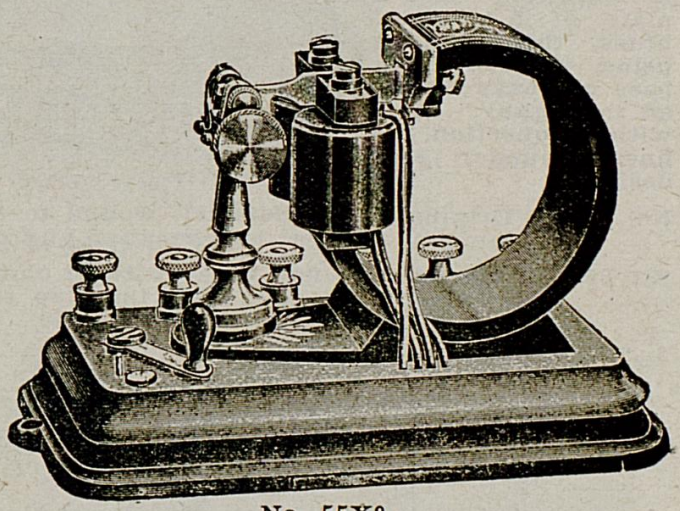
This is an improved form of Pony Relay, with rubber covered adjustable magnets, etc. It is finely polished and beautifully mounted.

No. 57X5, wound to 20 ohms...$4.25
No. 57X6, wound to 50 ohms... 4.50
No. 57X7, wound to 75 ohms... 4.75
No. 57X8, wound to 100 ohms.. 5.00

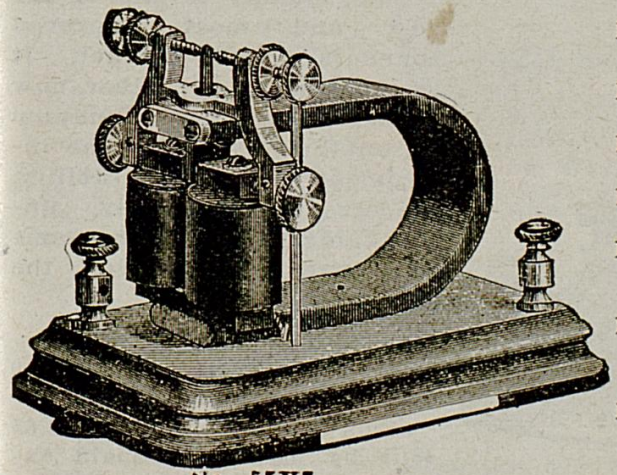
Sent by prepaid express or mail for 45c.

STANDARD POLARIZED RELAYS.

Polarized relays are more sensitive than any other form of relay. These instruments are so delicately balanced that the current produced between two wires when placed on the tip of the tongue will cause them to operate a sounder or bell. They are often used in connection with an experimental wireless receiving set, consisting of a coherer and decoherer and a sounder or register. The Polarized relays listed herein are unequaled for their delicacy and perfection in workmanship.



No. 55X9.



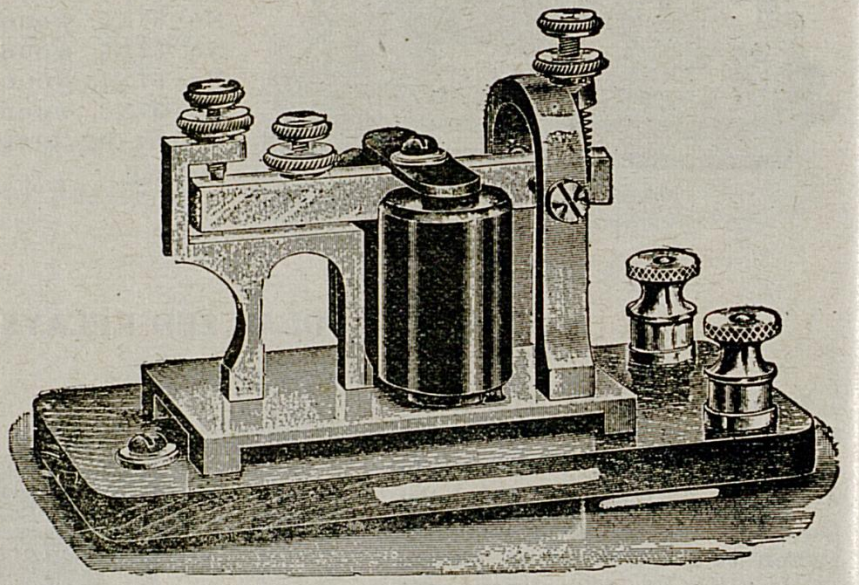
No. 55X7.

No. 55X5 Polarized Relay No. 1, Small size, 20 ohms.....$7.50
No. 55X6 Polarized Relay No. 1, Small size, 50 ohms..... 7.75
No. 55X7 Polarized Relay No. 2, Very strong, 50 ohm.....10.00
No. 55X8 Polarized Relay No. 2, Vry strong, 100 ohms.....10.25
No. 55X9 Quadruple Polarized Relay, Differentially wound, finest precision, 400 ohms....19.50
No. 56X0 Quadruple Polarized Relay, Differentially wound, finest precision, 500 ohms....21.00
No. 56X1 Quadruple Polarized Relay, Differentially wound, finest precision, 1,000 ohms...24.00

Sounders

THE NEW ALUMINUM LEVER GIANT SOUNDER.

This admirable sounder excels all others in tone, loudness and quick action. It is equipped with the celebrated Murdock aluminum lever. The coils are doubly protected by a heavy shell of hard rubber, with caps of the same material. It is mounted on a plate of brushed brass, this in turn being secured to a base of heavy finished mahogany. It is without question the finest sounder ever designed.



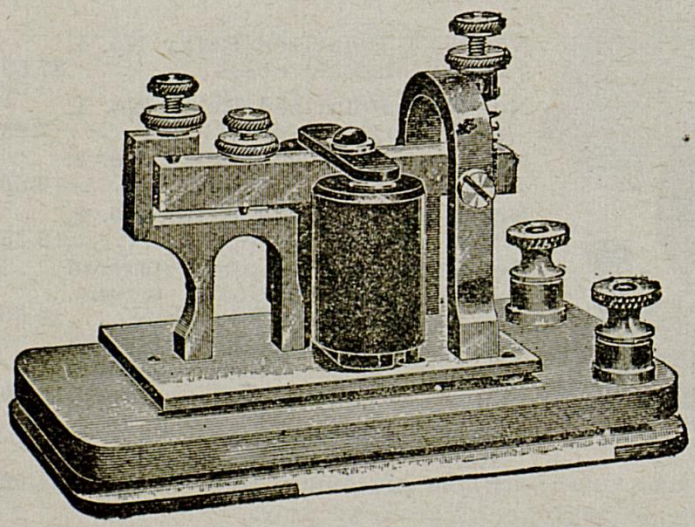
No. 50X0. Original Giant Sounder, wound to 4 ohms. Requires half the amount of local battery than any other form of sounder.....$2.00

No. 50X1. Wound with fine wire up to 20 ohms resistance, for main line use (without relay), on lines up to 15 miles in length..... 2.15

Postage 24c.

ALUMINUM LEVER SOUNDER.

With Patent Aluminum Resonator Base.



This sounder is one of the best and most improved sounders on the market. It is superior to any other now in use. The Patent Aluminum Resonator Base gives the instrument great durability, renders it practically unbreakable, and at the same time greatly increases the volume of sound.

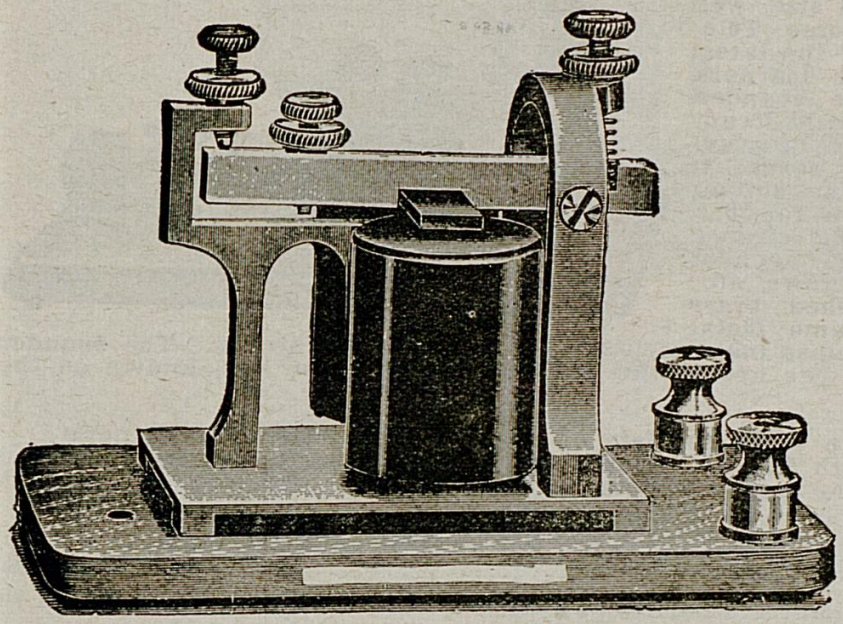
No. 50X2, wound to 4 ohms $3.50

No. 50X3, wound to 20 ohms $3.65

Sent by mail or prepaid express for 30c.

THE "1892" GIANT SOUNDER.

With Large Magnets and Important New Improvements.



These sounders have aluminum or brass levers, and with one cell of local Crowfoot Battery will give a loud, clear and quick stroke, equal to the best of any other form using two cells.

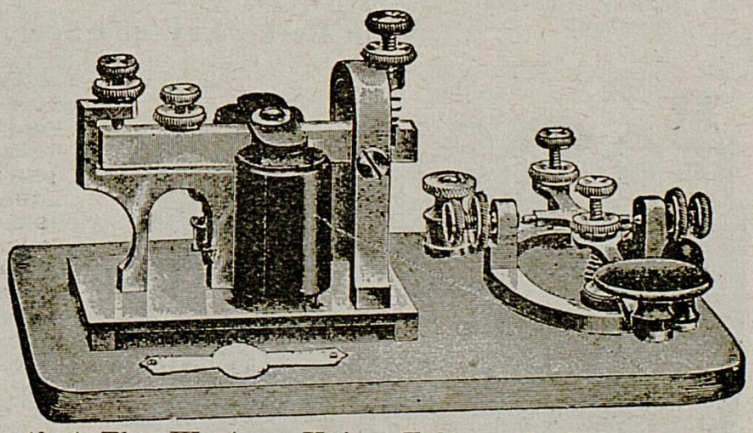
No. 51X5, wound to 4 ohms $3.20

No. 51X6, wound to 20 ohms $3.50

Sent by mail or prepaid express for 25c.

COMBINATION SET.

GIANT SOUNDER AND STEEL LEVER KEY.



For learner's use, or for use on city wires, private lines, and all short lines up to 15 miles in length. The most perfect and complete learner's instrument ever produced, consisting of aluminum lever, polished rubber covered magnets wound with fine silk covered wire, and mounted on polished mahogany base, with a steel lever, solid Trunnion key, with guaranteed hardened platinum points. These instruments are the same high grade type that The Western Union Telegraph Company and The Postal Telegraph Company, and all the principal railroad telegraph companies in the United States have been using for over a quarter of a century.

No. 50X4, wound to 20 ohms resistance. For all short lines up to 15 miles. No relay required.....$3.00

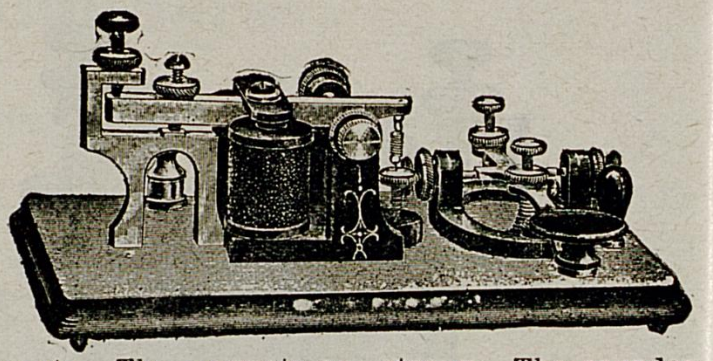
No. 50X5, wound to 4 ohms resistance. For local battery..... 2.90

Sent by prepaid express or mail for 50c.

No. 50X6. No. 50X5, complete with 6x8 Crowfoot Battery and Chemicals, wire for connecting, and Book of Instructions, making an extra fine learner's set 4.50

Shipping weight, 20 lbs.

THE "DANDY" MORSE LEARNER'S OUTFIT.
OUTFITS FOR LEARNING TELEGRAPHY.



Consists of a full size, well made, complete Morse Telegraph apparatus of the latest and best form for learners, including handsome sounder, with steel lever (Solid Trunnion) key, and a cell of gravity battery, latest form. It is the best working set of learner's instruments for long or short lines, yet offered. The sounder lever, sounder yoke, adjustment screws, etc., are in finely finished brass composition, the same metal as in all our first-class instruments. The magnets are strong. The sounder is loud and clear. The key is the celebrated steel lever key, known as the only perfect key.

No. 60X5. Complete outfit consists of one No. 60X7 "Dandy" Learner's Instrument, with 5x7 Crowfoot Battery, Wire, Book of Instructions and all necessary material for operating.....$3.65
Express additional.

No. 60X6 Same as No. 60X5 but with Red Seal Dry Battery instead of Crowfoot Battery 2.05

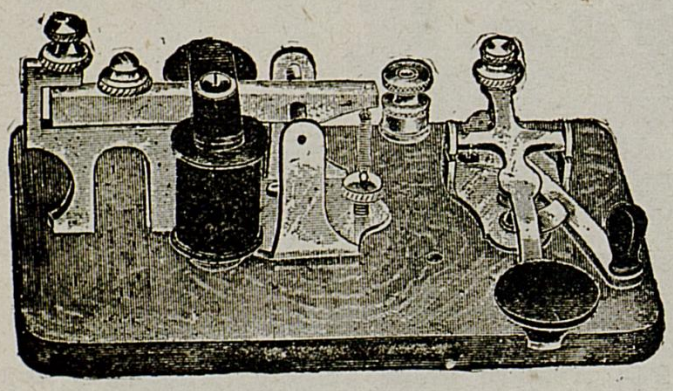
No. 60X7 "Dandy" Morse Instrument only, wound to 4 ohms..... 1.70

No. 60X8 "Dandy" Morse Instrument only, wound to 20 ohms..... 1.95

No. 61X0 Red Seal Dry Battery..... .35
Battery cannot be sent by mail. Postage on Nos. 60X7 and 60X8, 35c.

THE "NEW DEPARTURE" LEARNER'S OUTFIT.

With Beeko Key and Sounder.

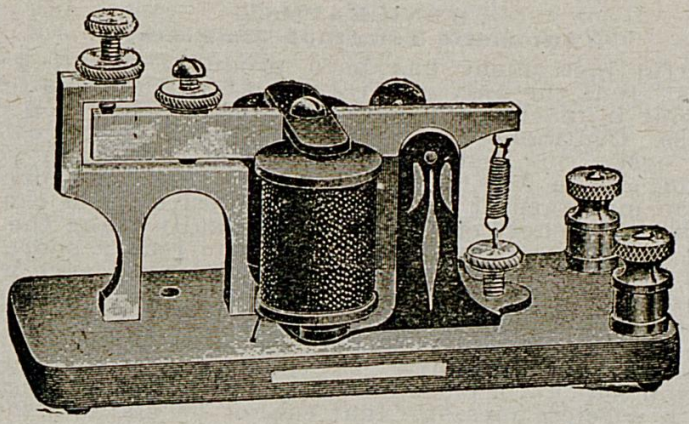


The ideal set for home practice. Always ready, neat, clean and attractive. The instrument is a well made Beeko learner's apparatus, with a steel lever key, arranged for use with a dry battery. The "circuit closer" is detached from the key, as it will prolong the life of the battery to leave the circuit open when not using the instrument. With "circuit closer" detached, the battery should last for several months' practice. It is sent with each apparatus, so that it can be replaced when it is desired to operate two or more instruments on the same circuit with bluestone battery. The magnets can be re-wound at slight expense for use on longer, outdoor lines. Instruction book sent free with each outfit. This outfit, packed in wooden box, weighs 7 pounds.

No. 61X1 Complete outfit consisting of one No. 43X6 Beeko Learner's Instrument, with Cell of Red Seal Dry Battery, Wire and Book of Instructions $1.90

No. 43X6 Beeko Instrument only, wound to 4 ohms..... 1.55

No. 43X7 Beeko Instrument only, wound to 20 ohms..... 1.85
Battery cannot be sent by mail. Postage on instrument only, 35 cents.



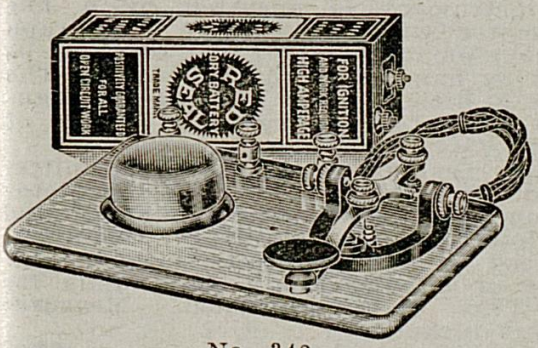
Beeko Learner's Sounder.

No. 58X74. 4 ohm Sounder $1.10

No. 62X20. 20 ohm Sounder 1.30

Postage 22c.

WIRELESS PRACTICE SET.



No. 342

The Practice Set comprises a regular telegraph key, without circuit breaker, a special high pitch buzzer, one cell Red Seal Dry Battery, and four feet of green silk covered flexible cord. We do not supply the dry battery because of its weight. It may be procured most anywhere. 30c extra if desired.

The key and buzzer are mounted on a highly finished wood base, and three nickel plated binding posts are so connected that the set may be used for five different purposes, as for Individual Practice, Testing Detector, on a Two Party Line, for Class Instruction and with the key only in use. The main object of the set is to enable the beginner to master the wireless code and the buzzer reproduces the sound of the signals of the most modern wireless stations perfectly.

Every beginner needs one of these sets, and as it is the equivalent of five different sets, the price is very low.

		Price.
No. 342	Wireless Practice Set, less battery	$2.00
No. 251	Wireless Buzzer only	.50

WATCH CASE BUZZER.

(Cut of Buzzer shown in practice set above).

The base and cover are made from sheet brass, polished and nickel-plated. The operating parts are designed to generate a clear resonant sound which can be heard in any part of an ordinary sized office or room. Easily connected and very reliable. Size 2⅛ inches diameter by 1 inch high.

No. 1936 Watch Case Buzzer ..... $0.50 Shipping wight, 8 oz.

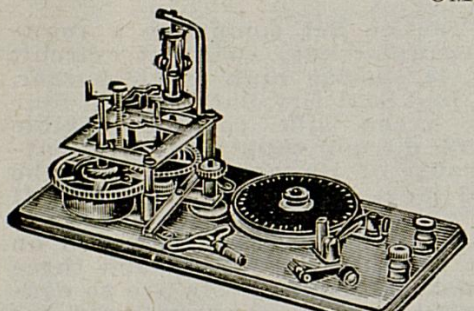
OMNIGRAPHS.
(Automatic Telegraph Machines)

This wonderful instrument has been produced to fill a gap that has existed for years. It is the only apparatus that will automatically teach you telegraphy without a teacher. The Omnigraph teaches you telegraphy, as well as Wireless, Continental and Morse code at your own home at a ridiculously low cost. Our instrument will positively teach you better than any teacher could, and in less time. It actually takes the place of an expert and will send you messages at any speed you desire. You can send a single letter continuously or a short message and gradually make the message more difficult. First you learn all the letters, then you read a short message, then you can reverse the dial and the Omnigraph will send part words and part letters. We furnish a large assortment of dials which will be found listed below. The Omnigraph works perfectly on any line or with any instrument.

WIRELESS—If you have no one to teach you Wireless, the Omnigraph will do it with astonishing rapidity. By connecting any of our buzzers with the Omnigraph you will get a close imitation of a wireless message. The best way to produce a wireless message that cannot be distinguished from a real wireless message is to cut out the center of the diaphragm of a 75-ohm watch receiver, or, in fact, any receiver, immediately above the magnets, and then put a piece of cardboard under the diaphragm so cut out; connect the 'phones across the electromagnets of the buzzer, putting a small condenser between the 'phones and magnets. We can supply a cut-out diaphragm, such as is used in our Murdock 75-ohm receiver for 15c. We can also supply a Murdock 75-ohm Watch Case receiver with cut-out diaphragm for 50c; cord 25c extra. Shipping weight 8 oz. Our single head bands, which cost 50c, cannot be used with this receiver. It would be necessary to purchase a Murdock 1000-ohm single receiver at $1.75, if the head band is desired.

All of our Omnigraphs operate sounders, recorders, relays, bells, buzzers, wireless sending apparatus, etc., etc. Our records being made of metal are everlasting and cannot wear out.

OMNIGRAPH No. 5.



No. 5

This instrument is operated by a fine spring motor which drives the Omnigraph for ¾ hour on one winding. It can also be operated by hand, by using the crank. The motor is a little wonder and can be regulated to work for any speed by means of governor.

Complete Omnigraph includes Transmitter arranged for hand or motor. Spring Motor with Governor for varying the speed and book "How to Become an Expert Operator." Guaranteed to work perfectly with any instrument or on any line. Extra dials 15c each. Two dials furnished. Measures 10½x5½x6 inches.

No. 5 Omnigraph, with spring motor, as descriped, each.....$7.00
Shipping weight, 6 lbs.

DIAL LIST FOR OMNIGRAPH No. 5.

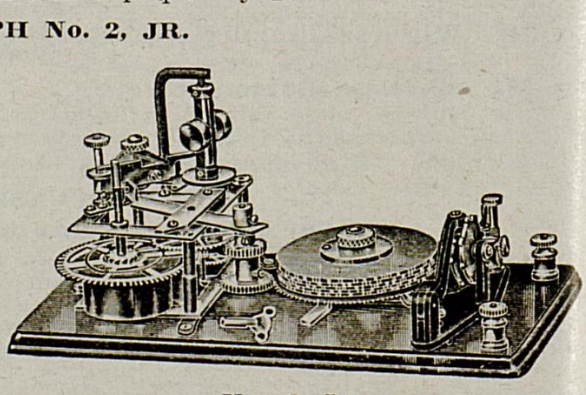
MORSE CODE—No. 6571 Numeral, No. 6572 Punctuation, No. 6573 Railroad. No. 6574 Practice, Nos. 6575, 6576, 6577 Railroad, Nos. 6578, 6579, 6580 Commercial, No. 6581 Press, No. 6582 Cipher. No. 6583 Alphabet in rotation, No. 6589 Numerals in rotation. We also have 20 single letter dials for the following letters: a b c d e f g h i j k l m o p q s t y z.

OMNIGRAPH No. 2, JR.

This is our best instrument and it is one of the most ingenious telegraphic machines ever invented. A masterpiece in all respects.

Sends absolutely perfect at any speed from 10 to 100 words per minute. You can change the message in the fraction of a second even while the machine is running. You can send the same message continuously or a 5th part repeatedly.

This Omnigraph is provided with five movable message changers. Each dial is divided into five equal parts, making the dials so far as changing the message is concerned equal to 25



No. 2 Jr.

dials. Starting the record when the dials are placed on the spindle from "A" to "E," having the dial marked "A" on top, it sends a comprehensive message of 50 words and before repeating the first dial it is equal to 100 words.

To change the message you move No. 1 message changer (the lever under the letters) in, so that it does not engage with the star wheel and move No. 2 out. This will transpose ten words. By making this change with the five different message changers it will transpose 50 words. Now by putting 1 and 2 so that they engage with the star wheel, this will make 20 changes, and by making this change five times, using different message changers each time, you make 100 changes. This same kind of manipulation can be done with three message changers, or four and with five, which will make the same proportion of changes in the message. Now remove the dials, shuffle them up, replace them on the spindle and you will begin all over again with new messages so far as practice is concerned. Just apply the rule of permutation to this Omnigraph and you will agree with us that you can send thousands of new messages.

If your memory is good we guarantee that you will master telegraphy in one month, practicing each day. One set of 5 dials furnished. Size 11x6x5 inches.

No. 2 Jr. Omnigarph as described. Shipping weight E lbs.....$12.00

DIAL LIST FOR OMNIGRAPH No. 2 JR.

No. 7200 to 7214, Fifteen Dials (3 sets of five Dials) Commercial Messages.
No. 7215 to 7229, Fifteen Dials (3 sets of five Dials) Commercial Messages,
No. 7230 to 7244, Fifteen Dials (3 sets of five Dials) Railroad Messages.
No. 7245 to 7259, Fifteen Dials (3 sets of five dials) Continental Code Messages.
No. 7260 to 7274, Fifteen Dials (3 sets of five Dials) Continental Code Messages.

Fifteen Dials form one comprehensive message.
Each set of five Dials 75 Cents. Shipping weight 1 lb.

Instrument has finely finished mahogany base, with all brass and metal parts gold laquered.

CONTINENTAL CODE—No. 6584 Numerals in message form, No. 6585 Alphabet in rotation, No. 6586 Message, No. 6587 Punctuation, No. 6588 Numerals in rotation, Nos. 6590 to 6594 five Message dials.
Each Dial 15 Cents. Shipping weight 2 oz.

THE NEW OMNIGRAPH NO 2

WITH SPRING MOTOR

The Spring Motor shown in this cut will run off 1200 words on one winding. One turn of the key will send 100 words. The governor will give you perfect regulation from 5 words to 100 per minute. Forty-five minutes, one winding. Full directions with each instrument. Also booklet. Size 11x6x5 inches.

The No. 2 Omnigraph, ready to connect with any line, or any key and sounder, or any wireless buzzer, complete with full set of 15 dials. Price $23.00
Shiping weight, 8 lbs.

Extra sets of 15 dials, Morse or Continental $ 3.00

PARTS OF TELEGRAPH INSTRUMENTS.

Parts sent prepaid.

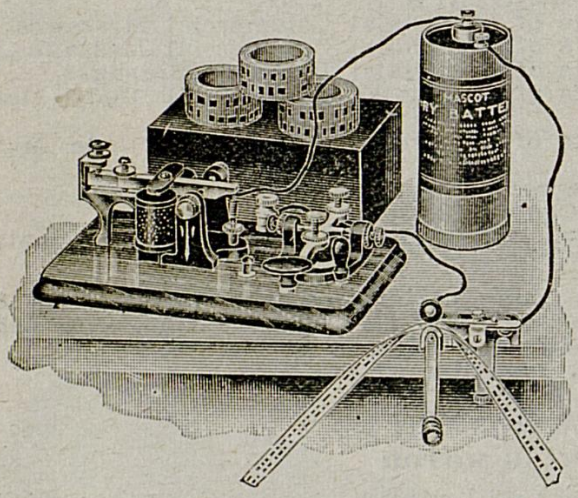
No.		
68X8	Key Lever, complete	$0.75
68X9	Circuit Closer, with Knob	.25
69X0	Circuit Closer, Knob only	.13
69X1	Lever Knob, 1⅛ in. diameter	.15
69X2	Trunnion Set Screws and Check Nut	.15
69X3	Lever Adjusting Screw and Check Nut	.10
69X4	Platinum Points	.40
69X5	Wing Nuts	.10
69X6	Springs	.10
69X7	Lag Bolts, with Wing Nuts, Back .08; Front	.10
69X8	Sounders, Levers (brass), complete	.45
69X9	Levers (aluminum), complete	.45
70X0	Armatures	.10
70X1	Bases	.30
70X2	Magnet complete, 4 ohms	.70
70X3	Magnet complete, 20 ohms	.85
70X4	Magnet, Rubber Cover only	.18

70X5	Springs	.10
70X6	Adjusting Screw and Check Nut	.10
70X7	Relay Magnet Complete, 150 ohms	2.00
70X8	Magnet Complete, 250 ohms	2.25
70X9	Magnet Covers, only	.25
71X0	Bases	.35
71X1	Surbases, Japanned	.25
71X2	Platinum Pointed Adjusting Screw and Check Nut	.43
71X3	Rubber Pointed Adjusting Screw and Check Nut	.15
71X4	Armatures, with Platinum	.60
71X5	Spectacles	.60

Orders for these parts must specify style of instrument for which they are needed.

For Learning Telegraph Operating or Wireless Telegraphy

Records are provided in either Morse or Continental code.



The object of the audible alphabet is to provide the student with a means of hearing transmission by sounds of letters, numerals, words and messages from the sounder, just as he would in any telegraph office, and at a speed, fast or slow, to suit his requirements. With this instrument and its exercises, in connection with its companion, our "New Departure" learner's outfit, or the "Dandy" Morse leaner's outfit which are described elsewhere, the student is equipped with an outfit that will enable him, in his own home, to produce the signals of the telegraph or wireless code distinctly and correctly.

The audible consists of means for feeding a suitably perforated record between electrical terminals in the same circuit with the key and sounder. The record is placed between the rollers and when the crank is turned, the record passes between the electrical terminals, and the perforations make and break the circuit, just as an operator makes and breaks the circuit with the key. Twelve graded exercises are furnished with the Audible, each with a different arrangement of words and messages, and thus a course of instruction is provided which cannot be excelled in its proficiency.

It is not the speed at which a letter is sounded that perplexes the learner, but the rapid succession in which they follow each other. The principle feature of our records is the gradation of the time which passes between the letters. By beginning with a record in which the signals are widely separated and then changing to others with less and less time between the characters, as the student advances and learns them, he gradually reaches the last, which are graded to about twenty-five words per minute, the average rate at which telegraphic messages are sent.

We also provide the lessons in the continental code, for wireless amateurs, who will be quick to appreciate the advantages of these lessons. It is of course necessary to also purchase the telegraph instruments above mentioned. No other records are provided. No other kind of records except those provided with the alphabet can be used therewith. In ordering be sure to state whether you desire records in Morse or continental code, or records will be furnished in Morse code.

No. 23X71 Audible Alphabet with Records in either Continental or Morse code $1.20

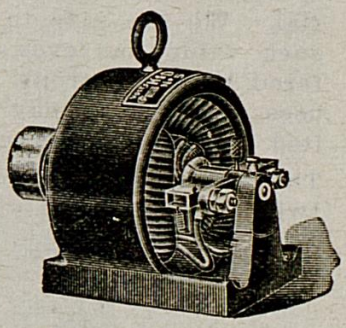
Postage 10c.

Motors, Dynamos, Sewing Machine Motors

OUR LINE OF MOTORS EMBRACES THE BEST TYPES OF THE LEADING MANUFACTURERS.

No. 90X K. & D. GENERATOR.

The same frame, field and other parts are used in this machine as in motor No. 50X, but it is shunt wound to obtain the best results as a generator. It may also be used as a motor. It is particularly adapted for experimental purposes, requiring but a small amount of current. It will light to full candle power, 12 6-volt 2 c. p. lamps. As an electro-plating machine it will operate a five-gallon solution successfully. There are also many other uses to which this machine may be put.



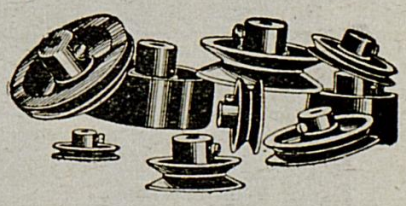
The field is of the ring type, cast solid with the frame. The coils are form wound, carefully taped and shellacked; they are entirely safe from mechanical injury or breakdown. The armature is of the drum type, laminated, slot wound—it does not heat. The commutator is of hard copper, carefully insulated with mica. The brush holders are of a new design, of the radial type, mounted on an adjustable yoke. The brushes are of woven wire, self-adjusting—they do not spark. The bearings are of hard bronze, nicely fitted; workmanship throughout the best. Finished in black enamel. Fitted with 1½-inch grooved or flat pulley as desired. Length of shaft, 6 inches. Weight, 9 lbs. Occupies space 6x4¾x6 inches. At speed of 2,200 r. p. m. the output is 36 watts (6 volts, 6 amperes). Shipping weight, 10 lbs.

No. 50X. Motor (same construction, but wound as motor. $8.00
No. 90X. Generator $8.00

Note:—Prepaid only in case express charges are not in excess of $1.00. If above this amount, $1.00 allowed on express charges. Shipping weight, 10 lbs. If in doubt, ascertain rate from local express company.

Small Iron Pulleys

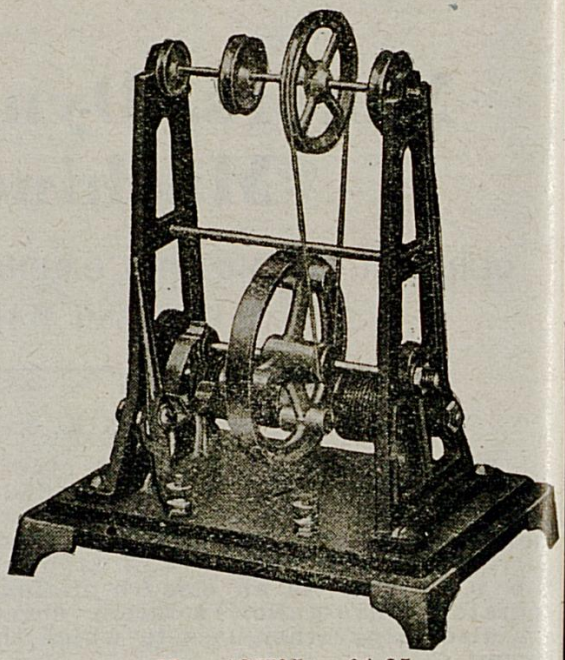
We can furnish exceptionally well made small iron pulleys in any of the following sizes. Please do not write for prices on any other sizes. We do not carry them. The postage on these pulleys must be estimated by the purchaser. (See also page 179.)



Outside Diameter	Bore	Face	Price each
5″	½″	V	$1.00
4″	⅜″—½″	V	.75
3″	⅜″—½″	V	.75
2″	¼″—$\frac{5}{16}$″	V	.45
2″	¼″	Flat Crowned	.45
1¾″	$\frac{7}{32}$″	V	.40
1½″	¼″	V	.40
1½″	¼″	Flat Crowned	.40

Outside Diameter	Bore	Face	Price each
1⅜″	$\frac{3}{16}$″	V	$0.35
1⅛″	$\frac{3}{16}$″ No. 19	V	.35
1⅛″	$\frac{5}{32}$″	V	.30
2-step Cone 2″—1⅜″	¼″	V	.45
2-step Cone 1¾″—1⅜″	½″ ⅜″ $\frac{5}{16}$″	V	.50
2-step Cone 1$\frac{5}{16}$″—1$\frac{1}{16}$″	¼″	V	.40

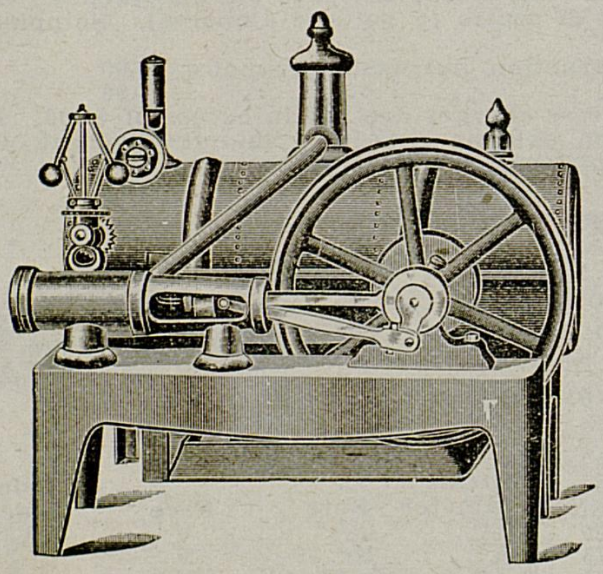
Our No. 18X05 motor is of the vertical type, combining motor and countershaft. The motor is the same as No. 18X02. The frame and base are cast iron, finished in red enamel and gold bronze. Fields are wound with No. 16 enamel wire. Has reversible switch. Countershaft has three pulleys besides the drive pulley. Several mechanical toys can be belted to the pulleys and nicely operate it. This combined motor and countershaft represent one of the greatest values we can offer to our patrons. It is not only beautiful in appearance, but is perfect in performance. No detail in its construction has been neglected. Every part is well made, and of high grade material. We are safe in saying that no such value has ever before been offered to our patrons. The variety of uses to which it may be put are limited only by the ingenuity of the boy. This excellent machine is easily worth twice the price we ask for it. Ship ping weight, 3 lbs. 5 oz.



No. 18X05. $1.25.
Size—Base, 5¾ in. x 6½ in.

No. 18X05. Combined Motor and Countershaft.....$1.5

STEAM ENGINE No. A140.



This Steam Engine has a large highly polished brass boiler, trimmed with steam dome, whistle, safety valve and water gauge, and is connected to steam chest on cylinder by a polished brass pipe.

The frame is iron, to which boiler and engine are firmly attached. The cylinder, steam chest and slide rest are cast in one piece and can not get out of order. The slide valve, eccentric, and connecting rod are all cut from heavy sheet brass and are fastened securely together. The whole engine is in every way strong and durable.

Balance wheel has polished nickel face, and cylinder has polished brass jacket.

It runs rapidly and easily, and will undoubtedly prove to be one of our most satisfactory and popular steam toys.

No. A140. Steam Engine $3.1

Shipping weight 4½ lbs.

Knapp Motors

Note.—Any of the Knapp battery motors, except the Type S, may be operated by a step down transformer. We particularly recommend our Flexible Toy Transformers for reasons stated in descriptions thereof.



These motors have a standard reputation for their excellence of construction and workmanship.

LITTLE HUSTLER MOTOR

With Starting Switch.

This motor is 3½ inches high, finished in black enamel, with nickel-plated trimmings. It drives a fan at a high rate of speed, and is fitted with pulley for running mechanical toys, such as lathes, drill presses, punch presses, water wheels, fountains, pumps, trip hammers, etc. Will operate on one dry battery. Regular price, $1.00.

No. 10X0. Motor. Special price.....$0.88
Postage, 17c.

No. 10XA. Complete parts, 75c. Postage 15c.

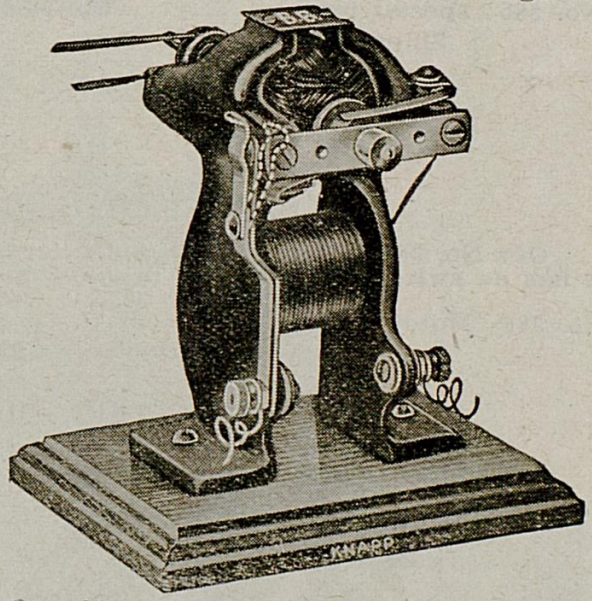
No. 10X1. Fan, 4½ inch, nickel-plated .....$0.21. Postage 3c

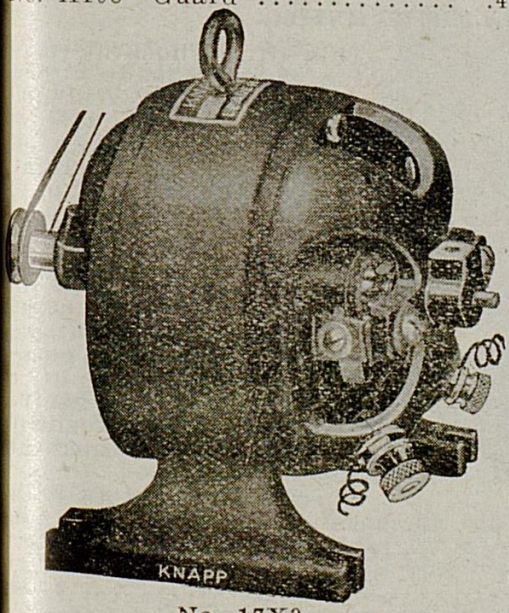
Our Type B. B. is larger and stronger than the Little Hustler. It is equipped with switch for starting. Has six pole armature. Will drive six-inch fan at high speed. For fan use, life of batteries prolonged by connecting two dry cells in series and two in multiple. Height, 4½ in.

No. A104 Special price $1.76
Shipping Weight, 2¼ lbs.

No. A105 Fan, 6 in., 4 blades.. .45

No. A108 Guard ..... .45





No 17X9.

Our No. 17x9 motor represents exceptional value. It is inviting in design, excellent in construction and is made of the best materials throughout. A careful examination of this motor invites the query as to the possibility of manufacturing such a high class motor at such a low price. In fact the price is the only cheap thing about this motor. The cut does not do it justice. The armature is 1¼ inches in diameter, three poles; laminated shaft ⅛-inch in diameter; pulley $\frac{5}{16}$-inch grooved. It is finished in black enamel, with nickel trimmings, and presents a most attractive appearance. Height, 4½ inches.

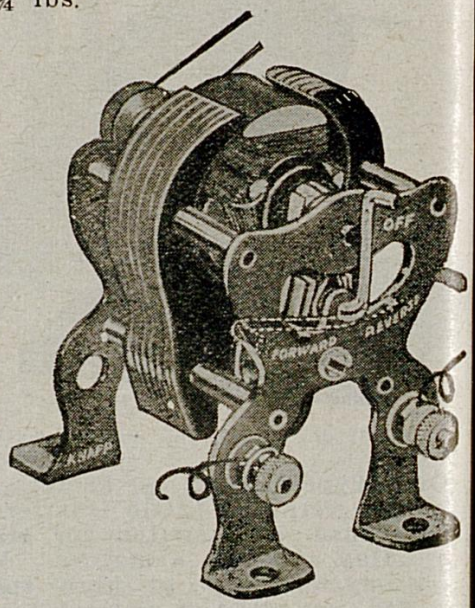
No. 17X9 Motor, formerly No. 11X8,
(regular price $1.75) our price....$1.60
Shipping weight, 2½ lbs.

PARTS OF No. 17X9 MOTOR

Many boys find a great deal of pleasure and derive a great deal of instruction in assembling their own motors. We can furnish the complete parts of our No. 17X9 motor, all ready to assemble, together with explicit directions and drawings. All the machine work is done at the factory, and any boy of average ability can very easily assemble the motor.

No. A178a Complete parts No. 17X9 Motor, (regular price $1.65). Our special price $1.46

Shipping weight, 2¾ lbs.



This is a carefully designed motor with all the value expended in constructional detail, all unnecessary parts being omitted. The motor is self-starting, has laminated field and armature motor, with a switch to reverse the direction of rotation and to turn off the current. It will run on one dry cell. It is an exceptionally well made motor.

No. 385 special price $0.88

Shipping weight, 12 oz.

No. 386 MOTOR, LESS SWITCH.

Our No. 386 motor is the same in every respect as No. 385, excepting that it has no switch and will run in only one direction.

No. 386 Motor $0.70

Shipping weight, 12 oz.

KNAPP ELECTRIC THRILLER MAGNETO.



This little shocking machine is well made. The machine work is excellent. By turning the crank slow or fast the current can be so regulated that a slight or severe shock is produced. There is no possibility of danger in its use.

The boy will get lots of fun and amusement out of it. An excellent contrivance in initiation ceremonies.

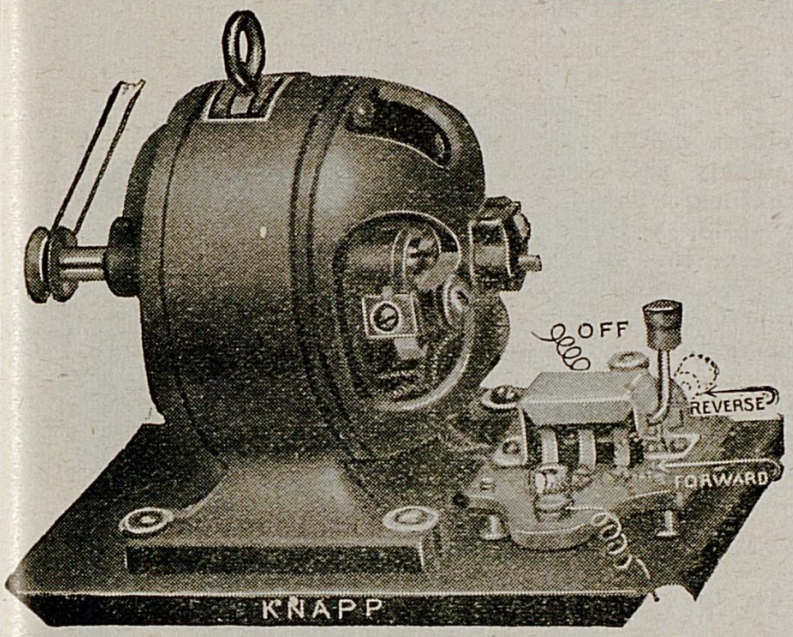
It also has its useful purposes. An excellent substitute for a medical battery.

Furnished complete with hand electrode, crank, multiplying gear, etc.

No. 150 Knapp Electric Thriller Magneto ..... $ .90

Shipping Weight, 20 Oz.

KNAPP TYPE C

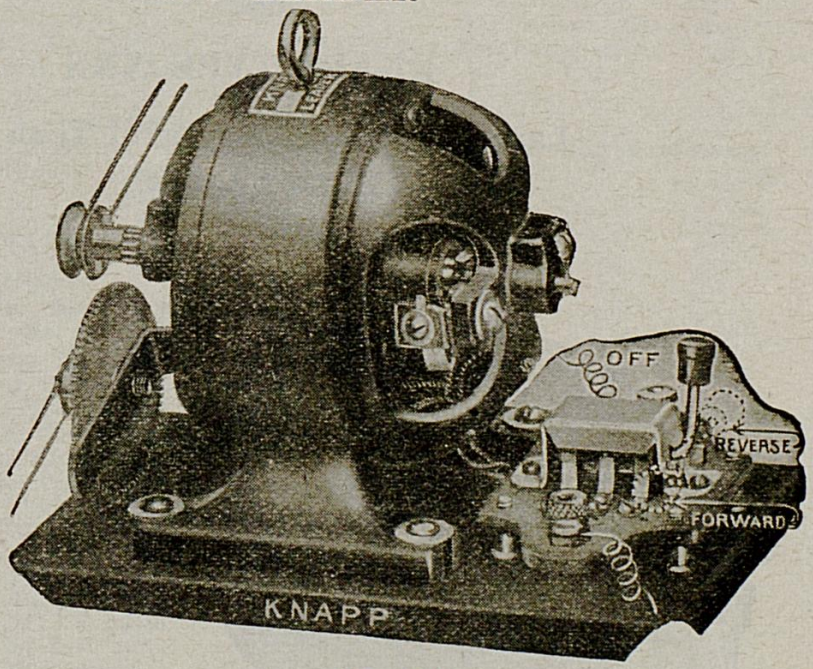


Our Type "C" comprises our No. 17X9 motor, mounted on an enameled metal base, and with reversing switch, to start, stop or run the motor in either direction. It has no reducing gear.

No. A180 Knapp Type C. **$2.15**

Shipping weight, 3¼ lbs.

KNAPP LEADER



This motor is unquestionably one of the greatest values we have ever been able to offer to our patrons. In looks it resembles a miniature power plant; in efficiency it will measure up to the highest expectations. No more welcome gift could be given to a boy. He will get more instruction and wholesome fun with this motor than he could possibly get in any other way.

The motor will drive from either pulley. The reducing gear, which is easily thrown in or out of mesh with the pinion on the shaft, transforms the high speed on the shaft to greater power and slower speed. The reversing switch is positive in action, and operates either as a starting switch or to reverse the direction of the motor.

No. A181

The Greatest Value Ever Offered

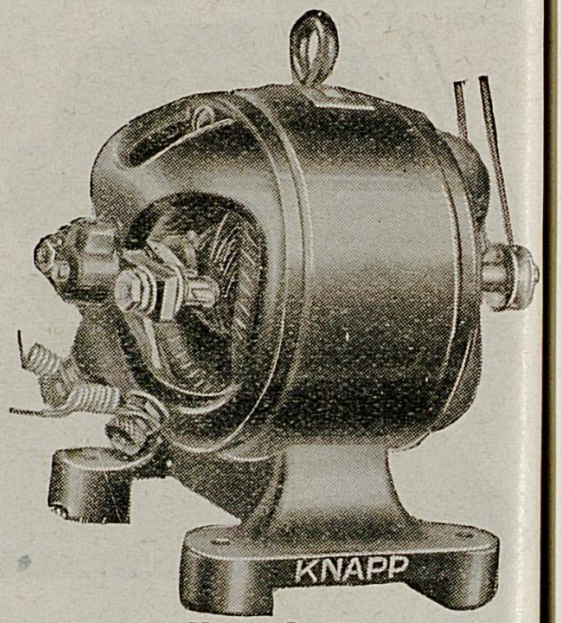
This motor is finished in black enamel, with nickel-plated trimmings; armature is laminated, 1¼" diameter, three poles; shaft, .125 inches in diameter; pulley, 9/16" high; will operate on from 2 to 4 volts; metal base, 4¼".

No. A181 Knapp Leader, (regular price $2.50), our special price.....**$2.25**
Shipping weight, 3¼ lbs.

KNAPP TYPE XX MOTOR

This is a very excellent motor, and is modeled very closely after the types of large machines. The two-pole field is cast solid, with form wound coils. The armature is 1⅜-in. diameter, drum type, laminated, with .148 shaft and 9/16 pulley. The brushes are spring tension. The finish is black enamel, with nickeled trimmings. Height 4¼-in., including base and ring; diameter, 2¾-in., less base and ring.

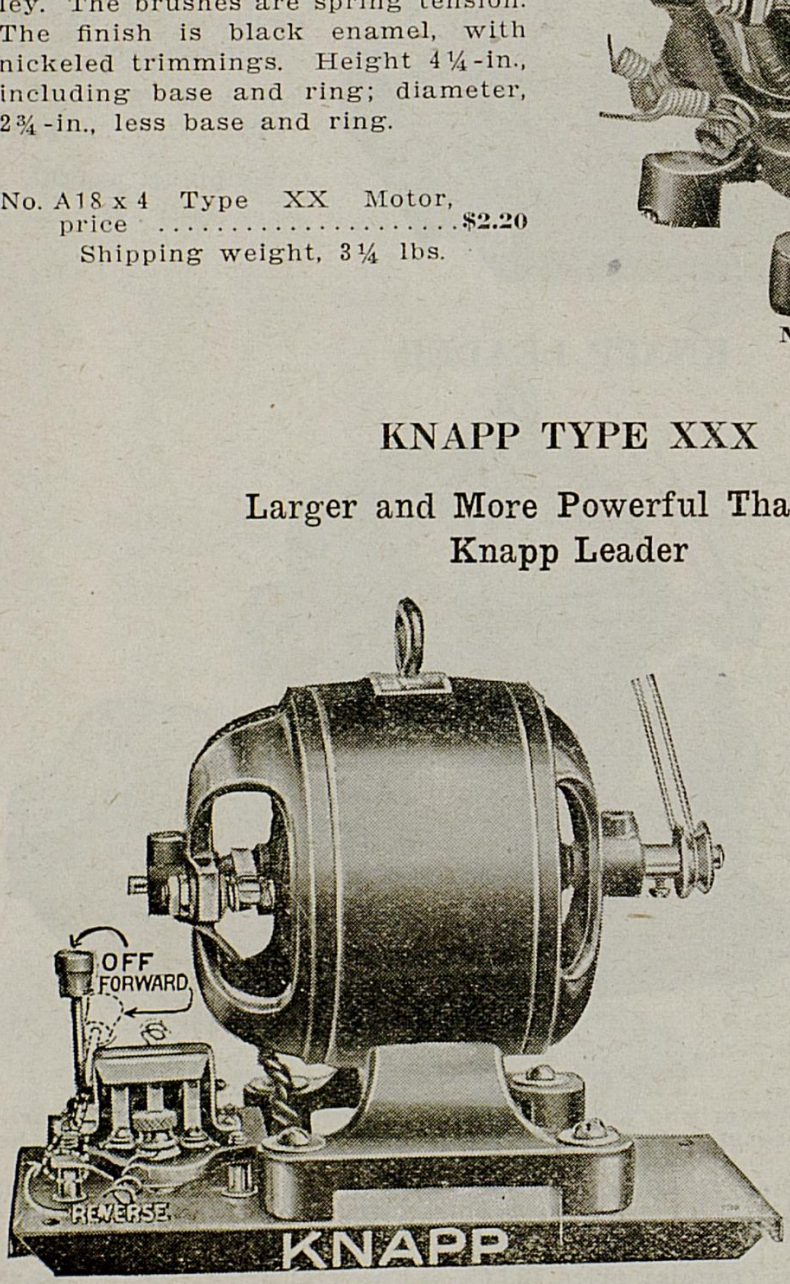
No. A18 x 4 Type XX Motor, price $2.20
Shipping weight, 3¼ lbs.



No. A18 x 4

KNAPP TYPE XXX

Larger and More Powerful Than Our Knapp Leader



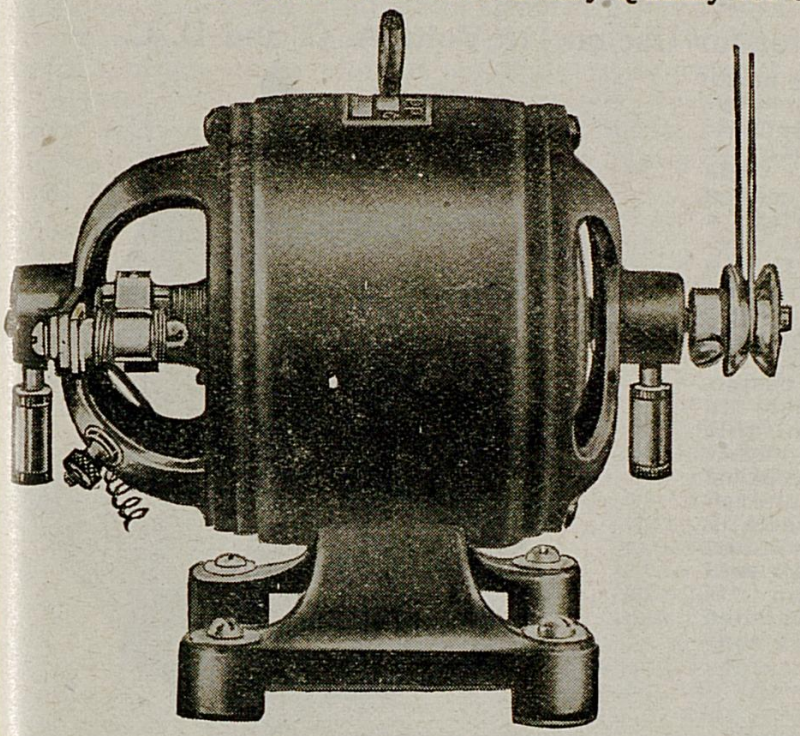
No. A185

The drum type six-pole armature and spring tension brushes, combined with two-pole iron clad field, gives strength and smoothness of running never before obtained from so small a motor. The motor is the same as our Type XX, with the added features of a formed metal base, on which is mounted a reversing switch, positive in action, to start, stop and rotate the motor in either direction.

No. A185 Type XXX motor $2.65
Shipping weight, 3½ lbs.

TYPE A1.

A Motor of Extraordinary Quality for 6 Volts.



This is our former No. A189, with the following improvements: Gauze brushes; commutator made from drawn copper bar, insulated with mica; oil cups, wick feed. In short it is a wonderfully constructed motor.

The field is cast solid, with coils formwound. Armature 1½ in. diameter, with drum type, six slots, laminated. Shaft, .188 diameter. The brushes are spring tension. It has rocker arm for turning the brushes to the best lines of commutation. Pulley ¾ in. diameter, grooved for $\frac{3}{16}$ round belt. Finish black enamel. Height, 4½ in., including base and ring; diameter, 3⅛ in., less base and ring. To develop full power, four dry cells, giving six volts, should be used. Regular price $4.00.

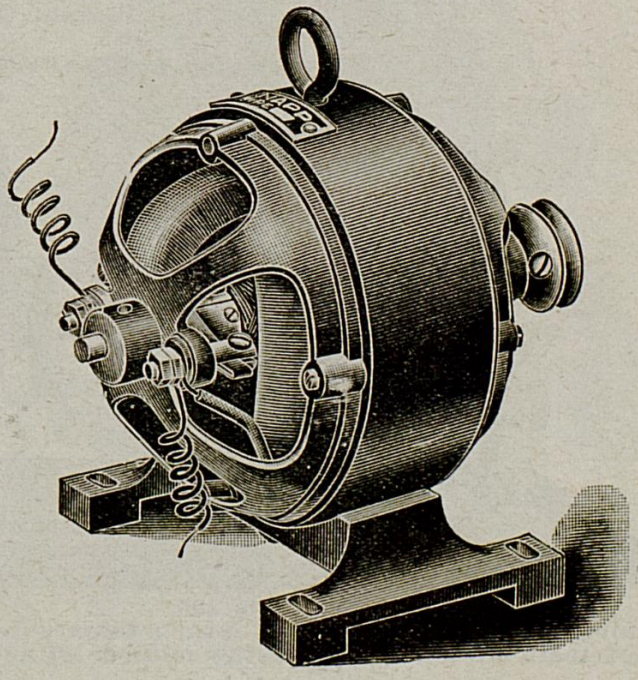
No. A191 Type A1, 6 to 8 volts, special price.....$3.50
Shipping Weight, 4 lbs.

No. A192 Type AA1, same as No. A191, with metal base and reversing switch. Special price $3.85
Shipping Weight, 4½ lbs.

KNAPP TYPE S DYNAMO-MOTOR.

"Has No Competitors."
Six volts; 4 amperes. Speed 3,000 Revolutions.

The type "S" dynamo is semi-enclosed, and is similar in design to large machines. The armature is 1¾ inches in diameter, six slots, laminated; pulley 1 in. in diameter, grooved, for 3-16-inch round belt. The field is cast solid, with coils formwound and connected in multiple. This dynamo is efficient, strongly made, and handsomely finished. It may be attached to our No. 11X5 hand drive, or be operated by any motor; will electro-plate, operate motors, trolley cars and many other appliances. It has an output of 24 watts, sufficient to take care of four 6-volt, 2 c. p. Tungsten lamps. Will operate on 4 dry cells as a motor. Shipping weight, 6½ pounds. Regular price $5.00.



No. 12X8. Special price....$4.45
Express additional.

NEW AND IMPROVED HIGH CLASS SMALL POWER MOTOR.

Universal Motor for Use on 110 Volts A. C. and D. C.

For several years this motor was brought out in two separate windings, for alternating and direct current, respectively. This year the manufacturers have succeeded in developing this type into a Universal Motor without sacrificing any efficiency. It will work equally well on 110-volt direct or alternating current. The advantages of a motor of this type are manifest. No matter where you may reside, you will always be able to find a use for this admirable motor. It is unquestionably one of the finest constructed motors of its class yet offered to the public. It is especially adapted for operating window displays, flashes and other mechanical devices within its range of power. Furnished complete with five feet of connecting cord and plug.



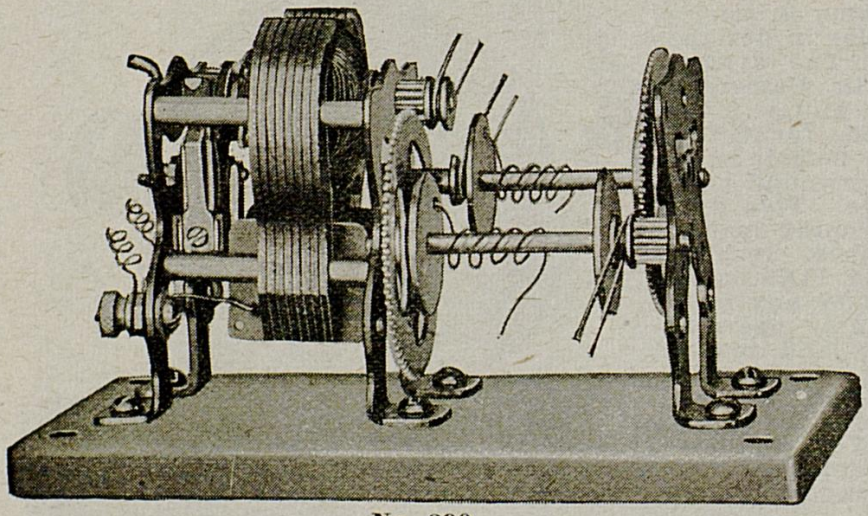
POINTS OF CONSTRUCTION.

Field—2 poles, laminated, 1⅜-inch opening for armature. Armature—laminated, 7 slots. Shaft—¼-inch diameter, 5⅜ inches long. Commutator—Copper, mica insulation, 14 segments for 110 volts, 7 segments for battery. Pulley—1 inch. Oil cups—Wick feed. Height over all—About 5 inches. Length of body, including bearings—4½ inches. Diameter of body only—3 inches. Horsepower—About 1/40. Speed—2,000 R. P. M. with load and 3,500 R. P. M. without load.

No. A160—Universal Motor, for use on 110-volt A. C., 60 cycles, and D. C. (regular price $7.50), our price.....$7.00

Shipping weight, 4¼ lbs.

KNNAPP FIVE-SPEED MOTOR.



No. 390.

The power of small motors is usually in their speed, therefore the torque or pull lessens when a load is put on that materially slows down the motor.

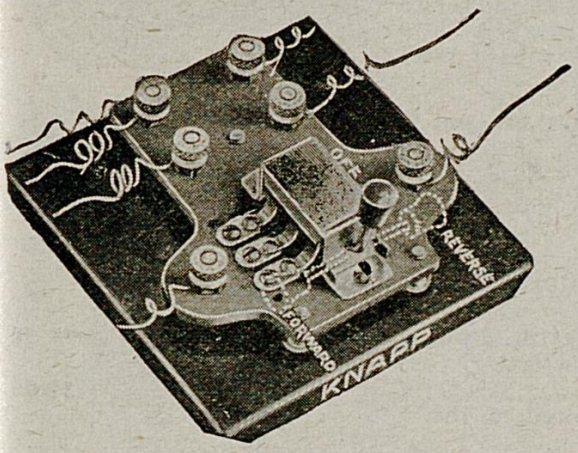
The power (except slight frictional loss) is easily retained when appliances requiring fewer revolutions are run by gears that will multiply the torque at each reduction, proportionate to the ratio between the number of teeth in the gear and the number of teeth in the little pinion.

This outfit, figuring the approximate working speed of the motor at 2500 revolutions per minute, with two gears and small pinions, each 7 to 1—produces wonderful results and demonstrates fully this principle in mechanics.

Five power changes may be taken off at the three pulleys and two drums, with a torque at the slowest shaft almost impossible to hold with the fingers.

This outfit will be found especially desirable for driving mechanical toys built up from structural steel outfits, and many other mechanical devices. The fund of information and pleasure derived from the operation will be greatly appreciated.

No. 390 (less cells).....$2.00
Shipping weight 1½ lbs.



KNAPP REVERSING SWITCH

The users of small motors will welcome this reversing switch for battery circuit. It is positive in its action, and directions and drawing are furnished that will enable the average boy to change the connection of any motor. This switch is exceptionally well made, and no boy experimenting with small motors should be without it. The accompanying directions show drawings or motors connected in shunt, series and reverse.

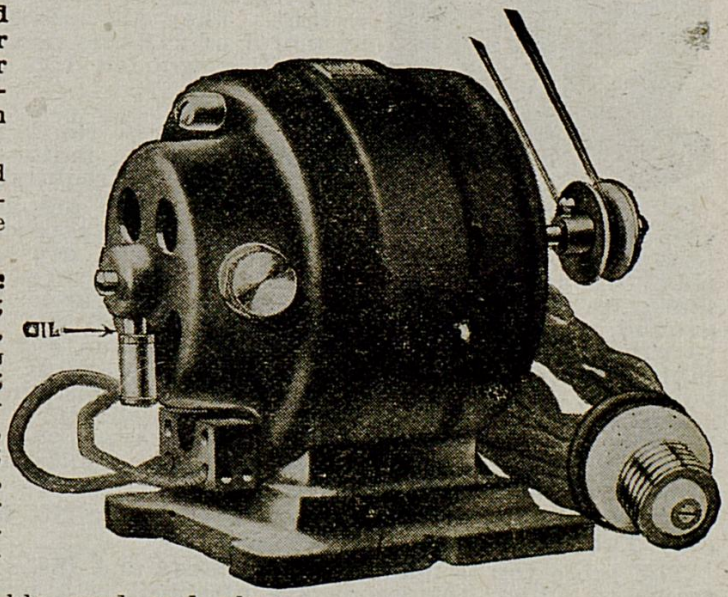
No. 195 Reversing Switch, (regular price, 75c), our special price $0.65
Shipping weight, 8 oz.

1/20 H. P. MOTORS FOR A. C. OR D. C. CURRENT.

These motors will be found particularly serviceable for all kinds of small power work. They are not, however, powerful enough to run washing machines.

The motors are constructed throughout of first-class material and are bound to give very satisfactory service.

Points of construction: Field, two poles, laminated; Armature, 2 inches diameter, laminated, 14 slots; Shaft, $\frac{5}{32}$ in. diameter, 6⅞ in. long; Commutator, copper, mica insulation, 14 segments; Pulley, 1 in.; Oil Cups, wick feed; Height over all, 7 in.; Body, diameter 4⅜ in.; length, including bearings, 5¾ in.; Finish, black enamel, brass trimmings.

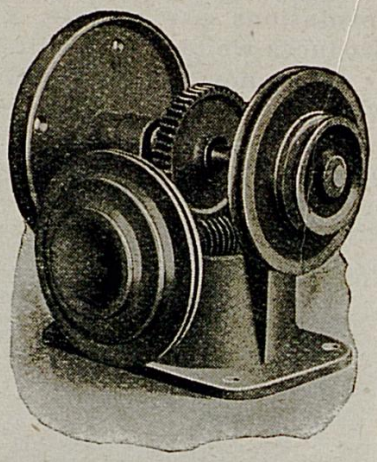


Complete, with 8 feet flexi ble cord and plug.

No. A315. 110 volts A. C., 60 cycles $10.25
No. A316. 110 volts D. C. 10.25
(Shipping weight 8½ lbs.)

No. A329. 1 emery wheel 2½ in. diameter ..... .40
No. A338. 1 spindle arbor for holding emery wheel..... .25

SPEED REDUCING GEAR No. 1.



An improved device by which the high speed of the motor is converted into a slow, powerful motion. The round plate may be removed if desired, and direct connection made to shaft. Useful for many purposes.

The fast running pulley has three grooves and the slow running pulley two grooves, thus giving a wide range of speeds.

Geared 48 to 1.

No. 1 Speed Reducing Gear.....$6.00
Shipping weight 10 lbs.

Diameters of 3-groove driving pulley, 2, 3 and 4 in.

Diameters of 2-groove pulley, 2 and 4 inches.

The reducing gear is often used with a large wooden disc attached to the round plate. This makes a revolving display with the table in a perpendicular position and is very effective.

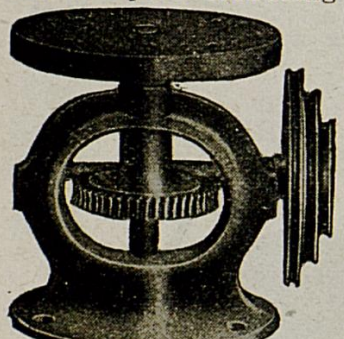
REDUCING GEAR No. 2.

In this device the gears are enclosed in a case which is filled with grease. All the bearings are so perfectly lubricated that the gear will run silently and without attention for a long time. The bearings are unusually large and the workmanship first class.

Geared .....48 to 1
Diam. of slow running cone pulley..1-in., 1½-in., 2-in., 2½-in.
Diameter of fast running pulley..... 4-in.

Fast running shaft can be fitted with a pulley 8-in. diameter or less if desired, at an extra cost according to size.

No. 2 Speed Reducing Gear $9.00
Weight, boxed, 9 lbs.



DISPLAY TABLES.

A revolving table for store windows and other purposes. These display tables are thoroughly well made with machine cut gears and ball bearings to carry the weight. They are silent in operation, and easily run by motor of suitable power. Screw holds are provided so that a wooden top of any size desired may be added.

Either No. 1 or No. 2 Display Tables may be operated by 1/30 H.P. motor. To operate No. 3 with full load of 1000 lbs. requires only a 1/16 H.P. Motor.



The Display Tables and Reducing Gear are adaptable to a great variety of moving window attractions. Round wooden tops of any desired size are easily made by anyone. These tops may be covered with black or green velvet or other material as a background, against which the goods displayed will show to great advantage. Tops are often made for these tables in the shape of a pyramid, or square or round box form. Goods are attached to the sides and top, and as the table revolves, each side is shown in turn. During the Holiday Season Christmas trees are often revolved by these tables, thus making an exceedingly attractive exhibit.

The hardware display shown in cut is on No. 2 Display Table.

The table top is made of box boards and the square frame to which the goods are attached is a packing case such as any store would have in stock. The case can be covered with cloth to give it a good appearance.

The above cut will show you how easily and cheaply you can get up an attractive, trade-pulling display for yourself.

Display Table No. 1, capacity 100 lbs. .....$ 6.00

Diameter of top 6½ in.; Height 5¾ in.; Diameter of pulleys, 2 in., 3in., 4 in., for ⅛ or 3/16 round belt. Shipping Weight, 8 lbs.

Display Table No. 2, capacity 250 lbs. $10.80

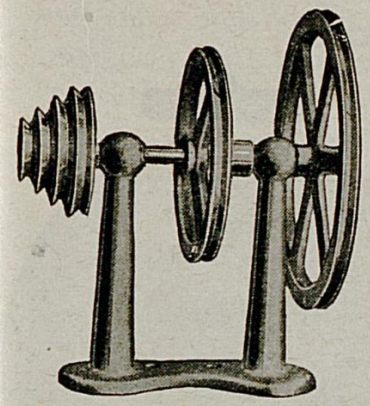
Diameter of top, 7¼ in.; Height, 9 in.; Pulley Wheel 6 in. diameter for 3/16 in. round belt. Shipping Weight 16 lbs.

Display Table No. 3, capacity 1000 lbs. $21.60

Diameter of top, 14 in.; Height 8½ in.; Pulley Wheel 7 in. diameter for ¼ in. round belt. Shipping Weight, 62 lbs.

NOTE. The above tables revolve once for 48 revolutions of pulley.

COUNTERSHAFT No. 2.



In belting up the displays the No. 2 Countershaft is often used as it is generally more convenient to belt from the motor to countershaft and from countershaft to display, than from motor to display direct. The countershaft is also used to increase or decrease speed by belting from small or ge pulley, according to result desired. It is also very desirable as a reducer or speed accelerator, and is admirably adapted for running any of the display tables listed herein. Pulleys grooved for 3/16 inch round belt.

Large Pulley ..... 6 in. dia.
Medium Pulley ..... 4 in. dia.
Cone Pulley 1 in., 1* in., 2 in., 2½ in. dia.
Shaft .....⅜ in. dia.
Net Weight ..... 4 lbs.

Price $2.40

IRON GROOVED PULLEYS FOR ROUND BELT.

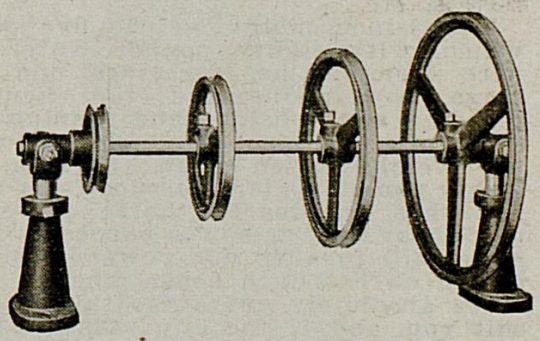
Turned and Bored for Set Screw.

4-in. size and larger made with spokes 3-in. size and smaller with webbed center.

12-in. size and smaller will take ⅜-in. or smaller round belt. 14-in. size and larger, ½-in. or smaller belt.

12-in. size and smaller may be bored for ¾-in. shaft or smaller. ½-in. is standard and is recommended, as quicker shipments can usually be made in that size.

14-in. size and larger may be bored for 1¼-in. shaft or smaller. ¾-in. is standard.



1-in.....$ .40	5-in.....$ .85	12-in.....$2.00
1-½in..... .45	6-in..... 1.00	14-in..... 3.60
2-in..... .50	7-in..... 1.25	16-in..... 4.50
2½-in..... .55	8-in..... 1.50	18-in..... 5.50
3-in..... .65	9-in..... 1.60	20-in..... 6.50
4-in..... .75	10-in..... 1.75	24-in..... 8.00

IRON CROWN FACED PULLEYS.

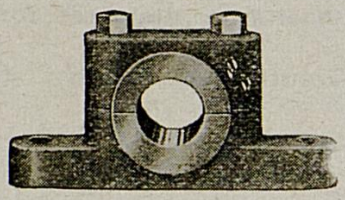
	¾-in. Bore 1¾-in. Face								
Diameter	2-in.	2-½in.	3-in.	4-in.	5-in.	6-in.	7-in.	8-in.	9-in.	10-in.	12-in.
Price, each	$ .50	$ .60	$ .70	$ .85	$1.00	$1.25	$1.40	$1.50	$1.65	$1.75	$2.00

	½-in Bore 1¼-in. Face										
Dia..	1-in.	1½-in.	2-in.	2½-in.	3-in.	4-in.	5-in.	6-in.	8-in.	9-in.	10-in.	12-in.
Price	$ .40	$ .45	$ .50	$ .55	$ .65	$ .85	$1.00	$.120	$1.35	$1.50	$1.65	$1.90

ADJUSTABLE SELF-ALIGNING HANGERS.

As shown in cut above.

Fitted for ½-in. Shaft:				
Height.....	2½ to 3 in.	3½ to 5 in.	5¼ to 6¾ in.	6½ to 8½ in.
Price, each.	**$ .85**	**$1.10**	**$1.20**	**$1.50**
For ¾-in. Shaft:				
Price, each.	**1.20**	**1.40**	**1.60**	**1.80**



PILLOW BLOCKS.

Diameter of hole—	⅜-in.	½-in.	⅝-in.	¾-in.	1 -in.	1¼-in.
Height to center—	⅝-in.	⅝-in.	1 -in.	1 -in.	1⅛-in.	1⅛-in.
Price, each—	**$ .50**	**$ .55**	**$ .60**	**$ .75**	**$ .90**	**$1.00**

RED DEVIL WATER MOTOR.

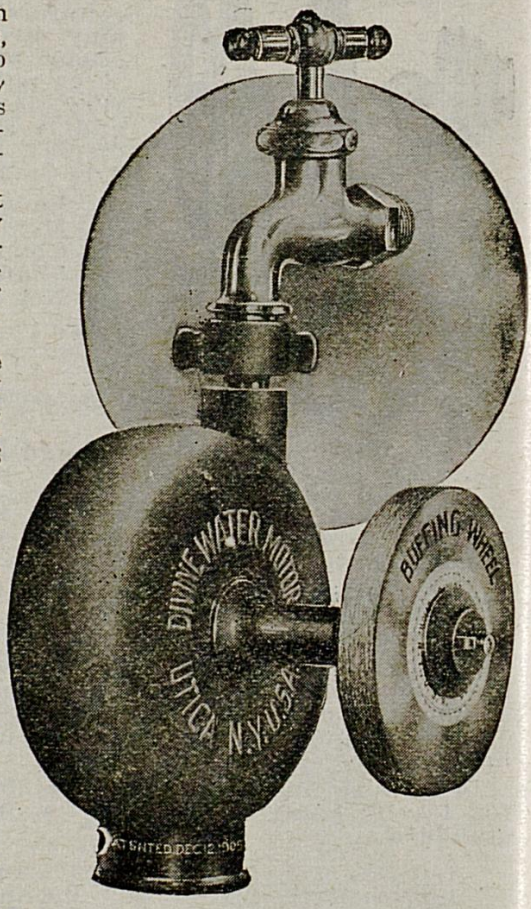
The Red Devil water motor has been proven by practical competitive tests, made by hydraulic experts, to develop more power with less water than any other motor of moderate size. Thousands of mechanics and householders have pronounced it the handiest tool ever produced.

This motor is recognized as the greatest little motor made. It is cheaper than any other small power generator. Its unequaled durability, convenience and economy in operation make it the best power producer of universal application for moderate power.

The uses to which this motor may be put are almost limitless. It is peculiarly adapted for operating washing machines, clothes wringers, emery wheels to sharpen knives, scissors, hatchets, tools or skates; with buffing wheels for polishing silver, metals, etc.

The 4-inch motor weighs five pounds, which, with eighty pounds water pressure from mains, furnishes one-eighth horse power, intended for household grinding and polishing and running of all kinds of small machines. The 6-inch motor weighs seven pounds, which, with eighty pounds water pressure from mains, furnishes one-quarter horse power, intended for heavier power purposes. Either style will furnish this power when connected on half-inch house pipe.

We absolutely guarantee this motor to suit you, and if for any reason you are not satisfied therewith after a twenty-four hours' trial, return it to us and we will refund your money to you.



No. 1492 Motor Equipment, consisting of
1 four-inch motor,
1 four-inch beveled face emery wheel,
1 blue felt buffing wheel for silver,
1 cake silver polish,
1 grooved wood pulley,

Price $3.00

Shipping weight, 6 lbs.

No. 1493 Motor Equipment consisting of
1 four-inch motor,
1 grooved pulley,

Price $2.50

Shipping weight, 6 lbs.

No. 1992—6-in. Motor for Flat Belt, 2-in. Flat Pulley..... $5.00
No. 1993—6-in. Motor for Round Belt..... 5.00
No. 1994—6-in. Motor for Flat Belt, double flange..... 5.00

Extras for 6-inch Motor.

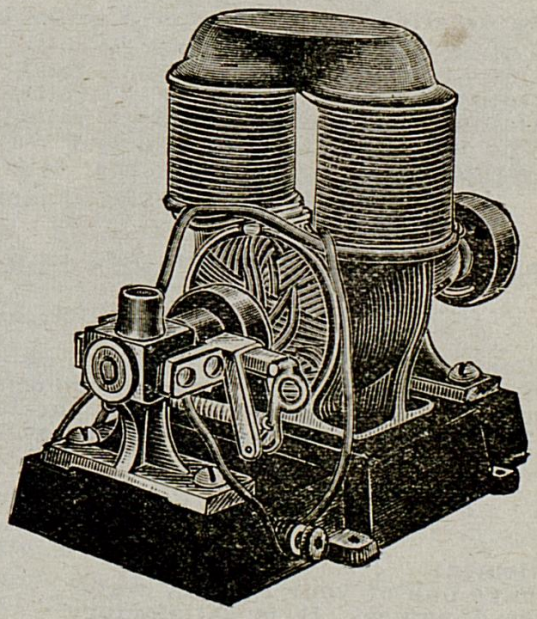
	Price	Postage
No. 1944—Wall Bracket	$0.34 each	$0.10
No. 1945—9-foot Endless Flat Belt.....	.50 each	.10
Pulleys, any style, 2-in. diameter.....	.50 each	.12

Extras for 4-inch Motor.

No. 1931 Blue felt Polishing Wheels for silver....	.32 each	.02
No. 1932 Cloth Buffing Wheels for brass.....	.32 each	.02
No. 1933 Brown Polishing Wheels for steel.....	.32 each	.02
No. 1938 Taper Screw Spindle for jewelers' buffs.	.60	.03
No. 1940 Emery Wheels, 4x½ beveled face for general work (regularly supplied with motor)	.60	.07
No. 1942 Emery Wheels, 5x1½, flat face.....	.72	.12

No. 24X. 75-WATT DYNAMO, or 1/6 H. P. MOTOR.

Price, $16.80



This Dynamo **has soft steel** field magnet, laminated toothed armature, six-part commutator, carbon brushes, etc.

It is a fine machine, and is a great favorite for all kinds of small work, such as running fan motors, dentists' motors, plating metals, etc. At 1,400 revolutions it will give 15 to 20 volts, and at 2,000 revolutions 40 to 50 volts.

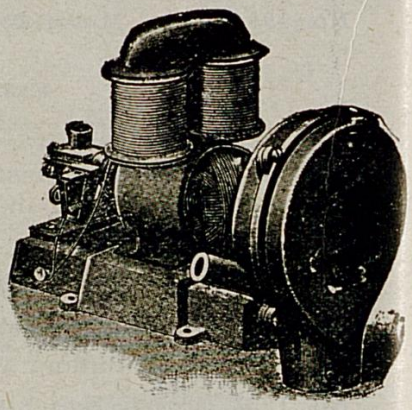
Is furnished either series or shunt wound. For most purposes the shunt winding is the best, as it is more self-regulating, but for driving fan motors the series wound dynamo is the best. The shunt dynamo will charge from two to eight storage batteries at a time.

This dynamo is well and strongly made. It will run constantly without attention. When used as an electric motor it will develop full one-sixth horse power. It will run steadily and noiselessly, and without heating. May be used for all kinds of small power purposes. Weight, boxed, 29 lbs. Floor space occupied, 10x5¾ inches. Height, 8 inches. Can be furnished with 2-inch crowned pulley with 1-inch face, or with 2½-inch grooved pulley for ⅜-inch round belt.

No. 24X. 75-Watt Dynamo or 1/6 H. P. Motor..... $16.80

HYDRO-ELECTRIC DYNAMO.

Price, $18.00



The Dynamo is of the inverted "horseshoe" type, cast-steel magnet frame of highest permeability; armature made of purest and softest sheet iron, toothed in order to lessen the air-gap resistance. The base of the dynamo is a light and strong iron casting, which carries the two bearings and water motor, as well as the dynamo field magnet. The water motor is made of brass, contained within a light iron casting. The latter being made in two parts, may readily be opened for inspection. A simple and effective means is provided for preventing water getting out along the shaft and into the

The dynamo is provided with carbon brushes of the radial type, held firmly in place by spiral springs. Large and heavy commutator steel shaft, etc., are among the good features of this dynamo.

The quantity of water used is small, and is easily carried off by the waste-pipe of washstand, sink or bathtub. No extra piping is required. Hose connections are furnished with each Dynamo.

The pressure of the water should not be less than 40 lbs. per square inch. Any pressure above this will give good results; the higher the pressure the greater the amount of electricity. It may be found necessary on very high pressure to partially close the faucet to prevent Dynamo running too fast.

The Dynamo, when shunt wound, is particularly adapted to charging storage batteries of moderate size, such as those used by physicians, etc. Two to eight cells may be charged at same time.

The shunt wound Dynamo is also best for running our electric railways and small motors. It is capable of furnishing current for two or three of our railways at the same time.

We advise using this Dynamo for running our electrical apparatus whenever possible.

In ordering, state whether a series or shunt wound dynamo is wanted.

Output at 40 lbs. pressure, 15 volts, 2 amperes.
Output at 50 lbs. pressure, 18 volts, 2½ amperes.
Output at 70 lbs. pressure, 20 volts, 3 amperes.
Output at 90 lbs. pressure, 25 volts, 3½ amperes.
The weight of the Dynamo and Water Motor complete is 28 lbs.
Weight, in strong wooden box, 34½ lbs.

No. 16X. Hydro-Electric Dynamo $18.00

No. 41X FINISHED PARTS FOR HYDRO-ELECTRIC DYNAMO.

Price, $12.90

Consists of all the finished castings—screws, springs, wire, armature, core, bearings, bed plate, water motor, connecting hose, and everything complete to make the No. 16X Dynamo when put together.

This is the most popular of the many styles of small dynamos.
Weight, boxed, 34½ lbs.

No. 41X. Finished Parts for Hydro-Electric Dynamo....$12.90

Ilion, N. Y.

Gentlemen:

I have one of your No. 16X water power dynamos. It is satisfactory in every way. I had it running on thirty pounds water pressure, and it ran a ten volt motor so fast that I could scarcely stop it.

Yours truly,
JOSEPH J. RUSSELL.

Montrose, Pa., Sept. 1, 1909.

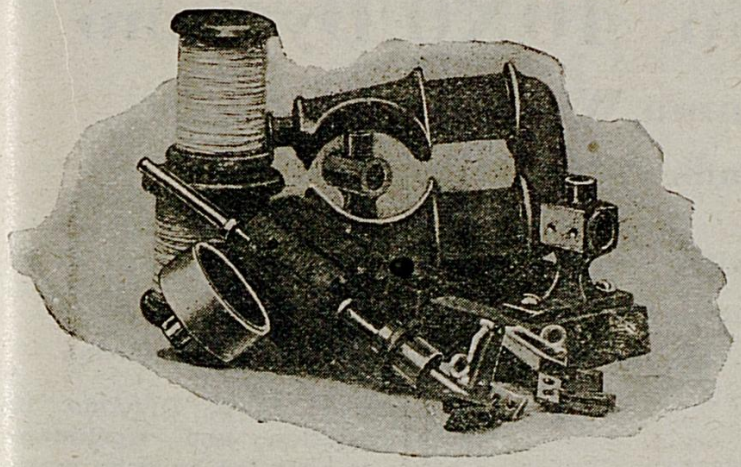
Dear Sirs:

The No. 16X shunt wound dynamo arrived yesterday, and I want to tell you that it is just what I want. It puts on gold, silver, copper or nickel in first class shape. Am more than pleased with it.

Respectfully,
F. B. SMITH.

No. 26X. FINISHED PARTS FOR 25-WATT DYNAMO, OR 1/6 H. P. MOTOR.

Price, $11.00



Consists of all the castings finished, armature core and shaft, bearings, bed plate, commutator, pulley, brushes and brush-holders, wire, and book of instructions.

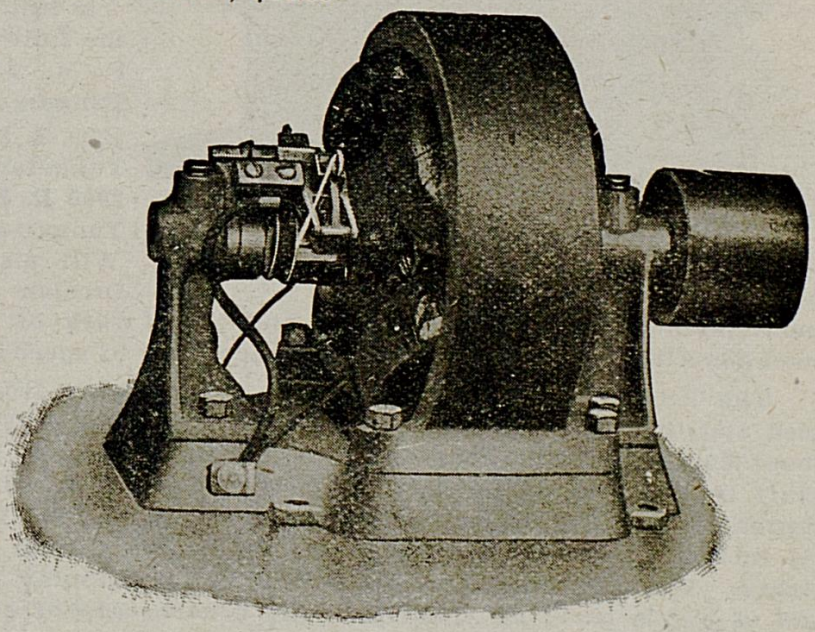
Everything is finished, and all screws, etc., furnished. May be put together as soon as wound. The winding is so simple that it may be done by the most inexperienced person. Weight boxed, 29 lbs. Book of instructions only will be sold for 10 cents each to peoplewho do not wish the castings and other parts.

No. 26X. Finished parts for No. 24X 75-Watt Dynamo or 1/6 H. P. Motor. $11.00

No. A71. 200-WATT DYNAMO.

18 Volts; 11 Amperes.

Price, $36.00



An exact model of a large multipolar dynamo. The field is a soft casting of electrical steel. The armature is built up of laminated sheet iron stampings, with slots punched in them for the wire. Carbon brushes on a movable yoke, large and substantial commutator, and a generally strong and well made construction make this machine one that bids fair to be very popular.

The commutator has nine sections. It is made of copper insulated with mica.

The speed is about 1,400 R. P. M., and the capacity 18 volts, 11 amperes. It will very nicely charge a 12-volt, 6-cell storage battery.

Dimensions 14 in. long, 8½ in. wide, 19 in. high. The pulley is 3 in. in diameter and 2 in. wide. Net weight of dynamo, 40 lbs.

No. A71. 18 volt, 11 amperes, (200 watts) Dynamo.....$36.00

FINISHED CASTINGS FOR No. A71 DYNAMO.

Complete with all screws, bolts, nuts, wire, etc., ready to put together; also Book of Instructons. Price.....$24.00

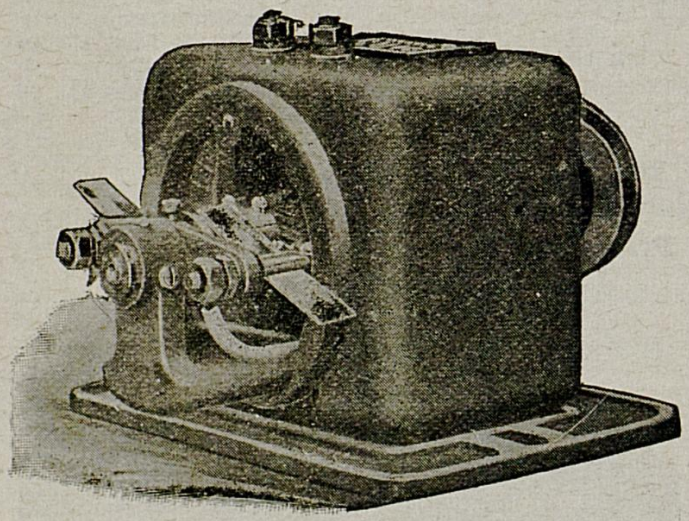
H. R. S. No. 40X0 Dynamo

A Dynamo Without a Peer

Thousands of Satisfied Users

10 Volts; 8 Amperes; 80 Watts.
or
6 Volts; 14 Amperes; 84 Watts (special winding.)

A small powerful dynamo for the experimenter or amateur electrician.



Our H. R. S. Dynamo, in construction and workmanship, is excelled by none manufactured. A glance at the cut will give some idea of its excellent construction. Almost half of our sales are to persons that have seen it in use.

A test of this dynamo gave the following results: 1400 R. P. M., 31 3½ volt, 1 c. p. Tungsten lamps in multiple; 2000 R. P. M., 15 6 volt, 4 c. p. Tungsten lamps in multiple; 2000 R. P. M., 8 6 volt, 16 c. p. Tungsten lamps in multiple. Will also do electroplating, furnish current for running small motors, charge storage cells and other work of similar nature. This machine will generate up to 10 volts according to speed at which it is driven.

The field—bi-polar, semi-enclosed, of soft gray iron. Plenty of iron is used and there are no joints in the magnetic circuit. The bearings are long, about four times the shaft diameter, with removable brass bushings. The shaft is steel, 7¼ inches long, turned between centers. The armature is a laminated modified tunnel drum of six sections 1 13-16 inch diameter and 1¼ inch long, insulated with fibre, wound with double cotton wire and varnished. The commutator is six section, heavy tubular 1 1-16 inch by 1 inch and of ample carrying capacity. The brushes are of strip copper, long and springy, held in slotted brush holders supported on an adjustable rocker arm. The field coils are form wound of double cotton wire, taped and dipped in insulating varnish. Pulley, 2 inch diameter, V-grooved for round belt. Size over all, 6¾x7¼x4½ inches high. Weight, 12 pounds.

No. 40X0. H. R. S. Dynamo, Standard Winding $10.50

No. 40X0.A. H. R. S. Dynamo, Special Winding, 6 volts, 14 amperes..... 10.50
2 inch flatpulley canbe furnished, if desired.
Express additional

6000 PAGES

Of Electrical Supplies and Equipment in Two Pages, Truly Embracing Everything Electrical

Following we list practically everything manufactured in electrical supplies and equipment, embracing the output of practically every leading American manufacturer. Never before has such a complete and comprehensive line of electrical supplies and equipment been listed between the covers of a single catalog. In fact, these two pages contain the equivalent of 6000 pages of electrical goods.

We can invariably supply pictures illustrative of, and full descriptive matter, comprehensively describing, the goods we list.

There are many things we can supply that might not be expected to be found in a catalog of this kind, such as moving picture machines for home and theatre use; Coinola player pianos (this company has a big player piano department in its retail store) electric heaters for street cars; electric heaters up to 6 kilowatt capacity, sufficient to adequately heat large rooms; electric headlights for locomotives and street cars; electric tools of all kinds and descriptions; electric refrigerator for home use, which keep a constant supply of small cubes of ice on hand and at the same time serves as an ideal refrigerator for family needs; floor and waxing machines for large factories, dance halls, etc. Large vacuum cleaners for hotels and palatial dwellings, everything in the line of electrical theapeutic apparatus, etc.

If there is anything conceivable in the electrical line that is not listed on the following pages, write us. We can supply it.

Because of the low selling cost involved in the sale of this comprehensive line of electrical supplies and equipment, we are able to quote you prices that mean a substantial saving.

A

Alarms, Burglar, Fire Tank and Thermometer.
Ammeters (Weston and Eveready).
Annunciators.
Armatures, Commutators and Coils.
Armature Machines.
Arresters, Lightning.

B

Batteries, all Types.
Bells, all Types.
Benches, Vise, Portable.
Benders, Conduit.
Blowers.
Brackets, Telephone.
Brass and Copper Sheet Rod and Tubes (quotations on 25 lbs. or more only).
Brushes, Generator and Motor (quotations on sizes from ½ H. P. or ½ K. W. and over, only).

C

Cabinets, Sheet Steel and Iron.
Cable.
Cameras, Moving Picture.
Caps, Color, for Signs.
Carbons, Arc Light.
Charging Outfits for Storage Batteries.
Chimes, Electric.
Choppers, Meat, Electric.
Cigar Lighters for autos and cigar stores.
Circuit Breakers.
Cleaners, Hat, Motor Driven.
Climbers, Lineman's.
Clocks, Electric Wound, Elect. Alarm, etc.
Cloth, Insulating (25 lbs. and upwards only).
Coinola Player Pianos.
Coloring, Incandescent Lamps, and Frosting.
Condensers, Telephone and Telegraph.
Connectors, all Types used in Electrical Work.
Controllers, all Types.
Corn Poppers.
Coupings, Shaft, Flexible and Insulated.

D

Decorative Lighting, all kinds.
Dimmers, Automobile Headlight.
Dimmers, Theatre.
Discs, Armature.
Driers, Shoe and Hair
Drills, Electric.
Dynamos.

E

Electro-Therapeutic Apparatus.
Electric Trains.
Elevators, Portable Electric.
Engravers, Portable Electric.
Extinguishers, Fire.

F

Fans, Electric.
Farm Equipment, Electric. (This means anything electrical made for farm use.)
Felt. (Quantities only.)
Fibre, Sheet Rod, Tube and Washers. (Quantities only.)

Flashers, Sign.
Floor Machines, Waxing Machine, Motor Driven.
Fountains, Electric.
Freezers, Ice Cream, Motor Driven.
Frigidaire Home Refrigator, Ice, Electric.
Fuses, all kinds.

G

Generators, all Standard Makes and Types.
Glue Pots, Electric.
Gongs and Bells.
Grounding Devices.
Guards, Lamp and Machine.

H

Hair and Shoe Driers.
Headlights, Electric Railway.
Heating Devices.
Heaters, Automobile and Electric Street Car.
Heaters, house type, up to 6 K. W. capacity.
Horns, Electric.
Humidifiers.
Hydrometers.

I

Ignition Outfits.
Instruments, Indicating, for Station and Miniature Switchboards.
Instruments, Laboratory, Standard Elect. Measuring.
Instruments, Pocket Type, Electrical Measuring and Portable Types.
Instruments, Recording.
Insulators, all kinds.
Ironing Machines, for home or laundry use.

L

Lacquer, Metal.
Lamps, Arc, Battery, Photo Engraving, Steriopticon, Vapor and Incandescent.
Lighting Plants.

M

Magnets, Permanent and Electro.
Machines, Electrical, of any type.
Mixers, Liquid.
Mirroscopes.
Molded Insulation.
Motor-Generators.
Motors for all uses.
Moving Picture Machines and Apparatus for home or theatre.

O

Openers and Locks, Door.
Ovens, Electric.
Ozonizers.

P

Pianos and Player Pianos, Coinola Players.
Plants, Portable Electric.
Player Piano Rolls, Q. R. S.
Platinum.
Pliers.
Plugs, Attachment, Fuse and Spark.
Points, Contact.
Pumps, Air, Gasoline, Water, Vacuum and Special Types.
Purifiers, Transformer Oil.
Push Buttons.
Pyrene Fire Extinguishers.
Pyrometers.

R

Ranges and Radiators, Electric.
Receptacles and Sockets.
Rectifiers for all purposes.
Reels, Wire.
Reflectors.
Refrigerating and Ice Machines for home and factory use.
Regualtors, all kinds.
Relays.
Rheostats, all sizes.
Roasters, Peanut and Coffee.
Rubber, Hard.

S

Saws, Motor Driven, all types.
Sewing Machines, Davis, Electric.
Shades.
Shoe and Hair Driers.
Signals, Automobile, Factory and Office, Marine and Street Railway.
Signs, Electric.
Slate for Switchboards.
Sockets and Receptacles.
Solder.
Soldering Compounds.
Solenoids.
Springs.
Stampings.
Staples and Tacks.
Starters, Motor.
Static, Machines, Wimshurst for Laboratory use.
Sterilizers, Water, Electric.
Stocks, Dies, Reamers and Pipe Cutters.
Storage Batteries.
Supplies, General Electrical.
Switchboards, Lighting and Power.
Switches.

T

Taps, Current.
Tape, Insulating.
Telephones, Intercommunicating, etc.
Thermostats.
Tools, all kinds used in Electrical construction and building.
Torches and Furnaces.
Towers, Steel.
Toys and Novelties.
Trains, Electric, Toys.
Transformers.

V

Vacuum Cleaners for home, factory, office building, hospital, etc.
Vibrators, Massage.
Victrolas.
Violet Ray Outfits.
Vulcanizers, Electric.

W

Warmers, Automobile, Foot
Washers, Leather and Metal (quantities only.)
Washing Machines.
Wavers, Hair.
Wax and Compounds (quantities only).
Waxing Machines for dance halls, office building, etc.
Welding Machines.
Whistles, Electrically operated.
Winders, Coil.
Wireless Telephones.
Wimshurst Static Machines for Laboratory use.

ROBBINS & MYERS ALTERNATORS.

For 1 K. W. Transformer: 1 K. W., 110 volts, alternating current, 60-cycle, single-phase generator, speed 1,800 r. p. m., complete including sliding base, pulley and wall type voltage regulating rheostat, and also with separate small ½ K. W. D. C. belted excitor generator with sub-base, pulley and field regulating rheostat. Equipment complete.....$103.50

For 2 K. W. Transformer: 2 K. W., 110 volts, alternating current, single-phase generator, speed 1,800 r. p. m., complete as above.....$130.00

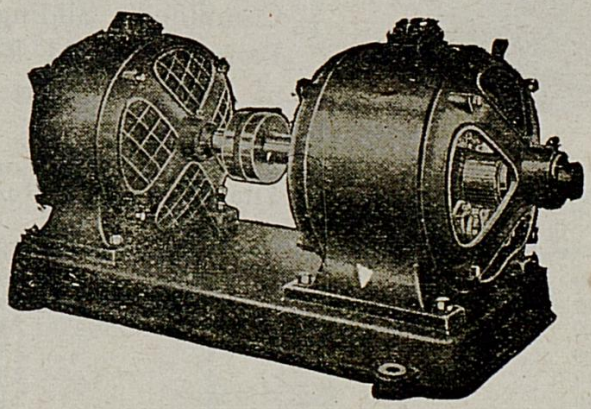
A 3 H. P. gas engine would be necessary to operate the 1 K. W. generator, and a 5 H. P. gas engine the 2 K. W. generator.

MOTOR GENERATOR SETS, ROTARY CONVERTERS, ALTERNATORS.

The following line of Motor Generators, Rotary Converters and Alternators are manufactured by one of the foremost concerns in America, making a specialty of this type of apparatus. They have furnished a great many of their motor generator sets to the Marconi Company for wireless use. The alternating current generators are for use in those cases where no current is available. Our Acme engines listed elsewhere in this catalog are admirably adapted for operating alternators.

It must be remembered that in using a rotary converter for wireless use that there is a loss of approximately 35% and the transformer must, therefore, be specially wound for the voltage shown in our price list of rotary converters. Wireless transformers can be supplied on order for these special windings at $2.00 additional. Motor generator sets, while costing more than rotary converters, are more satisfactory for wireless use because wireless transformers of standard voltage may be operated with consequent greater efficiency.

MOTOR-GENERATOR SETS.



Motors D. C., 3600 R. P. M. Generators 110 v., 60 Cycles, Single Phase.

	MOTOR		GENERATOR		PRICE With Motor Wound For	
Nos.	H. P.	Frame	K. W.	Frame	115 V.	230 V.
A700	.75	13	.400	13	$ 99.81	$104.94
A701	1.5	34	.750	12	130.98	134.87
A702	2.0	1	1.00	34	156.35	161.27
A703	2.75	1½	1.5	1	180.69	183.96
A704	3.6	2	2.0	1½	245.12	251.58
A705	5.5	3	3.0	2	324.56	331.48

The two units of these motor-generator sets are mounted on a common sub-base and connected by a flexible flanged coupling.

The sub-bases are of cast-iron with cast-in pads which are planed to suitable height for proper alignment of the two armature shafts.

Prices include no-voltage release starting rheostats with the motors, and field regulating rheostats, front of board connection, for the Generators.

Back of switchboard field rheostats can be supplied for the Generators at an additional price of $4.50 net.

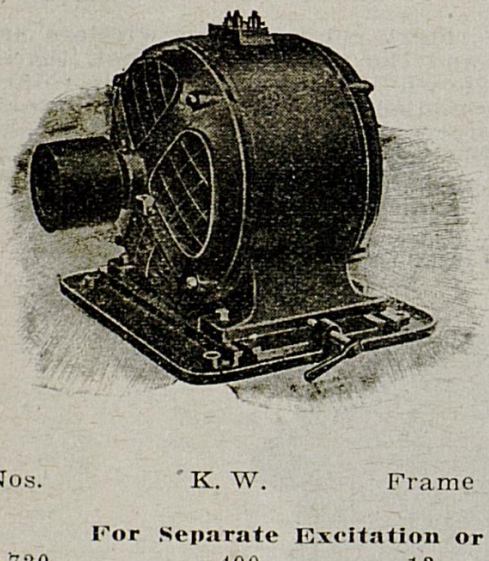
ROTARY CONVERTERS.

Rotary Converters are used for converting direct into alternating current. They are made with commutators at one end of the armature and two collector rings at the other end.

The armature has a single direct current winding, connected on one side to the commutator in the usual manner, and on the other end two points connected to the collector rings. This produces a single-phase alternating current at a voltage of approximately 65% of the direct current voltage under full load at unity power factor, without self-induction in the line.

The prices include no-voltage release starting rheostats.

60 CYCLES				Price	
Nos.	K. W. Output, A. C.	Speed	Frame No.	115 V., D. C. to 75 V., A. C.	230 V., D. C. to 150 V., A. C.
A710	.250	3600	14	$45.51	$48.66
A711	.400	3600	13	54.87	58.88
A712	.750	3600	12	65.37	70.29
A713	1.000	3600	34	79.88	82.04
A714	1.500	3600	1	93.39	94.02



STATIONARY FIELD ALTERNATING CURRENT GENERATORS.

110 Volts, 60 Cycles, Single Phase, 3600 R. P. M.

Complete with Standard Pulleys, Combined Sliding Bases and Drip Pans and Field Rheostats for Front of Board Connection.

			Pulleys Standard Dimensions		
Nos.	K. W.	Frame	Diameter	Face	Price
		For Separate Excitation or from Direct Current Line Voltage.*			
A720	.400	13	2½	1¾	$ 47.48
A721	.750	12	3½	2¼	56.03
A722	1.000	34	3½	2¼	70.83
A723	1.500	1	4	2¾	79.46
A724	2.000	1½	4	2¾	104.22
A725	3.000	2	5	3¼	119.04
		For Self Excitation.			
A730	.350	13	2½	1¾	$ 60.23
A731	.600	12	3½	2¼	71.03
A732	.900	34	3½	2¼	89.58
A733	1.300	1	4	2¾	101.96
A734	1.800	1½	4	2¾	129.72
A735	2.750	2	5	3¼	147.17
A736	3.30	3	5	3¼	180.44

*When ordering separately excited Generators, state voltage of direct current available, so that the fields may be properly designed for this voltage.

Self excited Generators have a double wound armature with commutator at one end developing direct current for exciting the fields.

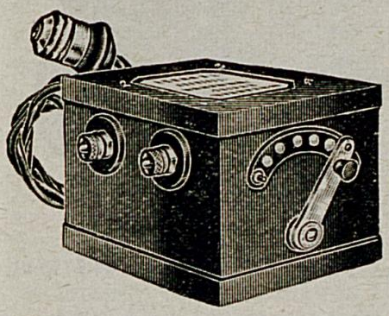
Back of switchboards field rheostats can be supplied with these Generators at an additional price of $4.50 each.

Pulleys with dimensions differing from those listed are special and supplied only at an extra charge.

FLEXIBLE STEP-DOWN ALTERNATING CURRENT TRANSFORMERS.

"The Best Manufactured."

Used for Operating Battery Motors, Electric Railways, Wireless Coils, Etc.



The Flexible Toy Transformers represent the last word in transformer construction. They are unquestionably superior to any other types of step-down transformers on the market, because they generate a greater range of secondary voltages and have a larger capacity. **The Flexible feature consists of a regulating switch and master connection post,** by means of which a range of voltages from zero to the maximum limit of the transformer is available in small and uniform steps. This combination is original and embodied only in these transformers.

The incorporation of a **regulating switch and master connection post** results in a very wide range of low voltages for operating and regulating the speed of electric engines, small motors, electric trains, etc. In fact, the different uses to which they may be put are unlimited, depending only on the ingenuity of the experimenter. These low voltages are still alternating. They will operate all classes of direct current apparatus, with the exception of the permanent magnet type motors, which are practically obsolete. The Toy Motors on pages in catalog immediately following the K. & D. Motors, and all the Knapp Battery Motors with the exception of the Type S, can very nicely be operated with any of these transformers. Because of the wide range of voltages and the small and uniform steps of voltages, these transformers are unequalled by any manufactured for this kind of work. Wireless experimenters will also find these transformers wonderfully efficient in operating spark coils. Experiments conducted by us and letters on our files show that they about triple the range of a spark coil. See page 103, giving detailed information for operation of spark coils with flexible transformers. They are practically indestructible and are considerably more inexpensive than dry batteries.

In designing the transformers particular pains were taken to make them simple in operation. They can be readily operated by any youngster. Voltages may be used singly or simultaneously. Also any number of leads of the same voltage may be used at the same time.

Transformers are mounted in handsome black enameled steel cases and equipped with extension cord and attachment plug so that they can be attached to any alternating current circuit. They have no moving parts.

The Flexible Type Transformers are mode in three sizes: 75 watts, generating 10 secondary voltages; 100 watts, generating 16 secondary voltages, and 150 watts, generating 20 secondary voltages.

PRICES

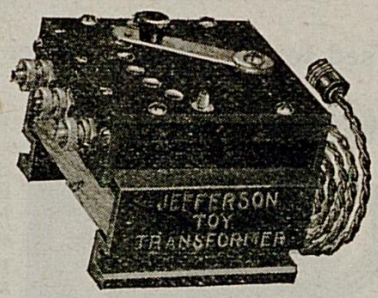
No. 1 Flexible Toy Transformer, 10 voltages, 2 to 20 volts, in 2-volt steps. Capacity, 75 watts. (Regular price $4.00).....$3.20
Dimensions, 4¼x3¾x3¼ inches.
Shipping weight, 8 lbs.

No. 2 Flexible Toy Transformer, 16 voltages, 1½ to 24 volts, in 1½-volt steps. Capacity, 100 watts. (Regular price $5.50)..... 4.00
Dimensions, 5x4x3¼ inches.
Shipping weight, 10 lbs.

No. 3 Flexible Toy Transformer, 20 voltages, 1½ to 30 volts, in 1½-volt steps. Capacity, 150 watts. (Regular price $7.50)..... 5.75
Dimensions, 5⅜x5x4 inches.
Shipping weight, 13 lbs.

Note.—Transformers with and without switch have the same dimensions and capacities. Stock winding will operate on 100 to 130-volt A. C., 60 to 133 cycle. 110 volt, 25 cycle, and 220 volt, 60 cycle, carried in stock and furnished at 10% extra.

LITTLE JEFF FLEXIBLE TOY TRANSFORMER



The "Little Jeff" has the same features and is identical in construction to the larger transformers, above described, but has no enclosing case. Like all standard toy transformers, can be used only on 100-130 volts, 60 cycles, alternating current. Generates eight secondary voltages, viz.: 3, 6, 9, 12, 15, 18, 21 and 24 volts. While little in size, this transformer because of its air type construction, has a capacity of 75 watts.

The same workmanship and quality of material enters into the construction of this transformer as in the other types. It will very nicely operate all but the very largest railway sets, motors, induction coils, etc.

Our particularly inviting price on this transformer represents only the cost of two sets of dry cells, which will last but a comparatively short time, while the transformer is practically indestructible and should last a lifetime. Dimensions, 3¼x3¼x2½ inches.

No. 6 "Little Jeff" Flexible Toy Transformer, complete with cord and plug $2.15

Shipping weight, 4 lbs.

BELL RINGING TRANSFORMERS.

For Use on Alternating Current Only.



Our Bell-Ringing Transformers are manufactured by the same concern that manufactures the Flexible Toy Transformers. They have had perhaps more experience in this class of work than any other manufacturer in the United States. They claim these transformers to be superior to anything on the market, because they will handle a greater and wider range of signal work and have the largest capacity. They embody all the essentials of a perfect design, electrical, magnetic and mechanical.

These transformers are designed to be connected to the ordinary current lighting circuit (110 volts, 60 cycles, alternating current only), and will step down the voltage to operate all classes of bells, buzzers, door openers, annunciators, and other signal work such as may be found in residences, offices, factories, mines, schools, etc.

They eliminate the use of all types of batteries and once installed will last a lifetime; are readily and easily installed, and consume so little power that they will not register on an ordinary watt meter. They are absolutely guaranteed in this respect.

The "Junior" Bell Ringer is designed for all classes of light signal work such as may be found in the ordinary residence or flat building. Will also operate all standard types of door openers.

Type "B" Bell Ringer, 25 watts, designed for heavier signal work and installations that require more power than is generated by the "Junior." Generates three secondary voltages, 6, 14 and 20.

The Heavy Duty "B" has an output of 75 watts, generates three secondary voltages—6, 14 and 20. Designed particularly to take care of large installations and operate a greater number of bells and other signal devices than the standard Type "B."

Type "C" has an output of 125 watts and generates four secondary voltages, namely, 6, 12, 18 and 24. These transformers are designed to take care of extra large bells and other signal work such as is found in schools, factories, mines, etc. Particularly suitable for large Alternating Current type of bells.

No. A1920 Junior, 24 watts, 2⅝"x2"x6", 2½ lbs. (Regular price $2.50), special price $2.00

No. A1921 Type "B," 25 watts, 3"x3¾"x4", 4 lbs. (Regular price $5.00), special price 4.00

No. A1922 Type "B," Heavy Duty, 75 watts, 3¾"x4⅛"x6", 7½ lbs. (Regular price $7.00), special price 5.60

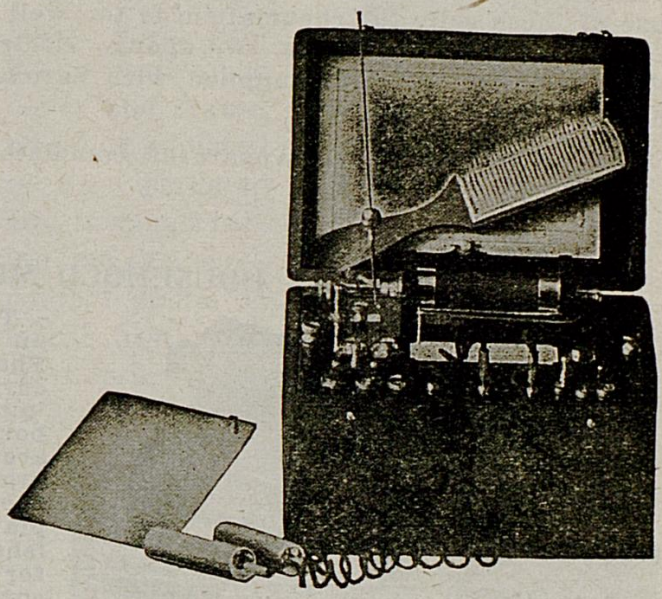
No. A1923 Type "C," Heavy Duty, 125 watts, 3¾"x4⅛"x6", 9 lbs. (Regular price $9.00), special price 7.20

NOTE—Stock winding 100 to 130 volts; 60 to 133 cycles.

DOUBLE CELL MEDICAL BATTERY.

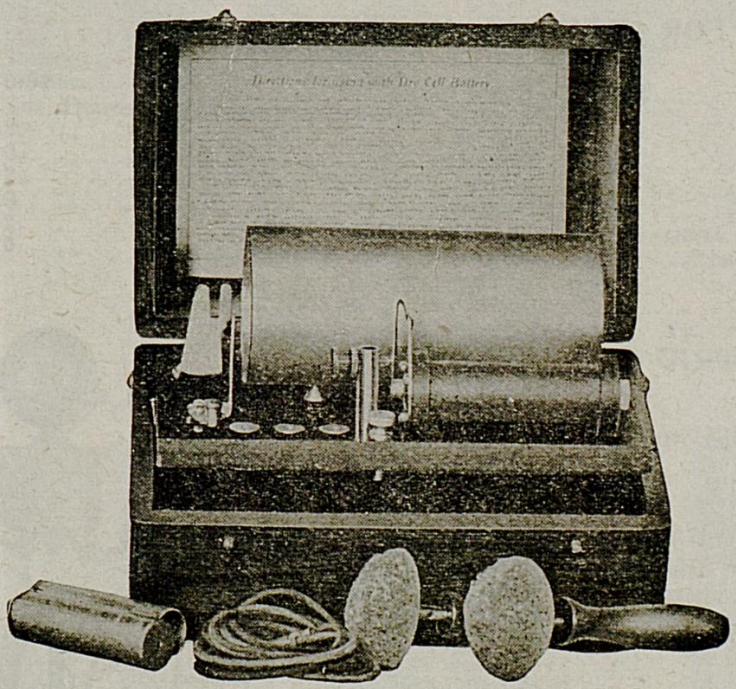
No. A178—This instrument is large and powerful. Has a capacity for two dry cells. The box is made out of a highly polished hardwood. In addition to the adjustment for regulating strength of current, it has an improved pole changer. We also furnish a special rheotome for treatment of various muscular diseases, such as rheumatism. All parts are nickel plated. We provide an electric hair brush, metallic foot plate, one pair of metallic hand electrodes, one pair of silk cords, one pair of sponge electrodes. We also furnish with each battery our Electropathic Guide.

Weight, less batteries, 5 lbs. Length, 8¾ in. Width, 6¼ in. Height, 8 in.



No. A178. Double Cell Medical Battery.....$6.95
Shipping weight, 10 lbs.

HOME MEDICAL APPARATUS.



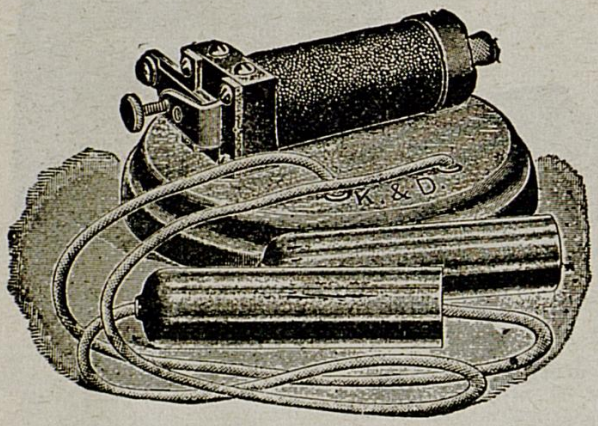
Our No. A175 coil is very powerful for its size, and yet so simple in its structure that it requires no skill at all to intelligently operate it, and it is so arranged that it seldom, if ever, gets out of repair. It possesses decided advantages over the single current instruments, because both the primary and secondary currents are combined in one instrument, and can be used by merely moving the cord tip from one contact stud to another. The primary current is used more particularly in treating eruptive conditions and extraneous growths, such as scrofula, cancers, ulcers, swellings, opacity of the eyes, enlarged tonsils, enlarged joints, etc. In these cases the regulator should not be removed from the coil. By applying the sponge electrode to the cheeks and about the eyes, it will often round out the face, clear the complexion and give to the eyes increased fullness and power. This current may also be used where the patient is too sensitive to bear the vibration of the secondary current.

The secondary current is better adapted to nervous affections and inflammatory diseases, and is used to arouse and give tone to the system. The use of these coils for rheumatism is too well known to need comment.

A cord, two electrodes, two sponge electrodes, foot plate and copy of the Electropathic Guide are supplied with battery. The case has fine mahogany finish. Weight, 5½ lbs.

No. A175. Home Medical Apparatus, complete as above, less dry cell.....$4.00

No. 26X HOUSEHOLD MEDICAL COIL.



This apparatus works efficiently on one cell, dry or other battery. The coil has perfect regulation, the current at the handles varying from imperceptible to all that can be borne. The coil and vibrator points are very compactly built. The vibrator contacts are pure silver—thought by many to be superior to platinum. Mounted on a round polished wood base, with neat bushings for the passage of the conducting cords. Coil ends are finished in polished black enamel. All metal parts nickel plated. Well made throughout.

No. 26X. Household Medical Coil.. .....$0.90 Postage 10c

PARTS FOR MEDICAL BATTERIES.

Red Seal Battery	$0.25	Postage	$0.05
Postage	.20	1 pair connecting cords (length 3 ft.)	.30
Sponge electrode only	.20	Postage	.02
Postage	.02	Foot plate	.30
Insulated handle only	.12	Postage	.05
Postage	.02	Electropathic Guide	.25
Tube hand electrodes with insulated handles only, per pair	.30	Postage	.02

ELECTRIC CALL BELL OUTFIT

Consists of:

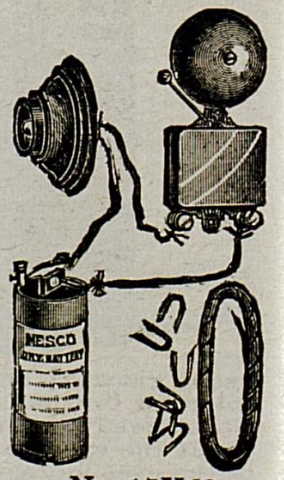
One Iron Box Bell, 2½-inch Gong.
One Cell Dry Battery.
One Wood Push Button.
Fifty Feet Insulated Wire.

Sufficient staples and printed instructions which will aid any person to put same in successful operation.

Packed in strong straw-board box. Weighs 5 lbs. A first-class outfit.

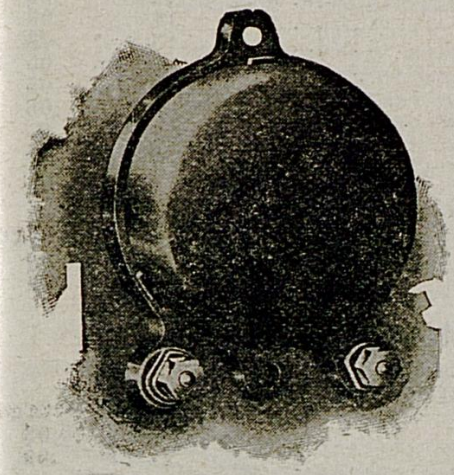
Price

No. 17X62. Complete, each $0.80
Less Battery ..... .55
Express additional.



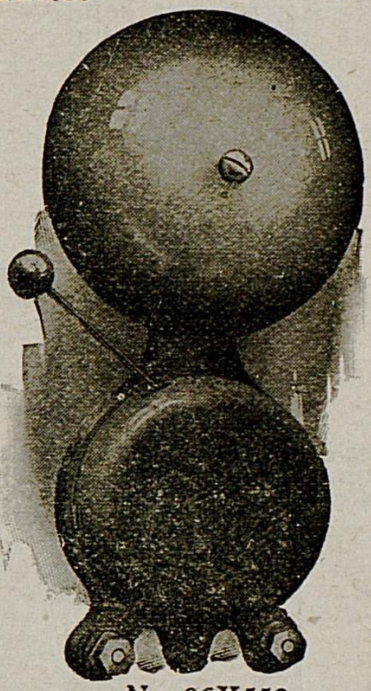
No. 17X62

IRON BOX BELLS AND BUZZERS.



No. 96X417

This bell is high class, with best grade cast iron cover and frame, nickel-plated gongs, patented non-turning binding posts and contact posts. It is the best moderate priced bell on the market.



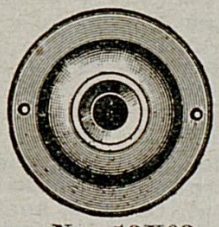
No 96X552

		Each	Postage
No. 96X552.	2½ in. bell	$0.35	$0.12
No. 96X553.	3 in bell	.40	.14
No. 96X417.	Buzzer, 2 ohm	.30	.10

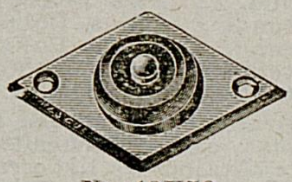
PUSH BUTTONS.



No. 13X41



No. 13X02



No. 13X56



No. 13X34



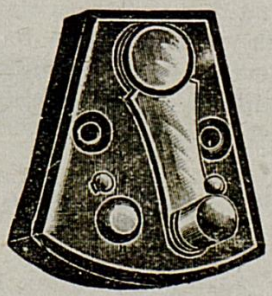
No. 7682

		Price	Postage
No. 13X41	2⅛ in. diameter (wood)	$0.09	$0.02
No. 13X02	Stamped Metal Push Button, oxidized copper finish, 2⅜ in. dia.	.15	.03
No. 13X56.	Bronze or Nickel Plate, with hard rubber midget	$0.50	$0.02
No. 13X34.	Centers in pearl, light or dark. Rim in nickel, ⅝-inch hole	.15	.02
No. 7682	Molded Composition Push Button. Jet Black Polished, White Porcelain Center. Dia. 1¾ in.	Price $0.15	Postage $0.02

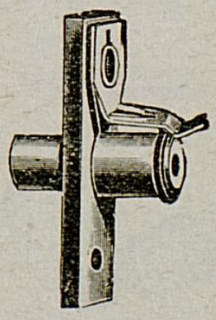
SWITCHES.



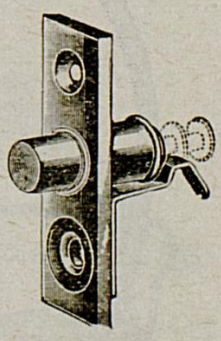
No. 16X06.



No. 16X26.



No. 15X68.



No. 15X69.

		Price	Postage
No. 16X06.	1 point	$0.08	$0.03

No. 16X07.	2 point	.09	.03
No. 16X08.	3 point	.10	.03
No. 16X09.	4 point	.11	.03
No. 16X10.	5 point	.15	.03
No. 16X11.	6 point	.18	.05
No. 16X12.	7 point	.28	.05
No. 16X13.	8 point	.30	.05
No. 16X14.	9 point	.37	.05
No. 16X15.	10 point	.37	.05

DOOR SPRINGS.

		Price	Postage
No. 15X68.	Closed circuit	$0.26	$0.02
No. 15X69.	Make and break	.26	.02

KEYSTONE SWITCHES.

Polished Rubber Base.
Lever and Points Nickel-Plated.

		Price	Postage
No. 16X26.	1 point, 2 inches long	$0.20	$0.03
No. 16X27.	2 point, 2 inches long	.22	.03



No. 67X.

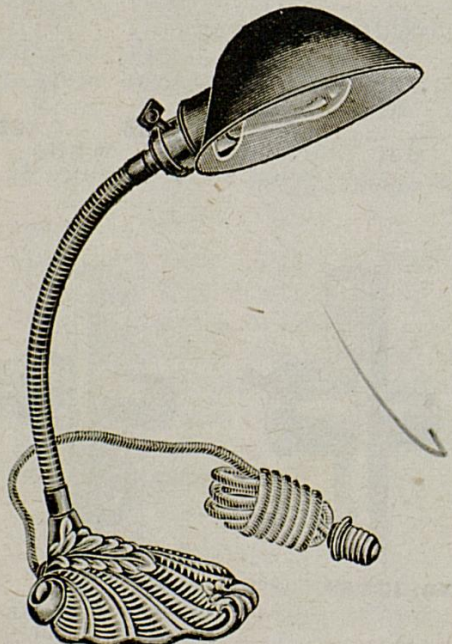


No. 80X.

BRACKET TUBES.

No. 80X	6-inch, Polished Brass, each	$0.13	Postage	$0.04
No. 80X	8-inch, Polished Brass, each	.16	Postage	.05
No. 80X	10-inch, Polished Brass, each	.18	Postage	.06
No. 67X3	Extends 3 inches, Polished Brass, ea.	.22	Postage	.03
No. 67X	Extends 4 inches, Polished Brass, ea.	.26	Postage	.03
No. 68X3	Extends 3 inches, Nickel Plated, each	.33	Postage	.03
No. 68X5	Extends 1 inch, Nickel Plated, each	.33	Postage	.03

Note—The No. 68X5 Bracket is designed for use in connection with Audion, Audio Tron, Electron Relay and Moorhead tubes in making home-made detectors. Elsewhere in this catalog we list graphite rods, semi-circular graphite discs, four types of detector bulbs, switch handles, switch points, binding posts, rheostats and flash-light batteries. Refer to index, under "Parts for Audion Detector."



THE RETHFLEX LAMP

For the piano, desk, table office, sick room and shop.

This lamp is very popular among our local trade.

It has a flexible arm, which permits of its being bent to any position. It is also a very pretty lamp. The base is padded to prevent marring of furniture. Will last a life time. Finished in Pompeian, Statuary Bronze, and Nickel and Ivory.

No. 8625 Rethflex Lamp in Pompeian or Statuary Bronze finish, special price $2.75

No 8625A Rethflex Lamp in Nickel and Ivory finish, special price 3.50

Shipping Weight 6 lbs.

STAR SOLDERING PASTE.

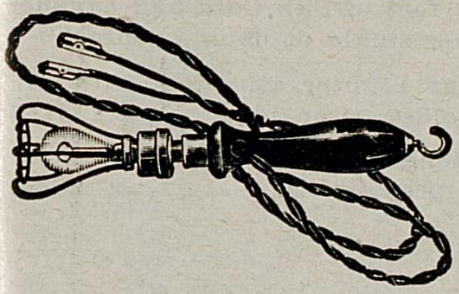


A high quality soldering flux which saves time and labor and insures a smooth, evenly flowing metal and perfect results. Strong and rapid in action. Absolutely non-corrosive.

No. A2776 2 oz. box.....$0.15 Postage 4c

No. A2777 4 oz. box..... .20 Postage 6c

TROUBLE LAMP OUTFIT.



No. 10X93.

This handy lamp outfit will be found absolutely safe to use near gasoline or other explosives.

It has a four candle power lamp which requires 6 or 7 volts current to illuminate to its full brilliancy. Four sells of fresh dry batteries give 6 volts.

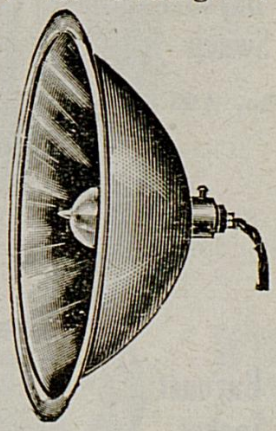
The spring clip terminals on the conductors can be quickly attached to ignition cells of an auto engine or wherever batteries are in use and lamp can be used within range of the 12 foot cord.

Can be suspended by the hook or tied up by the cord. Guards prevent accidental breakage. Metal parts nicely plated. A fine looking and very useful outfit at a moderate price.

No. 10X93 Lamp with Cord complete, special price.....$1.05 Postage 10c

No. 10X94 Lamp Guard to fit 110 volt, 16 c. p. or 32 c. p. lamps, each ..... .15 Postage 5c

SILVER REFLECTOR.



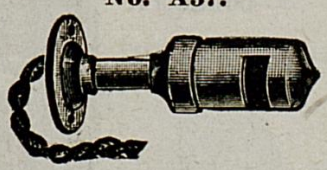
Our Reflectors are made of Extra heavy brass, highly polished, plated with Sterling Silver; same are furnished with Ediswan Socket and 14 inches of wire.

6 inch, less bulbs, price per pair.....$1.70
7 inch, less bulbs, price per pair..... 1.90
8 inch, less bulbs, price per pair..... 2.10
9 inch, less bulbs, price per pair..... 2.30
10 inch, less bulbs, price per pair..... 3.25
11 inch, less bulbs, price per pair..... 4.00
12 inch, less bulbs, price per pair..... 5.00

Dimensions over all.

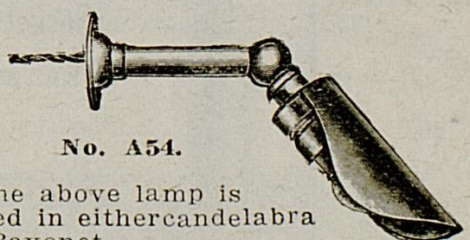
ASSORTED STYLES GAUGE LAMPS.

No. A57.



Our No. A57 Speedometer Gauge Lamp is wired with candelabra or Bayonet Socket.

No. A57C Candelabra $0.80
No. A57E Bayonet ..... .80



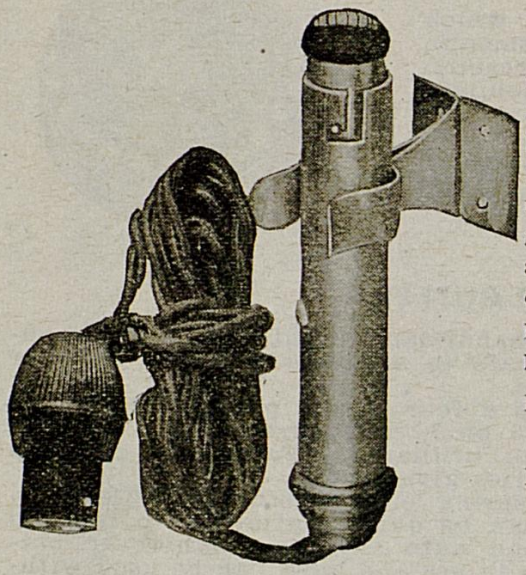
No. A54.

The above lamp is wired in eithercandelabra or Bayonet.

No. A54C Candelabra $0.65
No. A54E Bayonet ..... .65

All of our Gauge Lamps are supplied in either Brass or Nickel finish
Above prices are less Bulbs.

ELECTRIC CIGAR LIGHTER.



Every autoist appreciates the difficulties in lighting a cigar or pipe when his car is in motion. This cigar lighter solves his troubles. The lighter is small enough to fit into the bowl of any pipe. It is neatly constructed and equipped with single contact bayonet base, which makes it adapted for use on all cars. It is unequalled in efficiency and durability. Supplied with 7 feet of Silk Cord and bayonet plug in either single or double contact.

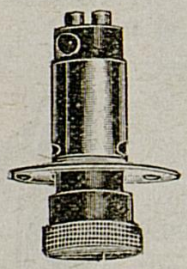
No. 77 Cigar Lighter, complete with holder, prepaid $1.25

No. 177 Renewal Cigar Lighter Tip, prepaid ..... .45

HARD RUBBER BAYONET SOCKETS AND SWITCHES.

Bayonet Switch

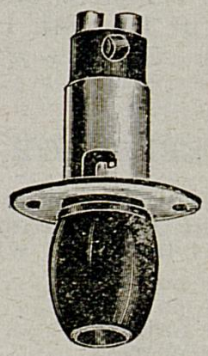
No. A96



Size ⅝	Price
No. A96 Switch	$0.35

Connector with Cap

No. A2C.



Size ⅝	Price
For 2-Wire	$0.35
For 1-Wire	.35

Socket with Cap

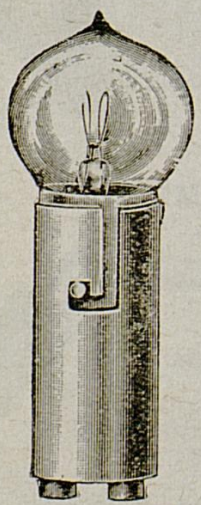
No. A18.



Size ⅝	Price
For 2-Wire	$0.20
For 1-Wire	.20

Bayonet Socket

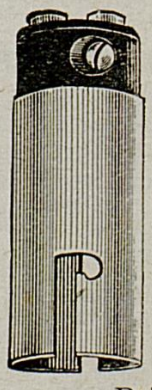
No. A13.



Size ⅝	Price
For 2-Wire	$0.13
For 1-Wire	.13

Set Screw Socket

No. A17.



Size ⅝	Price
For 2-Wire	$0.18
For 1-Wire	.18

Wire Connector

No. A4E.



Size ⅝	Price
For 2-Wire	$0.24
For 1-Wire	.24

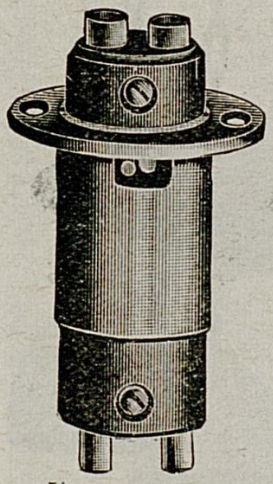
BAYONET PARTS.

Combination Socket and Cap Plug. No. A14.



Size ⅝	Price
For 2-Wire	$0.32
For 1-Wire	.32

Wood Dash. No. 2E.



Size ⅝	Price
For 2-Wire	$0.32
For 1-Wire	.32

Combination Socket and Plug. No. A15.



Size ⅝	Price
For 2-Wire	$0.25
For 1-Wire	.25

Plug Only. No. A115.



Size ⅝	Price
For 2-Wire	$0.09
For 1-Wire	.09

Cap Connector. No. A4C.



Size ⅝	Price
For 2-Wire	$0.38
For 1-Wire	.38

Cap and Plug. No. A114.

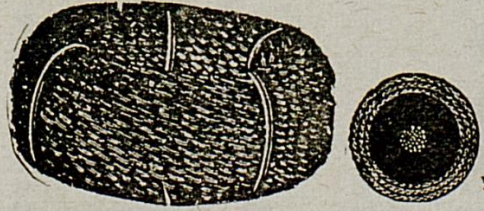


Size ⅝	Price
For 2-Wire	$0.15
For 1-Wire	.15



PRIMARY CABLE.
Price per foot.....$0.05

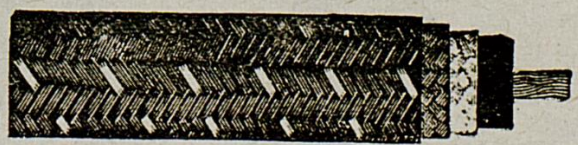
ELECTRIC LAMP CORD.



Cotton Twisted Cord.
No. 18 Per foot.....$0.04



2 CONDUCTOR No. 14 LIGHTING CABLE.
Price per foot.....$0.08



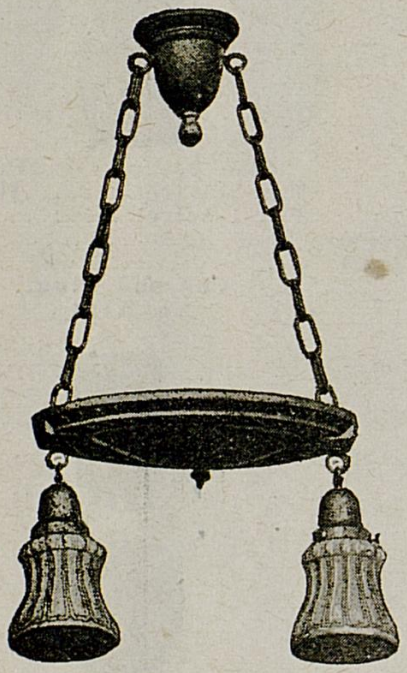
SECONDARY CABLE.
Price per foot.....$0.09

LIGHTING FIXTURES

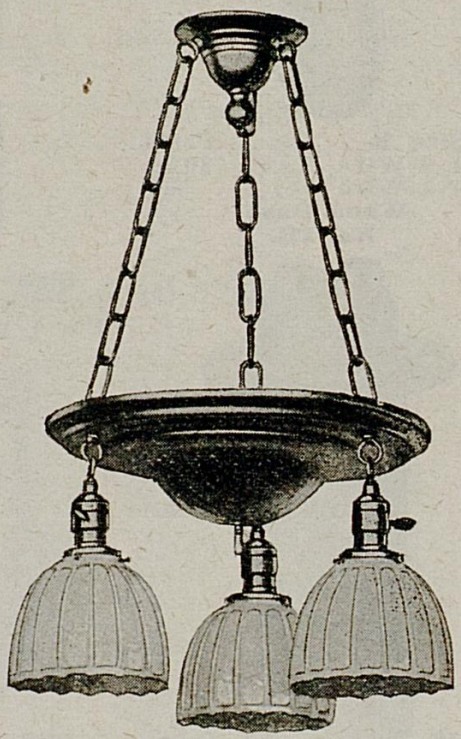
Below is our standardized line of lighting fixtures, comprising several of our most popular and inexpensive types. In our retail store almost half of one floor is devoted to lighting fixtures. We are not in a position, however, to send photographs of any other fixtures, because our complete line of fixtures is not standardized. In contracting for large numbers of these particular types and because of our low selling expense through our mail order department, we are able to deliver these fixtures to your home at a substantial saving to you.

These fixtures are all completely wired, ready for installation, for ceilings 9 feet high. For ceilings of less heighth, you simply take off a few links from the chains. If your ceiling is higher than 9 feet, order extra chain. Price 25c per foot.

Finish of fixtures is brush brass and black. Each fixture is substantially packed in a strong carton.



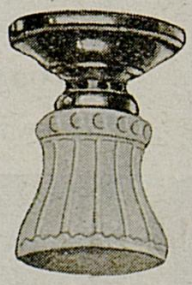
No. 8689—2 Light Shower.
Price as shown----------$5.15



No. 101-RW—3 Light Shower.
Price as shown ---------$7.15



No. 606-RW—I Light Side Bracket.
Price as shown, $2.00



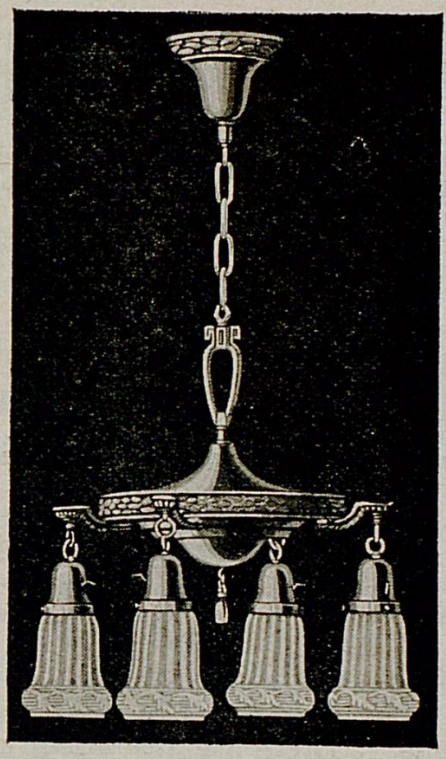
No. 505-HW—1 Light Ceiling Fixture.
Price as shown, $ .93



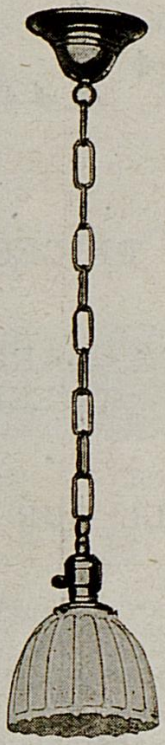
No. 8686 — 1 Light Ceiling Fixture.
Price as shown, $1.85



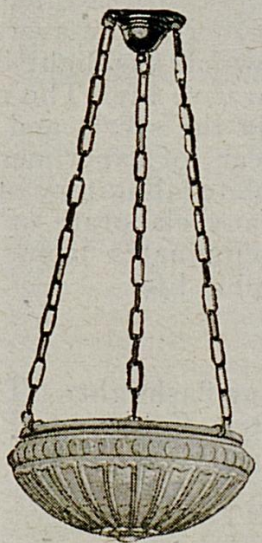
No. 303FW—
1 Light Ceiling
Drop.
Priceas shown,
$2.10.



No. K-1—4 Light Shower.
Price as shown ----------$11.60



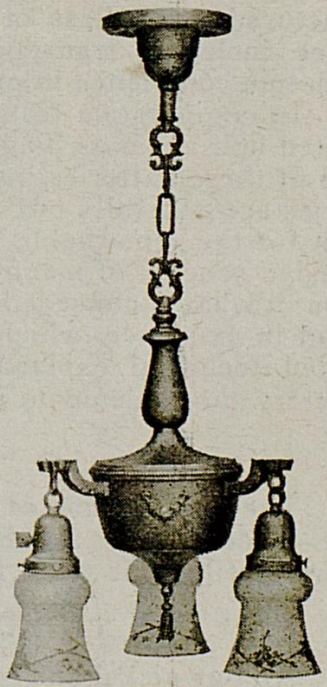
No. 303-RW—1
1 Light Ceiling
Drop.
Price as shown,
$2.00.



No. 202-FW—1
Light, 16 inch In-
direct Bowl.
Price as shown,
$5.80.



No. 404-LW—
Porch Ring and
Ball, Black Enam-
el Finish.
Price as shown,
$1.20.



No. 8691—3 Light
Shower.
Price as shown---$10.75

FLASH LIGHTS

46c to $1.35

OUR PRICES TO CONSUMER LOWER THAN MOST DEALERS' COST.

OUR LARGE SALES OF FLASH LIGHTS MAKE THESE UNHEARD OF PRICES POSSIBLE.

ALL OUR FLASHLIGHTS SUPPLIED WITH "FRENCH" OR "EVEREADY" BATTERIES.

Specify type desired when ordering.

French Battery Sold Upon a Money-Back Guarantee.

This battery is sold upon the unconditional guarantee "that it will give serviceable light longer than any other battery of the same dimensions under comparable conditions." There are absolutely no qualifications to this guarantee **and there is no seal on the battery, the breaking of which relieves us of the guarantee.** Less than five of these batteries have been returned to us as defective inside of two years, which is a record that no other type of battery we have ever sold remotely equalled. **If any purchaser of this battery, with or without flash light, believes it is not the best battery manufactured, regardless of price, he may return it to us and full purchase price, including transportation charges, will be cheerfully refunded. Only supreme confidence in our claims would warrant such an unusual guarantee.**

In comparative tests with other standard makes, several of the tubulars lasted half again as long, on continuous burning, as all others. The average life of these batteries, for intermittent light, the use to which flashlight batteries are generally put, will show even a greater comparative life. The reason for the remarkable life of these batteries consists in the secret and exclusive process of manufacture, discovered only after years of experimentation in what is conceded to be the largest and most complete laboratory of its kind in existence, which process, without resorting to any elaborate or detailed technical explanation, at once retains in and eliminates from the battery those elements which give to it its longest possible life.

LAMPS

The best quality of Mazda lamp is supplied with our flashlights. They are made under patents owned by The General Electric Company. They now cost but 13c each, the price of the old carbon lamps.

THE CASES OF OUR FLASHLIGHTS

All our nickel and tubular cases have the sliding and permanent contact, giving permanent light when desired. Our tubular flashlights have fibre cases of the best quality. The lenses of all our flashlights are remarkably clear and free from flaws or specks. The cases are made by the foremost and largest manufacturers of flashlights in the world.

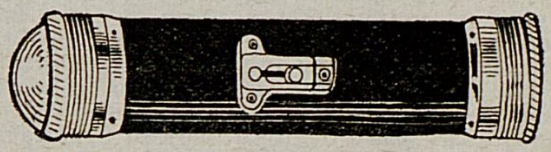
FLASHLIGHTS. TUNGSTEN BATTERIES. MAZDA LAMPS.

The practical utility of flashlights has, during very recent years, assumed such commanding importance that millions of them are being sold yearly to meet the large and increasing demand. Since flashlights have been in use, millions of dollars have been saved in fire losses alone. The practical advantages and uses of flashlights are not, however, limited to prevention of fire losses. They will be found to be of practical and serviceable use in every home, and the mistress of no home should be without one. Autoists, night watchmen, policemen, plumbers and other workmen will find them without a substitute.

Do not forget to remit for postage.

OUR BABY TUBULAR FLASHLIGHT.

Others ask $1.00. Our Price, $0.60

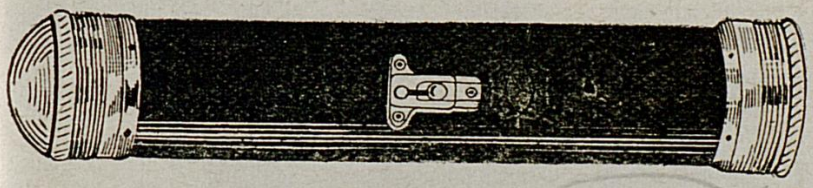


Baby Tubular Flashlight. No. 5220.

Our Baby Tubular Flashlight is one of our most popular sellers. Particularly desirable for autoists, mail carriers, delivery men, and in all cases where a flashlight of convenient size with powerful light is required. The case is of beautifully polished black fibre, with highly polished nickel trimmings, fitted with the new patented press and permanent combination contact switch, giving permanent light when desired. The reflector is of white enamel, thoroughly baked upon heavy brass. It will not crack. With this type of reflector a clear light is radiated. There are no dark circles of light such as are common to all types of flashlights using polished reflectors. The lens is of powerful clear glass, ground in a manner to greatly increase the strength of the light. Equipped with two-cell Tungsten battery and Mazda lamp.

No. 5520 Baby Tubular Flash Light, complete (size 1¼ in. x 5¼ in.).....$0.60
Shipping weight 8 oz.
No. 121 Extra Tungsten Battery..... .22
Shipping weight 5 oz.
No. 85X2 Extra 2.8 volt Mazda Lamp for above flash light..... .13
Postage 2c.

Postage prepaid on flash lamps in lots of 3.



BULL DOG TUBULAR FLASHLIGHT.

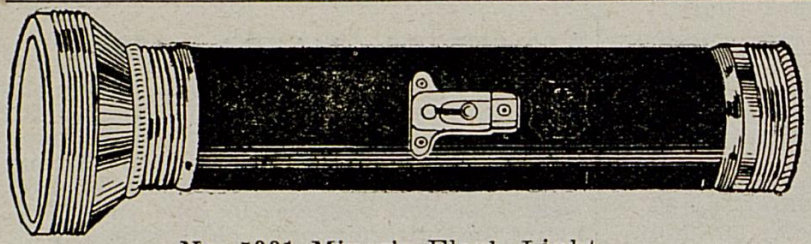
Others ask $1.50. Our Price, $0.75.

Bull Dog Tubular Flash Light, No. 5323

The Bull Dog Flash Light throws a very powerful light, and is used extensively by autoists, delivery men, plumbers, night watchmen, and in all cases where a powerful light is required. The case is of beautifully polished black fibre, with highly polished nickel trimmings, fitted with the new patented combination press and permanent contact switch, giving permanent light when desired. The reflector is of white enamel, thoroughly baked upon heavy brass. It will not crack. With this type of reflector a clear light is radiated. There are no dark circles of light such as are common to all types of flash lights using polished reflectors. It is equipped with Mazda lamp and Tungsten battery. This type is supplied in two sizes.

No. 5221 Bull Dog Flash Light, complete (size 1½ in. x 6½ in.).....$0.68
Shipping weight 14 oz.
No. 221 Extra two-cell Tungsten Battery for above flash light..... .22
Shipping weight 8 oz.
No. 85X2 Extra 2.8 volt Mazda Lamp for above flash light..... .13
Postage 2c.
No. 5323 Bull Dog Flash Light, complete (size 1½ in. x 8½ in.)..... .75
Shipping weight 20 oz.
No. 231 Extra three-cell Tungsten Battery for above flash light..... .28
Shipping weight 11 oz.
No. 855 Extra 3.8 volt Mazda Lamp for above flash light..... .13
Postage 2c.

Postage prepaid on flash lamps in lots of 3.



MINER'S FLASHLIGHT.

Others ask $2.00.
Our Price, $1.00.

No. 5331 Miner's Flash Light

The Miner's Three-Cell Flash Light is the largest type listed by us. The case is of beautifully polished black fibre with highly polished trimmings, and is equipped with the new patented combination press and permanent contact, giving permanent light when desired. It is equipped with Tungsten battery and Mazda lamp. The lens is of clear optical glass, measuring 2½ inches in diameter, which greatly increases the radiation of the light. An exclusive feature of the head piece consists in the separate parts, each being separately removable and renewable, thereby avoiding the necessity of purchasing a new case should any part become broken through careless treatment. This flash light is made in two sizes. Where a very strong and powerful light is desired, this flash light will be found to answer all requirements. It will light up the road for a considerable distance, and for temporary use will answer all the purposes of a fairly powerful electric head light.

No. 5229 Miner's Flash Light, complete (size 1½ in. x 6½ in.).....$0.92
Shipping weight 18 oz.

No. 221 Extra two-cell Tungsten Battery for above flash light..... .22
Shipping weight, 8 oz.

No. 85X2 Extra 2.8 volt Mazda Lamp for above flash light..... .13
Postage 2c.

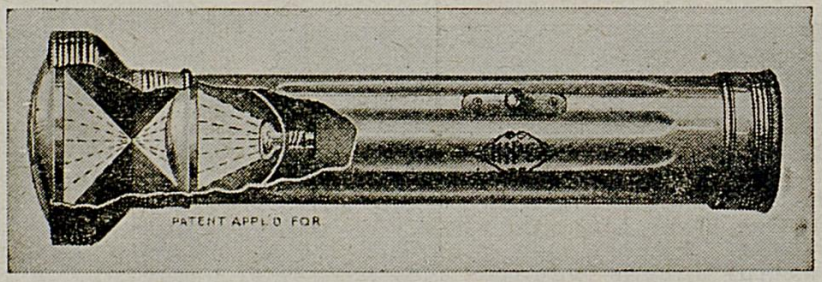
No. 5331 Miner's Flash Light, complete (size 1½ in. x 8½ in.)..... 1.00
Shipping weight 22 oz.

No. 231 Extra three-cell Tungsten Battery for above flash light..... .28
Shipping weight 11 oz.

No. 85X3 3.8 volt Mazda Lamp for above flash light..... .13
Postage 2c.

Postage prepaid on flash lamps in lots of 3.

SEARCHLIGHT FLASHLIGHT.



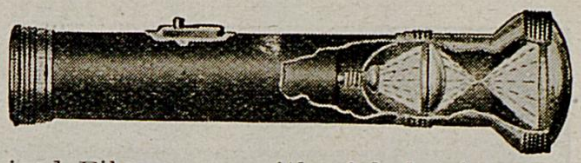
No. 260. Silver-Nickel Searchlight Flashlight. Supplied in Metal or Fibre Case.

Since this flashlight has been on the market it has demonstrated its extraordinary superiority over the prevailing types of flashlights, giving three times the amount of light and having a range of 200 ft., secured by the scientific adjustment of two imported magnifying lenses fixed at an exact focus. This searchlight in the new designed silver nickel case (non-short circuiting) is unquestionably the finest flashlight on the market. A silver nickeled case is recommended as being the best for use where the very hardest service is expected. In the other the case is made of the finest quality of fibre, beautifully finished. The two styles differ only in the material used in the construction of the cases.

No. 260 Silver-Nickel Searchlight Flashlight, size 10½x1½ in., complete with three cell Tungsten battery and Mazda lamp.....$1.95
Shipping weight, 2 lbs.

No. 265 Silver-Nickel Searchlight Flashlight, size 6x1¼ in., complete with two cell Tungsten battery and Mazda lamp..... 1.25
Shipping weight, 24 oz.

No. 65. Searchlight Flashlight.
Vulcanized Fibre Case.



No. 60 Searchlight Flashlight, Vulcanized Fibre case, with nickel trimmings, size 10½x1½ in., complete with three cell Tungsten battery and Mazda lamp 1.50
Shipping weight, 2 lbs.

No. 65 Searchlight Flashlight, Vulcanized Fibre case, with nickel trimmings, size 6x1¼ in., complete with two cell Tungsten battery and Mazda lamp ..... .80
Shipping weight, 24 oz.

No. 231 Renewal three cell Tungsten battery for Nos. 260 and 60 Searchlight Flashlight ..... .28
Shipping weight, 11 oz.

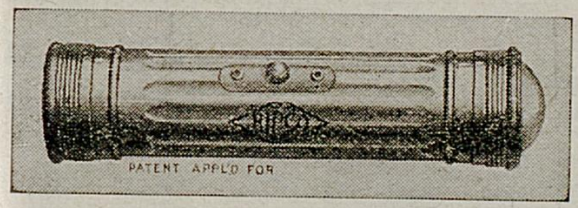
No. 121 Renewal two cell Tungsten Battery for Nos. 265 and 65 Searchlight Flashlights ..... .22
Shipping weight, 8 oz.

NEW DESIGN SILVER-NICKEL TUBULAR FLASHLIGHT.

Non-short Circuiting.

This battery is fast becoming very popular. The fluted design is attractive in appearance, increases the strength 50%, and prevents the batteries from becoming "stuck." The use of hardened brass tubing—not soft brass—absolutely eliminates denting or scratching the highly polished surface. It is so substantial that a person may stand on it without in any way denting the case. The positive lock switch and non-short circuiting feature make these cases unique in the flashlight field.

All cases are equipped with Mazda bulb and Tungsten battery, which is a guarantee of perfect satisfaction.



Regular Price...$1.25

Our Price..... .82

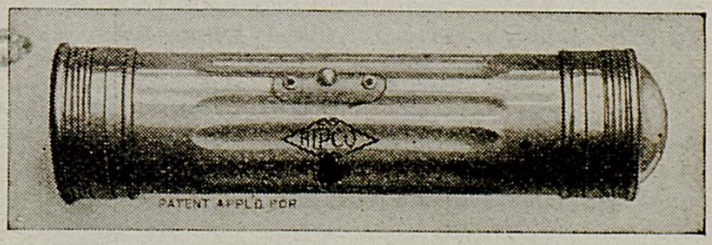
No. 201 Baby Tubular Silver-Nickel Flashlight, size 1¼x5, 2-cell, complete with Tungsten Battery and Mazda Lamp. Regular price, $1.25. Our Price.....$0.82
Shipping weight, 9 oz.

No. 121 Renewal Tungsten Battery ..... .22
Shipping weight, 5 oz.

No. 85X2 Renewal 2.8 volt Mazda Lamp..... .13

Regular Price...$1.50

Our Special Price. .96

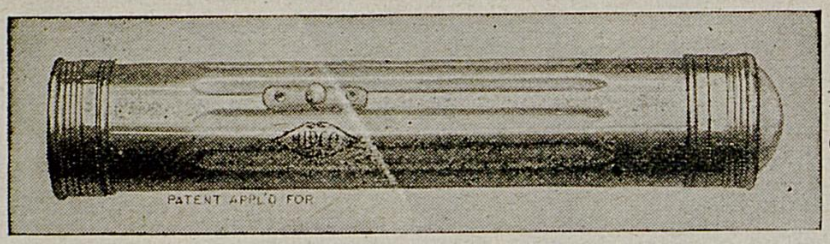


No. 205 Tubular Silver-Nickel Flashlight, size 1½x6½, 2-cell complete with Tungsten Battery and Mazda Lamp. Regular price, $1.50. Our Special Price $0.96
Shipping weight 15 oz.

No. 221 Renewal Tungsten Battery ..... .22
Shipping weight, 8 oz.

No. 85X2 Renewal 2.8 volt Mazda Lamp..... .13

Specify whether you desire "French" or "Eveready" Tungsten battery.



Regular Price...$1.75

Our Special Price. 1.10

No. 210 Tubular Silver-Nickel Flashlight, size 1½x8½, 3-cell complete with Tungsten Battery and Mazda Lamp. Regular Price, $1.75. Our Special Price.....$1.10

Shipping weight, 22 oz.

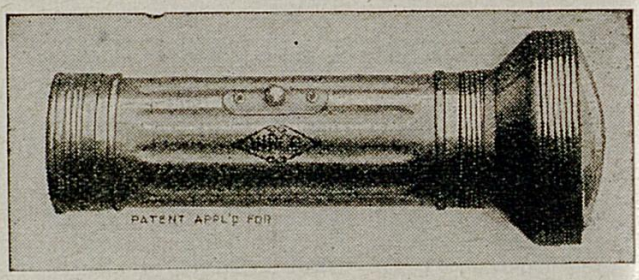
No. 231 Renewal Tungsten Battery ..... .28

Shipping weight, 11 oz.

No. 855 Renewal 3.8 volt Mazda Lamp ..... .13

Regular Price...$2.00

Our Special Price. 1.35



No. 215 Miner's Silver-Nickel Flashlight, size 1½x6½, 2-cell complete with Tungsten Battery and Mazda Lamp. Regular Price, $2.00. Our Special Price.....$1.35

Shipping weight, 19 oz.

No. 221 Renewal Tungsten Battery ..... .22

Shipping weight, 8 oz.

No. 85X2 Renewal 2.8 volt Mazda Lamp..... .13



Regular Price...$2.40

Our Special Price. 1.55

No 220 Miner's Silver-Nickel Flashlight, size 1½x8½, 3-cell complete with Tungsten Battery and Mazda Lamp. Regular Price, $2.40. Our Special Price.....$1.55

Shipping weight, 24 oz.

No. 231 Renewal Tungsten Battery ..... .28

Shipping weight, 11 oz.

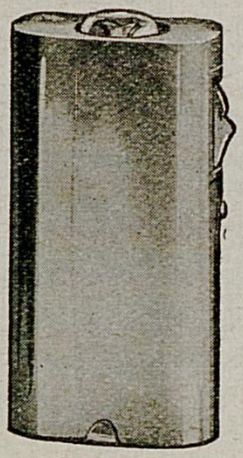
No. 85X3 Renewal 3.8 volt Mazda Lamp..... .13



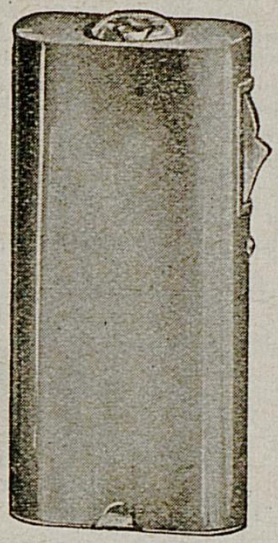


MINIATURE VEST POCKET FLASHLIGHTS.
Nickel Plated and Highly Polished.

Equipped with Mazda Opal Back Lamp and Tungsten Battery.



No. 2470.
2½x1½x$\frac{11}{16}$ in.
Others ask $0.90.
Our price $0.46.
Shipping wt., 6 oz.



No. 2472.
2⅞x1⅜x¾ in.
Others ask $0.90.
Our price $0.46.
Shipping wt., 6 oz.



No. 2573.
2⅞x2x¾ in.
Others ask $1.00.
Our price $0.58.
Shipping wt., 8 oz.

These are the smallest and neatest types of flash lights made. They may be easily carried in a ladies' purse or in your vest pocket. They are made of seamless brass, heavy nickeled and highly polished. No. 2740 is the smallest flash light made. These types are equipped with snap switch, giving permanent light when desired. Equipped with Mazda opal back lamp and new Tungsten battery.

..o. 721 Extra two-cell Tungsten battery for No. 2470 Flash Light.....$0.22
Shipping weight, 3 oz.

No. 85X0 Extra Mazda opal back 2.8 volt lamp, for No. 2470 Flash Light. .13
Postage, 2c.

No. 421 Extra Battery for No. 2472 Flash Light..... .22
Shipping weight, 4 oz.

No. 85X0 Extra Mazda opal back 2.8 volt lamp for No. 2472 Flash Light.. .13
Postage, 2c.

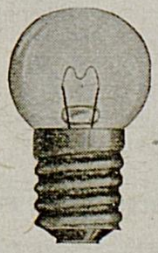
No. 431 Extra three-cell Tungsten Battery for No. 2573 Flash Light.... .28
Shipping weight, 4 oz.

No. 85X1 Extra Mazda opal back 3.8 volt lamp for No. 2573 Flash Light.. .13
Postage, 2c.

Postage prepaid on flash lamps in lots of 3.



No. 85X2
Mazda Lamp



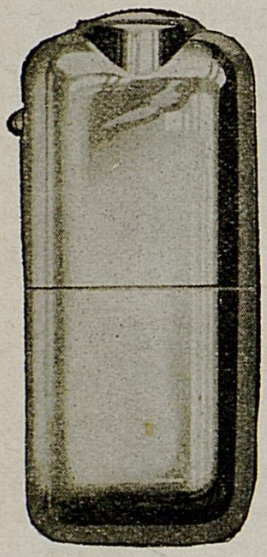
No. 85X3
Mazda Lamp



No. 85X0
Mazda Opal Back Lamp

Any of above, 13c; postage, 2c. Postage prepaid on flash lamps in lots of three.

LATEST TYPE VEST POCKET FLASHLIGHT.



This type of case represents the newest design in vast-pocket flashlights. It is without doubt the most popular flashlight ever produced. The faults of all other similar cases have been overcome, which accounts for their phenomenal popularity. There is not a hinge or clasp on the entire case. For beauty of design they are unequalled. The case consists of two metal parts drawn into shape from a solid sheet of metal, the lower part telescoping over the upper and when pushed together they firmly lock. With a slight pressure on the side of the case the two pieces can be pulled apart, making it an easy matter to insert the battery. Everyone that has used the other type of metal case is familiar with the trouble of adjusting the contacts to produce a light. You are assured of a quick and permanent contact the moment the cases are locked. We supply this type of flashlight in three different sizes. We show cut only of the smaller size.

No. 3475 Nickel-plated flashlight, complete, regular price $1.00, (size ¾x1⅜x2⅞ in.), price....$0.65
Shipping weight, 6 oz.

No. 85X0 Extra Mazda, opal back, 2.5 volt Lamp, for No. 3475 flashlight ..... .13
Postage 2c.

No. 421 Extra Tungsten Battery, for NoN. 3475 Flashlight ..... .22
Shipping weight, 4 oz.

No. 3577 Nickel-Plated Flashlight, regular price $1.25 (size ¾x2x2⅞ in.) .90

No. 85X1 Extra Mazda, opal back, 3.8 volt Lamp, for No. 3577 Flashlight .13
Postage, 2c.

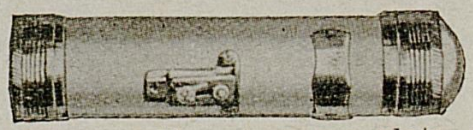
No. 431 Extra three-cell Tungsten Battery, for No. 3577 Nickel-Plated Flashlight ..... .28
Shipping weight, 4 oz.

No. 3579 Nickel-Plated Flashlight, regular price $1.75 (size 1x2½x3½ inches) 1.25

No. 85X1 Extra Mazda, opal back, 3.8 volt Lamp, for No. 3579 Flashlight .13
Postage, 2c.

No. 531 Renewal three-cell Tungsten Battery for No. 3579 Flashlight.. .28
Shipping weight, 6 oz.

IVORY AND GOLD TUBULAR FLASHLIGHTS.



The most beautiful type of Flashlight made. The body of the case is made of beautiful white Parisian Ivory, scientifically treated so that it will not crack or peal. A most exquisite contrast is effected by the trimmingsof 14-karat gold. A name plate of gold on the side of the case providesfor a monogram or inscription. We make a charge of 25c for the monogram, if desired.

No. 7200 Ivory and gold Flashlight, complete; regular price $2.50 (size 1¼x5 in.) $1.75
Shipping weight, 11 oz.

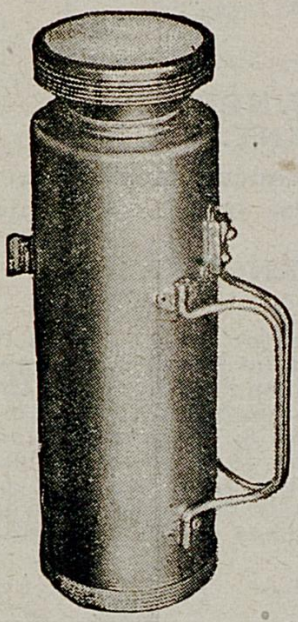
No. 121 Renewal Tungsten Battery for No. 7200 Flashlight..... .22
Shipping weight, 5 oz.

No. 85X2 Renewal Mazda, opal back, 2.8 volt Lamp..... .13
Postage, 2c.

ELECTRIC LANTERNS

In the Kwik-lite line is found the most practical and durable Dry Battery Lanterns ever produced. They instantly appeal to farmers, autoists, watchmen, sportsmen, and all others who require a practical hand lamp of long life, which cannot possiby cause fire or explosion.

The Kwik-lite Lanterns will burn from thirty-five to fifty hours on an ordinary dry cell battery, and will yield a steady, piercing stream of light for



No. 4000

a great distance. They are handsome, durable, and compact. The handles of the horizontal type are constructed so as to fold down on the side of the lantern. Produced in horizontal and vertical types.

Constructed throughout of brass and handsomely nickel plated, representing the latest and best achievement possible in design and construction. Furnished with a powerful reflector, ground lens and Mazda bulb.

No. 1000 Hand Lantern, black metal, nickeled trimmings, size 2⅞x7¾ inches, less dry cell $1.15

Horizontal types, size 2⅞x9 in.

No. 4000 Hand Lantern, black metal, nickeled trimmings, less dry cell $1.60

No. 7000 Hand Lantern, brushed brass, less dry cell $2.50

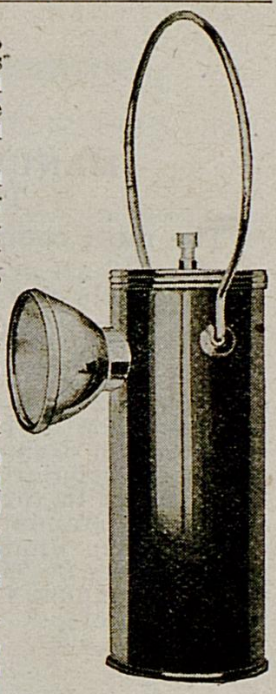
No. 8000 Hand Lantern, nickeled plated, less dry cell $2.65

Shipping weight of any of the above Lanterns, 2 lbs.

Renewal 1.5 Volt Mazda bulb for any of above ..... $ .20

Dry cell ..... .40

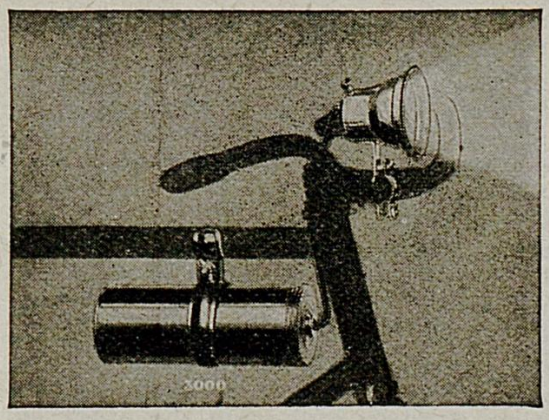
No. 6004 Renewal Bulb ..... .20



No. 1000

ELECTRIC HEAD LIGHT.

For Bicycles, Vehicles, Motorcycles and Boats.



This is the only reliable, detachable electric head light using Standard No. 6 Dry Battery, that we have ever been able to secure. The majority of these devices are impractical. clumsy or awkward contrivances. This device is made to fit any bicycle or vehicle, and can be adjusted so that the ray of light can be thrown on the ground direct in front, to cast a broad circle of light right in front of the wheel or at any angle desired. By means of the perfectly designed parabolic reflector, the light can be thrown a distance of 300 feet, made possible only by means of the special focal length of filament as supplied in the bulb and as projected by the reflector and lens. It is constructed throughout of brass, and handsomely triple nickel plated. One battery will burn up to fifty hours continuously. Battery can be purchased any place.

Furnished complete with Nickel-Plated Headlight, black steel battery container, equipped with clamps to attach to frame of motorcycle or bicycle, and sufficient weather-proof wire with terminals. When used on vehicles the battery container is omitted.

No. 3000 Electric Head Light, complete less battery, regular price $2.50, our price $1.75

No. 3500 Electric Head Light, for use on vehicles, regular price $2.25, our price 1.65

No. 6004 Renewal Bulb ..... .20

Mazda Lamps
FOR ALL USES

MANUFACTURED UNDER PATENTS OWNED BY THE GENERAL ELECTRIC COMPANY.

The most complete line of Lamps LISTED by any concern anywhere.

Note.—All orders for lamps must specify type and size of bulb (Example, G10), candle power, voltage and style of base.

SOME IMPORTANT POINTS YOU SHOULD KNOW WHEN ORDERING LAMPS.

The size of all miniature lamps is rated by the diameter of the lamps in inches. The unit of measurement is 8, which is the standard unit for lamps one inch in diameter. The prefix "G" or "P" to the number signifies that the lamp is globular or pear shape; for instance, G-8 lamp means that the lamp is globular in form and is one inch in diameter, the figure 8, as above stated, being the standard measurement for one inch. Lamps less than or more than one inch in diameter have sizes that are fractional parts of 8, the unit of measurement. Therefore a G-6 lamp means a lamp that is 6/8 of an inch in diameter, and a G-10 lamp means a lamp that is 10/8 inches or 1¼ inches in diameter, etc.



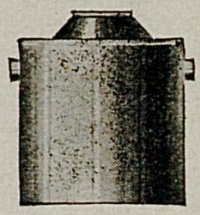
Candelabra Screw Base
10 threads to inch
Style 500



Miniature Screw Base
14 threads to inch
Style 600



Bayonet Candelabra Base
Double Contact
Style 1000



Bayonet Candelabra Base
Single Contact
Style 1100

The above cuts show the styles of bases of lamps almost universally used. The single contact bayonet candelabra base is the latest and most advanced type of base used. Candelabra screw base is the same as candelabra base, the former name now being in most general use in referring to this type of lamp. It is preferably called candelabra screw base, to more clearly distinguish it from Edison screw base, the size ordinarily used in larger lamps for house lighting purposes. It is the same type of lamp except as to size. The miniature screw base lamps are of the same general type as candelabra screw base lamps, excepting that the miniature has 14 threads to one inch, whereas the candelabra has 10 threads to one inch.

A larger number of the newer models of gasoline cars are using the single wiring system. The object of this is to eliminate any possible trouble in the lighting circuit, and where lamps are required for this type of car, of course the bayonet candelabra single contact lamps are the only ones that will answer the purpose. In this system of wiring on automobiles, the return wire is grounded on the frame of the car instead of forming a complete circuit, and connecting with the battery. With the bayonet candelabra base double contact lamps the wire runs from the battery to one contact and from the other contact back to the battery.

MAZDA AUTOMOBILE LAMPS

last the longest and produce the largest amount of light with the least strain on batteries and generators. They withstand all shocks and jars, give a steady light and stay bright always.

Made in every size and voltage to fit the lighting system of any gasoline or electric car.

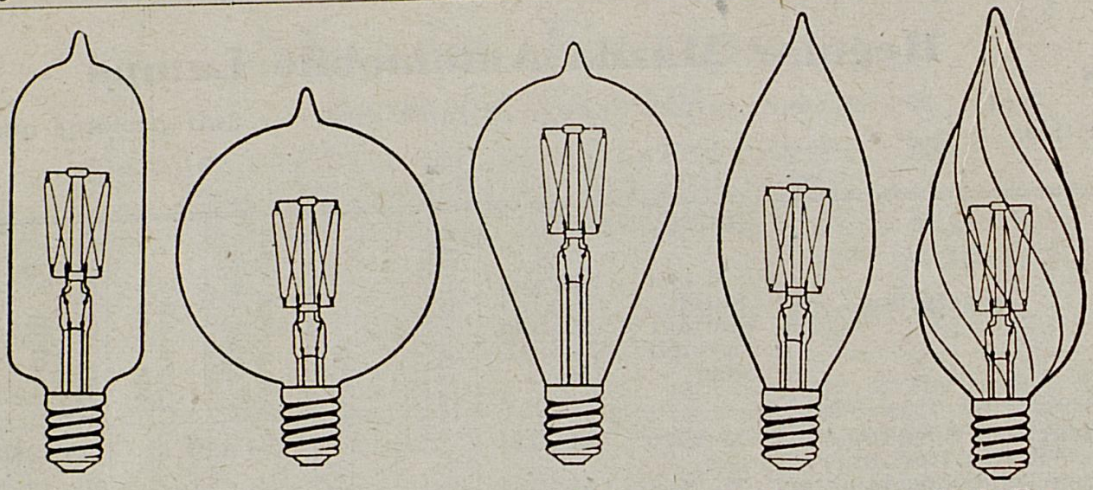
Regular Mazda Automobile Lamps

Note: 25% discount in lots of four of same grade or unit package quantities.

Description	Catalog Number: Fitted with Double Contact Bayonet Base	Catalog Number: Fitted with Single Contact Bayonet Base	Approximate Candle Power	Volts	Amperes (a.) Watts (w.)	Type and Size Bulb	Unit Package	Price, Prepaid
Rear and Speedometer (Series Burning)	M–2160	M–2161	2	3	.84 a.	G-6	10	$0.21
Rear and Speedometer (Series Burning)	M–2163	M–2164	2	3½	.84 a.	G-6	10	$0.21
Rear and Speedometer	M–2130	M–2131	2	6	.42 a.	G-6	10	$0.21
Rear and Speedometer	M–2133	M–2134	2	7	.42 a.	G-6	10	$0.21
Side	M–2060	M–2061	4	6	.84 a.	G-8	10	.21
Side	M–2063	M–2064	4	7	.84 a.	G-8	10	.21
Side	M–2050	M–2051	6	6	1.25 a.	G-10	10	.24
Side	M–2053	M–2054	6	7	1.25 a.	G-10	10	.24
Headlight (focusing)	M–2018	M–2019	12	6	2.00 a.	G-12	5	.27
Headlight (focusing)	M–2021	M–2022	12	7	2.00 a.	G-12	5	.27
Headlight (focusing)	M–2000	M–2001	15	6	2.50 a.	G-16½	5	.27
Headlight (focusing)	M–2003	M–2004	15	7	2.50 a.	G-16½	5	.27

Mazda Lamps for 6 and 7 Volt Battery and Generator Lighting Systems.

Description	Catalogue Number: Fitted with Double Contact Bayonet Base	Catalogue Number: Fitted with Single Contact Bayonet Base	Approximate Candle Power	Ratings that Appear on Lamps: Volts	Ratings that Appear on Lamps: Amperes	Type and Size Bulb	Unit Package Quantity	Price, Prepaid
Rear and Speedometer	M–9000	M–9001	4	6	.84	G-6	10	$0.24
Rear and Speedometer	M–9002	M–9003	4	7	.84	G-6	10	.24
Side	M–9010	M–9011	6	6	1.25	G-8	10	.24
Side	M–9012	M–9013	6	7	1.25	G-8	10	.24
Side	M–9020	M–9021	8	6	1.70	G-10	10	.27
Side	M–9022	M–9023	8	7	1.70	G-10	10	.27
Side (focusing)	M–9030	M–9031	6	6	1.00	G-10	10	.30
Side (focusing)	M–9032	M–9033	6	7	1.00	G-10	10	.30
Side (focusing)	M–9040	M–9041	6	6	1.00	S-8	10	.32
Side (focusing)	M–9042	M–9043	6	7	1.00	S-8	10	.32
Dome (tipless)	M–9050	M–9051	4	6	.84	R-8	10	.32
Dome (tipless)	Candelabra Screw Base—M–9052		4	6	.84	R-8	10	.32
Dome (tipless)	M–9053	M–9054	4	7	.84	R-8	10	.32
Dome (tipless)	Candelabra Screw Base—M–9055		4	7	.84	R-8	10	.32
Headlight (focusing)	M–9060	M–9061	9	6	1.50	G-12	5	.30
Headlight (focusing)	M–9062	M–9063	9	7	1.50	G-12	5	.30
Headlight (focusing)	M–9070	M–9071	12	6	2.00	G-16½	5	.27
Headlight (focusing)	M–9072	M–9073	12	7	2.00	G-16½	5	.27
Headlight (focusing)	M–9080	M–9081	18	6	3.00	G-16½	5	.27
Headlight (focusing)	M–9082	M–9083	18	7	3.00	G-16½	5	.27
Headlight (focusing)	M–9090	M–9091	21	6	3.50	G-16½	5	.30
Headlight (focusing)	M–9092	M–9093	21	7	3.50	G-16½	5	.30
Headlight (focusing)	M–9100	M–9101	24	6	4.00	G-16½	5	.30
Headlight (focusing)	M–9102	M–9103	24	7	4.00	G-16½	5	.30



Style E Style G Style F Style B Style D

MAZDA CLASS—MINIATURE STYLE.

Candelabra and Decorative Types.

105 to 125 Volts.

Regularly fitted with Unskirted Candelabra, Screw Base (Style 500).

35% Discount in Unit Package Quantities.

Description	Watts	W. P. C.	Type and Size Bulb	Diameter Bulb, In.	Maximum Over all Length, In.	Base	Unit Package Quantity	Price	
								Clear	Frosted
Candelabra —Style B..	15	1.50	B-9½	1 3/16	3¾	Candelabra Screw	5	$0.55	$0.60
Candelabra —Style D..	15	1.50	D-10	1¼	3½	Candelabra Screw	5	$0.55	$0.60
Candelabra —Style E..	15	1.50	T-8	1	3¾	Candelabra Screw	5	$0.55	$0.60
Candelabra —Style G..	15	1.50	G-16½	2 1/16	3⅛	Candelabra Screw	5	$0.55	$0.60
Decorative —Style F..	15	1.50	S-12½	1 5/16	3½	Candelabra Screw	5	$0.55	$0.60

Mazda Lamps for 14 Volt Battery and Generator Lighting Systems.

Rear and Speedometer (Series Burning)	M–9200	M–9201	2	7	.42	G-6	10	$0.21
Rear and Speedometer	M–9210	M–9211	2	14	.26	G-6	10	.24
Side	M–9220	M–9221	4	14	.42	G-8	10	.24
Headlight (focusing)	M–9230	M–9231	15	14	1.00	G-16½	5	.30
Headlight (focusing)	M–9240	M–9241	18	14	1.25	G-16½	5	.30

No. 12X4

For adapting miniature base lamp to candelabra base.

Price, 5c; Post. 1c



No. 69X9

For adapting candelabra base lamp to regular Edison base.

Price, 15c; Postage, 2c.



Candelabra-Ediswan Adapter.

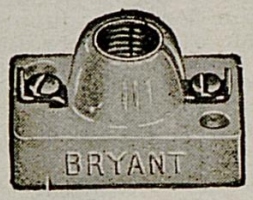
By the use of this adapter any lamp with candelabra screw base socket may be fitted to standard Ediswan socket.

No. 69X8. Ediswan Adapter.....15c Postage 2c

SOCKETS AND RECEPTACLES.



No 54X55



No. 32X5



No. 32X1

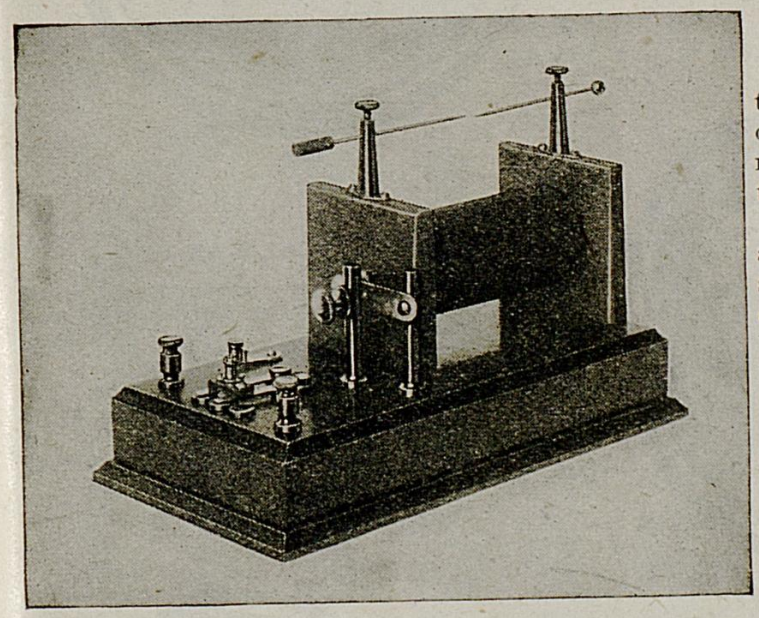


No. 94X45



No. 32X2

		Price	Postage
No. 54X55	Hubbell pull-chain candelabra socket, brass finish	$0.60	$0.03
No. 32X0	Miniature keyless socket, ⅛-in. thread	.25	.03
No. 32X1	Candelabra keyless socket, ⅛-in. thread	.25	.03
No. 53x33	Candelabra keyless socket, ⅛-in. thread, nickel plated, for use with our No. 68X5 Audion Detector bracket	.30	.03
No. 32X2	Miniature porcelain socket with leads	.10	.02
No. 32X3	Candelabra porcelain socket with leads	.10	.02
No. 32X5	Candelabra porcelain receptacle	.12	.03
No. 94X45	Miniature porcelain receptacle	.07	.02
No. 94X46	Candelabra porcelain receptacle	.09	.02



RHUMKOFF COILS.

Special care is taken in the selection and use of only the best quality of material in the construction of these coils.

Secondaries are wound and imbedded in special insulating material. Large coils have the secondaries built in sections to obtain high insulation.

The circuit breaker is a mechanical break, and on all coils over 2-inch spark is operated by a sharp hammer blow, making the break almost instantaneously, thereby reducing sparking of platinum points.

The platinum points are so designed that they can be readily replaced, if necessary.

Three special means of adjustment are provided for on coils giving over 1½-inch spark, allowing a wide range of vibration, from three to one hundred per second; this makes the coils adaptable to a large variety of work, such as may be found in the school-room or experimental laboratories.

A 6-inch induction coil will produce a heavy 6-inch spark with 4 volts, 6 amperes or 24 watts, supplied.

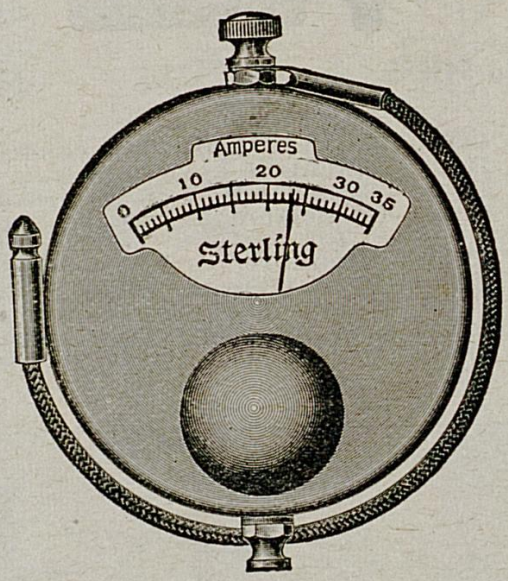
	Each
¼-Inch Spark Coil	$4.25
⅜-Inch Spark Coil	5.00
½-Inch Spark Coil	5.50
⅝-Inch Spark Coil	6.50
¾-Inch Spark Coil	12.00
1-Inch Spark Coil	$17.00
2-Inch Spark Coil	27.00
3-Inch Spark Coil	35.00
6-Inch Spark Coil	68.00

BATTERY METERS—GUARANTEED FOR LIFE

For Testing Electrically All Kinds of Dry or Storage Batteries

The meters listed below are made by one of the largest and most prominent manufacturers of pocket ammeters, voltmeters and voltammeters in the United States. They are always reliable and accurate and not only indicate the strength or condition of batteries but are invaluable in locating ignition and starting trouble. They are especially valuable for this purpose because they show polarity and thus indicate the direction of the current. They operate according to real scientific principles. The best permanent magnets obtainable are used in their construction. In fact all material used in their construction is the very best obtainable.

The meters as listed are the best and most reliable for their respective uses.

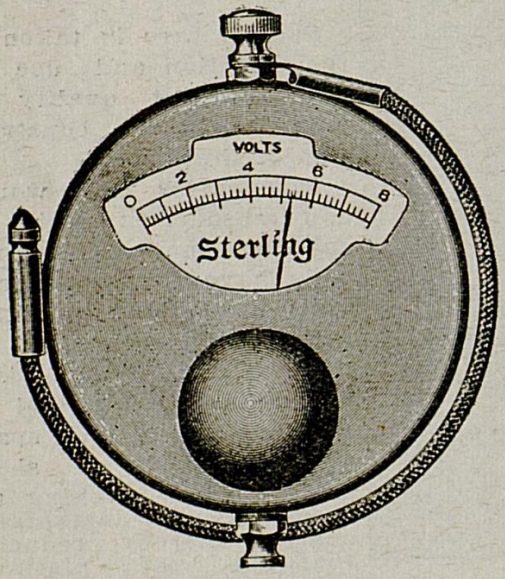


TYPE "C" AMMETER

0-35 Amperes—1 Ampere Divisions.

For testing dry batteries as used by automobiles, motor boats, stationary or portable gas engines, telephones, bell circuits, etc.

No. 24 Ammeter ----------$ .90
Shipping weight, 6 oz.



TYPE "C" VOLT-METER

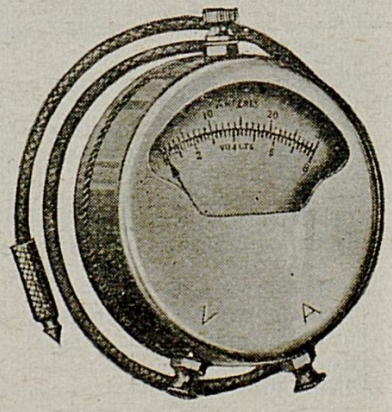
For testing storage batteries as used for gas engine ignition, automobile and motor boat lighting and ignition systems, etc.

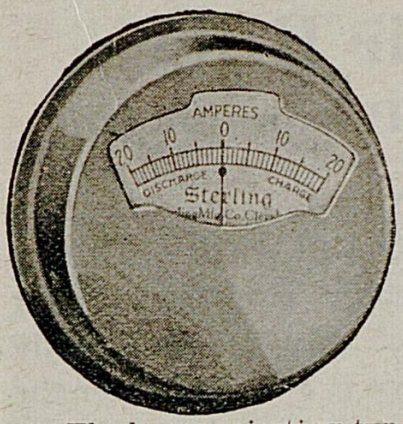
No. 34 Voltmeter 0-8 Volts, D. C. 1-5 Volt Divisions---------$1.05
No. 34A Voltmeter 0-16 Volts D. C. ½ Volt Divisions------ 1.40
No. 34B Voltmeter 0-30 Volts D. C. 1 Volt Divisions-------- 2.00
Shipping weight, 6 oz.

TYPE "C" VOLT AMMETER

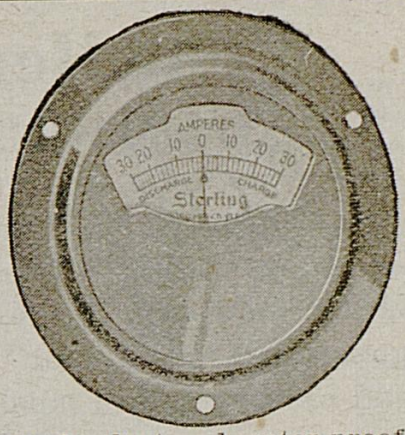
For testing dry or storage batteries as used for automobiles, motor boats, stationary or portable explosive engines, telephone and bell circuits, etc.

No. 44 Volt Ammeter 0-30 Amperes 0-8 Volts 1 Ampere and 1-5 Volt Divisions ----------$1.15
No. 44A Volt Ammeter 0-35 Amperes 0-12 Volts 1 Ampere and ½ Volt Divisions ---------- 1.65
Shipping weight, 6 oz.





TYPE "E" AMMETERS AND VOLTMETERS



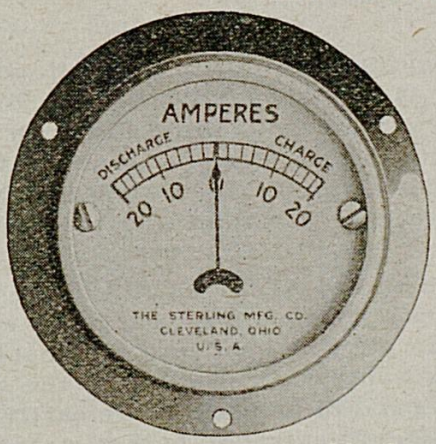
Flush or projecting type as desired, accurate, sturdy, dust and water proof. Absolutely guaranteed.

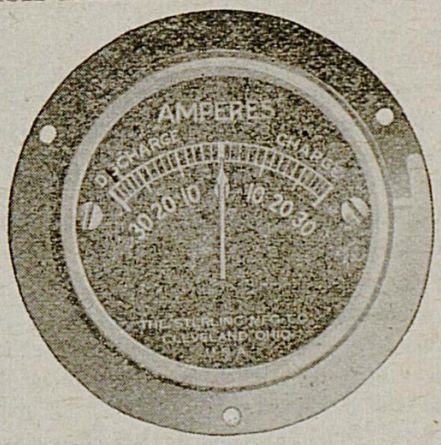
Designed for use in circuit continuously with direct current electric lighting systems on automobile or motor boats. Also suitable for use on switchboard or charging boards.

No. 61	Ammeter, 15-0-15 Amperes	$1.75
No. 62A	Ammeter, 20-0-20 Amperes	1.75
No. 63	Ammeter, 30-0-30 Amperes	2.05
No. 64	Ammeter, 40-0-40 Amperes	2.05
No. 66	Voltmeter, 0-8 Volts	2.70
No. 67	Voltmeter, 0-16 Volts	2.85
No. 68	Voltmeter, 0-30 Volts	3.30
No. 69	Voltmeter, 0-40 Volts	3.30
No. 70	Voltmeter, 0-50 Volts	3.30

Shipping Weight, 12 oz

NEW MODEL 500 DASH METERS





Etched Metal Dials in black or silver gray finish.

Cases heavy Brass, Finished in Nickel.

The new model 500 Ammeters are now switchboard meters which have been adapted to dash use. They were especially designed to register accurately when in actual use on gas engine driven vehicles under the effects of road motion and engine vibration. Provided with zero center scales they show constantly the correct rate of battery charge or discharge, which is essential to the proper care of the generator and the storage battery. A "dead beat" pointer is secured by the use of a revolving disc in the magnetic field which is the best and simplest means of obtaining a "dead beat" yet devised and not at the expense of sensitiveness.

Both the flush and projecting types are provided with brass studs at the back so that connections can be made without injury to the meter.

No. 500-15	Ammeter 15-0-15	$3.00
No. 500-20	Ammeter 20-0-20	3.00
No. 500-30	Ammeter 30-0-30	3.00

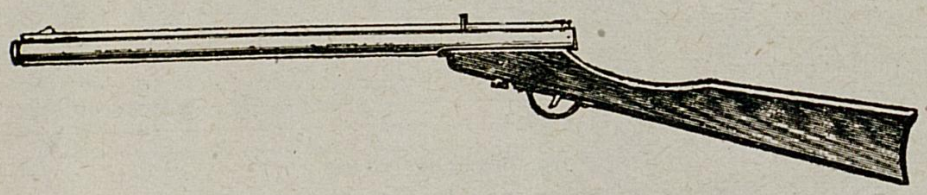
Shipping weight, 12 oz.

Be sure to indicate the following when ordering instruments: Our catalog number, whether Flush or Projecting Style, scale, finish of dial, finish of flange or case.

The Benjamin Air Rifle

New Model "E" A Genuine Pneumatic Gun.

Being operated entirely by Compressed Air, it is not a Spring Gun as are all other so-called Air Guns. It will shoot ten times harder than any of the spring guns commonly advertised as air guns. It sends a shot through one-half inch of white pine easily and has a record of much more. Force of shot is entirely under the operator's control.. This is a take-down gun and hammerless. When put together, gun is 37 inches long. When taken down, only 23 inches long.



The Benjamin is a practical gun for hunting all sorts of small game, such as rabbits, squirrels, frogs and birds. It is a splendid rat gun. Every part is carefully made of best materials and absolutely nothing has been left undone which could be done to make the gun better or more efficient. It is modeled on most approved lines and is well balanced. Its weight is about two pounds and its length 37 inches. The stock is of walnut and the barrels full nickeled.

The gun is opened by pulling out the pump rod as far as it will go and then pressing it in. The stroke is 17 inches. This puts a charge of compressed air in the air chamber. Then drop an air rifle shot into the shooting barrel. It will not fall out but is held in position by the swaging of the barrel at the back end. The air gun can be used where cartridge guns are forbidden, and the Benjamin Air Rifle will outshoot, both in accuracy and force, many of the cheap cartridge guns now on the market, and at the same time it is not half so dangerous.

With ordinary care there is no limit to the life of a Benjamin Air Rifle. It is strongly built and in point of the number of parts and their accessibility the gun has no equal. The only parts likely to need replacing are the pump leather and valve ball and these are furnished at a trifling expense and can be put in by any one.

The Benjamin Air Rifle is fully covered by patents in the United States and many foreign countries, more than eighty claims having been allowed on same by the United States patent office.

Caution.—Use Air Rifle (not Standard BB) Shot. Air Rifle Shot is slightly smaller and much more uniform in size. Irregular shot is apt to cause trouble by the larger ones sticking in the barrel.

The following are a few of many testimonials corroborating all we say concerning the merits of this gun:

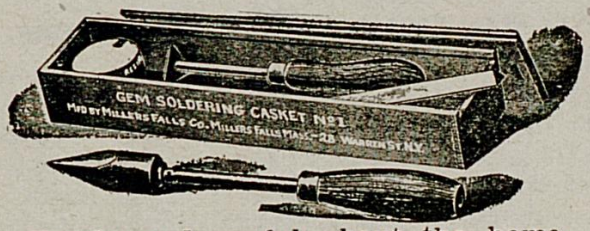
"Independence, Mo., Sept. 2, 1908.
"I bought a Benjamin for my brother, who has killed sparrows and rabbits with it. I was surprised when I found the shots went way through the rabbits, as I did not suppose it would shoot that hard. It is a good gun.
Samuel A. Yale, Jr."

"Nokomis, Ill. Aug. 28, 1908.
"I have found the Benjamin satisfactory in every respect and the best air rifle on the market. I have killed blackbirds at 50 yards and sparrows at 35 yards. Can shoot through one inch of soft pine.
Rexford Cain."

"St. Louis, Mo.
"This is to certify that my negro boy killed 24 rats with Benjamin Air Rifle the night of May 20, 1908. Those shot in the head were killed instantly.
J. D. Lucas."

No. 29X9. Benjamin Air Rifle, New Model "C," special price.....$2.50
Air Rifle Shot, 25-lb. bag.....$3.75 10-lb. bag, $1.70

No. A1 SOLDERING SET.



Handy and useful about the home. Comprising one bar of solder, one box of resin, scraper and solder copper. Copper is of sufficient size to retain heat. When attached to a gas burner, the gas passes through a hollow tube within the length of the handle and is ignited at emission holes, immediately beneath the copper.

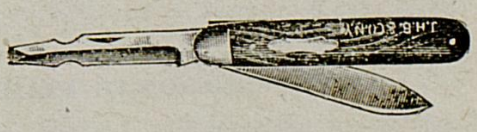
No. A1 Soldering Set.....$1.00
Shipping weight, 1½ lbs.

Electric Railways

Our big train catalog, displaying the finest and most complete line of electric railways manufactured, and at substantial discounts from regular resale price, mailed upon receipt of 2c stamp.

ELECTRICIAN'S COMBINATION KNIFE, SCREW DRIVER AND WIRE SCRAPER.



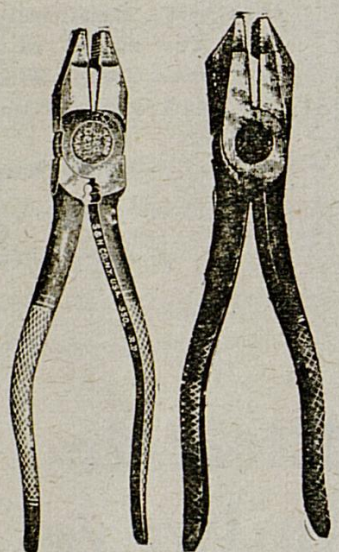


The screw driver blade is locked when open and cannot shut down on the hand when in use.

		Each	Postage
No. A524	Single blade	$0.50	$0.06
No. A624	Double blade	.80	.08

Red Devil Drop Forge Steel Pliers

Note the attractive prices.



No. A1050 No. A1950

SIDE-CUTTING PLIERS.

			Ship. Wgt.
No. A1050	5 inch	$0.45	5 oz.
No. A1050	6 inch	.55	7 oz.
No. A1050	7 inch	.65	8 oz.
No. A1050	8 inch	.80	10 oz.

HIGHEST QUALITY BONDED SIDE-CUTTING PLIERS.

No. A250	5 inch	$0.75	5 oz
No. A250	6 inch	.85	5 oz.
No. A250	8 inch	1.40	8 oz.
No. A250	9 inch	1.65	10 oz.

NICKEL-PLATED SIDE-CUTTING PLIERS.

No. A50	4 inch	$0.62	5 oz.
No. A50	5 inch	.75	5 oz.
No. A50	6 inch	.85	5 oz.

The Pliers That Last

LINEMAN'S HEAVY SIDE-CUTTING PLIERS.

No. A1950	6 inch	0$.85	10 oz.
No. A1950	8 inch	1.18	16 oz.
No. A1950	9 inch	1.70	18 oz.

INSULATED HANDLE HEAVY SIDE-CUTTING PLIERS.

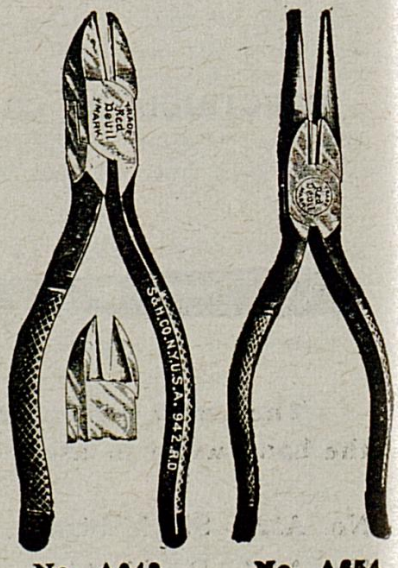
No. A2950	6 inch	$1.55	10 oz.
No. A2950	7 inch	1.95	10 oz.
No. A2950	8 inch	2.20	12 oz.

DIAGONAL PLIERS.

No. A942	4 inch	$0.60	6 oz
No. A942	5 inch	.72	6 oz.
No. A942	6 inch	.80	6 oz.

LONG CHAIN NOSE SIDE-CUTTING PLIERS.

No. A654	5½ inch	$0.75	7 oz.
No. A654	7 inch	.95	7 oz.

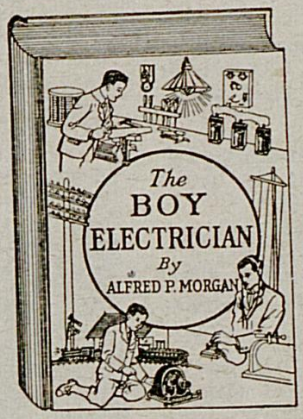


No. A942 No. A654

ELECTRICAL BOOKS.

THE BOY ELECTRICIAN—by A. P. Morgan

387 pages; 8 vo. Cloth. Price, net $2.00; Postpaid $2.25.



The most interesting and educating Book yet written for boys on Electrical Toys and Apparatus. Tells not only how to make All kinds of Motors, Telephones, Wireless Instruments, Batteries, etc., but thoroughly and simply explains the principles upon which these many instruments depend for operation.

Read our complete description of this unrivaled Book. Is far in advance of any Book yet published in this interesting field.

In the method of treatment of the various subjects in this field, this book unquestionably occupies the front rank among all books of a similar nature thus far published. In fact it is not quite true to say that there has yet been published any other book quite similar to this, for in comprehensiveness of subject matter, clearness and lucidity of treatment and aptness of illustration, there is no other book comparable to it. The subjects mentioned below are all elaborately treated in separate chapters, and in each chapter is given detailed instructions for building and operating the various instruments, and clear and lucid explanations of the principles of operation. For instance, Chapter IV on Cells and Batteries tells you how to build your own Batteries—How Electricity is made with Chemicals—A Simple Cell—Leclanche Cell—Polarization—Dry Cells—How to make a Dry Cell—Recharging Dry Cells—Wet Batteries—Carbon Plates—Battery Elements—Bichromate Batteries—Handling Acid—A Plunge Battery—The Edison Lalande Cell—A Tomato-can Battery—Secondary or Storage Batteries—Connecting Cells—Making a Storage Battery—The Plates—Forming the Plates—Charging a Storage Battery—Ampere Hours.

While many of these names may seem strange to one unacquainted with electricity, after reading the chapter, there is an intimate familiarity with all kinds of dry cell and storage batteries.

The chapter on wireless telegraphy embraces forty-three pages, clearly and thoroughly explains the principles of wireless telegraphy and also explains in detail, with very clear drawings, how to make Tuning Coils, Receiving Transformers, Condensers, Detectors, Spark Coils, Spark Caps, Helices, Transformers, Receivers, Coherers and Decoherers, Relays and many other instruments.

It must be remembered that the book is not filled merely with data and explanations. The author, in a very fascinating way, explains how many interesting experiments may be carried on with instruments that you can make yourself. This book will hold your interest like some of the masterpieces of Jules Verne. You will be unconsciously absorbing a great deal of practical information about electricity without the expenditure of any mental effort. The book has to be read to be appreciated.

The chapters on the following subjects embrace a wide range of subject matter:

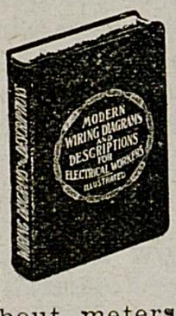
Magnets and Magnetism; Static Electricity; Static Electric Machines; Cells and Batteries; Electro-Magnetism and Magnetic Induction; Electrical Units; Electrical Appurtenances; Electrical Measuring Instruments; Bells, Alarms and Annunciators; Electric Telegraphs; Microphones and Telephones; Induction Coils; Transformers; Wireless Telegraphy; A Wireless Telephone; Electric Motors; Dynamos; An Electric Railway; Miniature Lighting; Miscellaneous Electrical Apparatus.

PRACTICAL APPLIED ELECTRICITY. By David Penn Moreton, B.S., E.E. Contains 450 pages, illustrated with 273 line drawings and 50 halftones; 20 full pages of valuable tables.

All interested in electricity, old or young, artisan or amateur, expert or experimenters, should own this positive authority.

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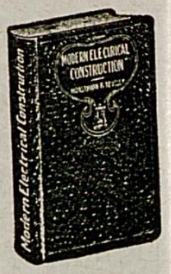
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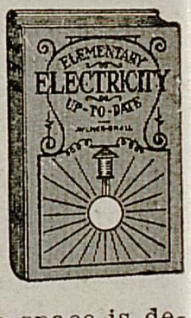
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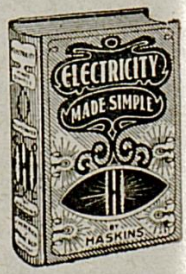
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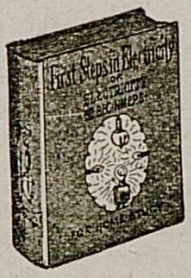
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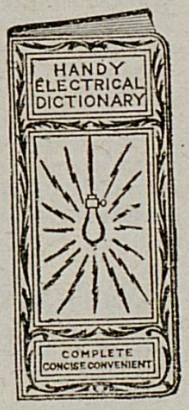
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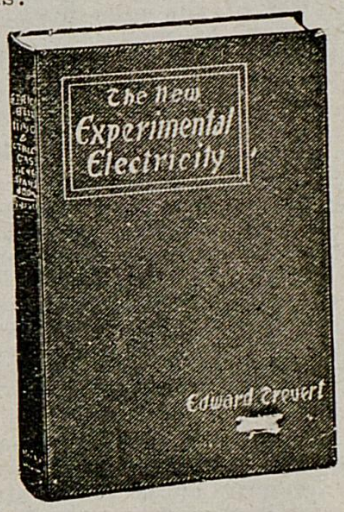
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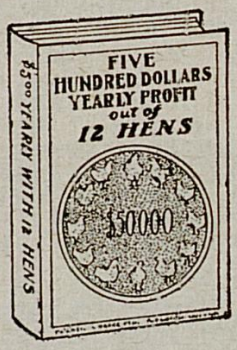
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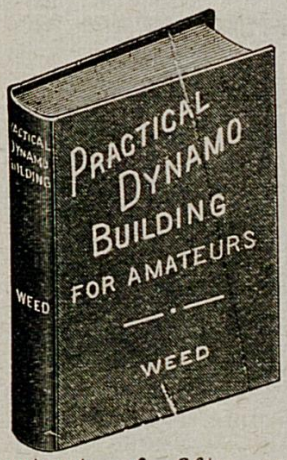
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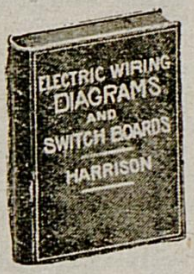


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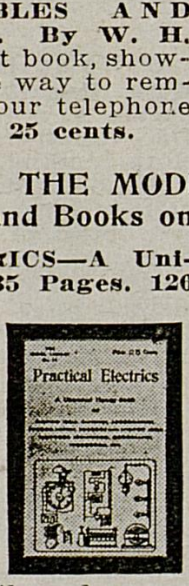
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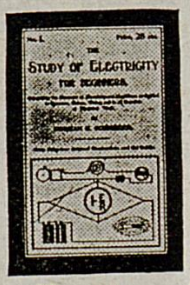
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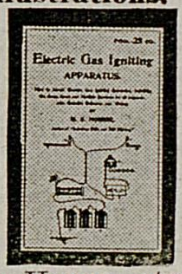
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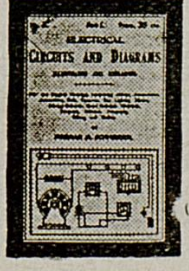
1. Introductory Remarks. Introduction; means of producing sparks; induction, etc. 2. Multiple Gas Lighting. Application of induction coils to gas-lighting. Forms of burners used, etc. 3. Connections and Wiring. How to connect p apparatus. Wiring a House, etc. 4. Primary Coils and Safety Devices. How to make a simple induction. coil. Automatic Cut-outs, etc. 5. Lighting of Large Buildings. Series or Jump Spark System. Burners Used, etc. 6. How to Select Batteries. Electrical Rules, etc.

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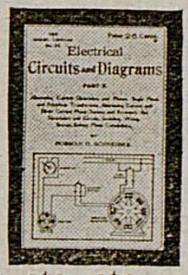
1. What an Alternators. 6. Rotary connating Current is. 2. How alternating currents are produced. 3. How alternating currents are measured. 4. Transformers and verters. 7. Rectifiers.

ELECTRICAL CIRCUITS AND DIAGRAMS.—Part 1, 72 pages, 217 illustrations.



Being a selection of original up-to-date and practical diagrams for installing annunciators, alarms, bells, electric gas lighting, telephones, electric power light and wiring circuits, induction coils, gas engine igniters, dynamos and motors. armature windings, etc., etc.

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MAGNETS AND MAGNETISM.—Simply Explained—94 pages, 49 illustrations.



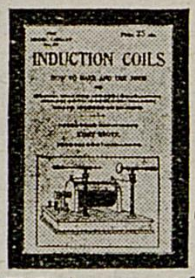
1. The Theory of Magnets. Magnetic lines of force. Attraction and repulsion, etc. 2. Permanent Magnets. Natural Magnets, or Lodestone. Artificial Permanent Magnets, etc. 3. Electro Magnets. Various Shapes of Electro Magnets. The Magnetic Strength of Magnets, etc. 4. Solenoids. Purpose for which Solenoids are Required. Peculiar Property of a Solenoid, etc. 5. Experiments with Magnets. To make a Magnetoscope. Magnetizing Various Kinds of Steel and Iron, etc.

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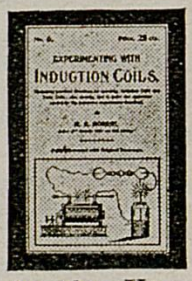
1. Instruments for Testing the Presence of an Electric Current; Detectors, Galvanometers. 2. Instruments for Measuring the Pressure or Quality of an Electric Current; Amperemeters, Voltmeters. 3. Instruments for Measuring Electrical Resistance; Wheatstone Bridge. 4. Instruments for Measuring Static Electricity. 5. Practical Details of Construction. 6. The Principles upon which Electrical Measuring Instruments Work. 7 and 8. How to Choose and Use Electrical Measuring Instruments.

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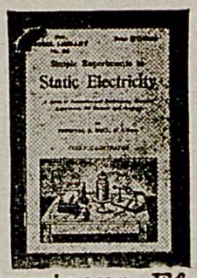
Introduction. The kind of coil available. 1. The Handling of a Ruhmkorff Coil. The Ruhmkorff Coil. Discharges. Battery for the coil, etc. 2. Experiments with Sparks. Increasing the spark length. Disruptive effects. Polarity of terminals, etc. 3. Effects in the Vacuum. Florescence. Vacuum tests. Geissler tubes, etc. 4. Induction and Wireless Telegraphy. Hertz induction apparatus. Resonator. Spiral induction coil, etc.

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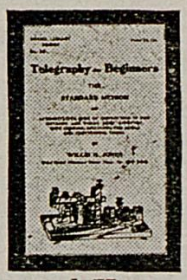
Antennæ or aerials to catch the waves, etc. 2. Marconi's coherer. The coherer mixture of metals. The spark coil or transmitter, etc. 3. Metal towers. Ground connections 1. How the waves are made. How the waves are received. and antennæ conections. Use of gas pipes for ground, etc. 4. Power required for long distance wireless telegraphy. Dimensions of coils for different spark lengths. The telegraphic codes, etc. Table 1. Heights for antennæ, with distances between stations. Table 2. Brass knobs 8/10 inches in diameter. Table 3. Dimensions for different spark lengths.

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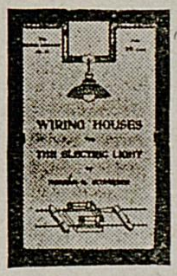
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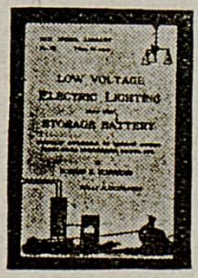
1. The Theory of the Accumulator. 2. How to make a four-volt pocket Accumulator. 3. How to make a Twelve-volt Accumulator. 4. **Types of** Small Accumulators. 5. How to charge and use Accumulators. 6. Applications of Small Accumulators. Useful Receipts. Glossary of Technical Terms.

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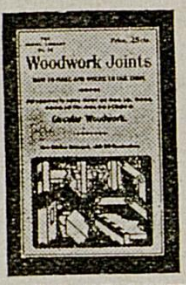
1. Introductory. 2. Construction. 3. Lines. Indoor Lines. 4. Signalling Apparatus. 5. Batteries. Open Circuit Batteries. Closed Circuit Batteries. 6. Practical Operations. How to Test the Line. 7. Battery Telephone. Three instruments on One Line. 8. General Remarks. Index.

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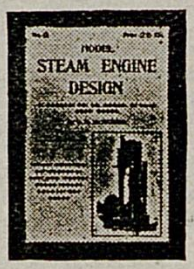
1. The Natural Rights of Invention and the Public. 2. The Business of Inventing. 3. The Nature of a Patent and Patentability. 4. The Considerations for which a Patent is Granted. Novelty and Full Disclosure. 5. Sole and Joint Invention and Joint Ownership. 6. Protection Before Applying for a Patent. Caveats. 7. The Application for Patent and Its Preparation. 8. Patent Office Procedure. 9. Transfer of Patent Rights.

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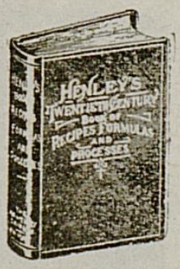
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3. How to Make an Electric Motor.
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6. How to Make a Magneto Machine.
7. How to Make a Medical Induction Coil.
8. How to Make a Pocket Accumulator.
9. How to Make a Plunge Battery.
11. How to Make a Galvanometer
12. How to Make a Hand Dynamo.
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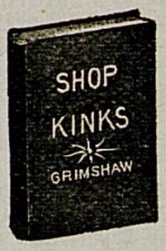
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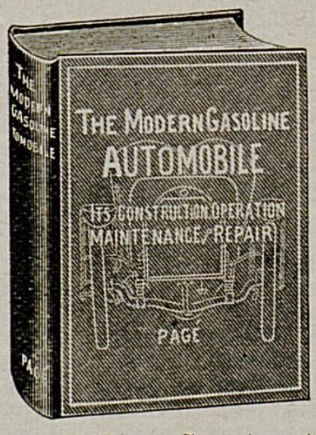


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AUTOMOBILE BOOKS

(See also Page 214)

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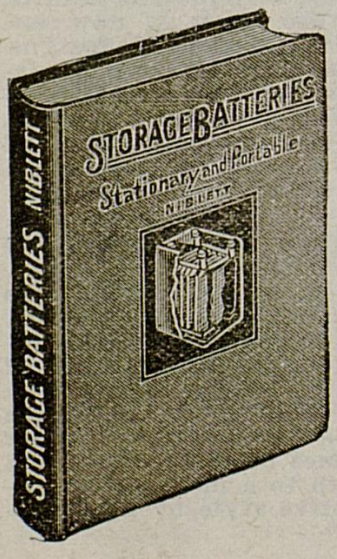


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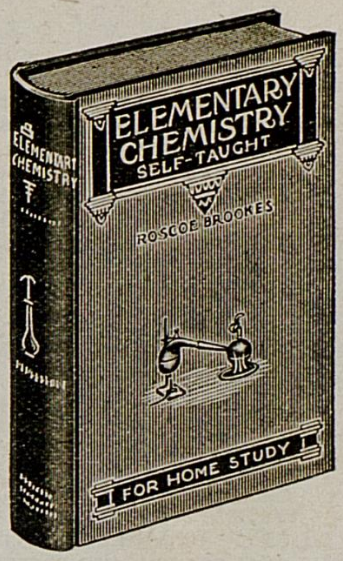
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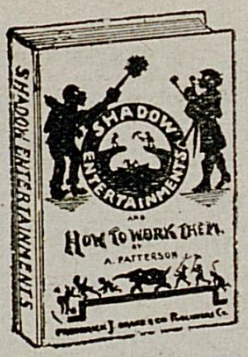
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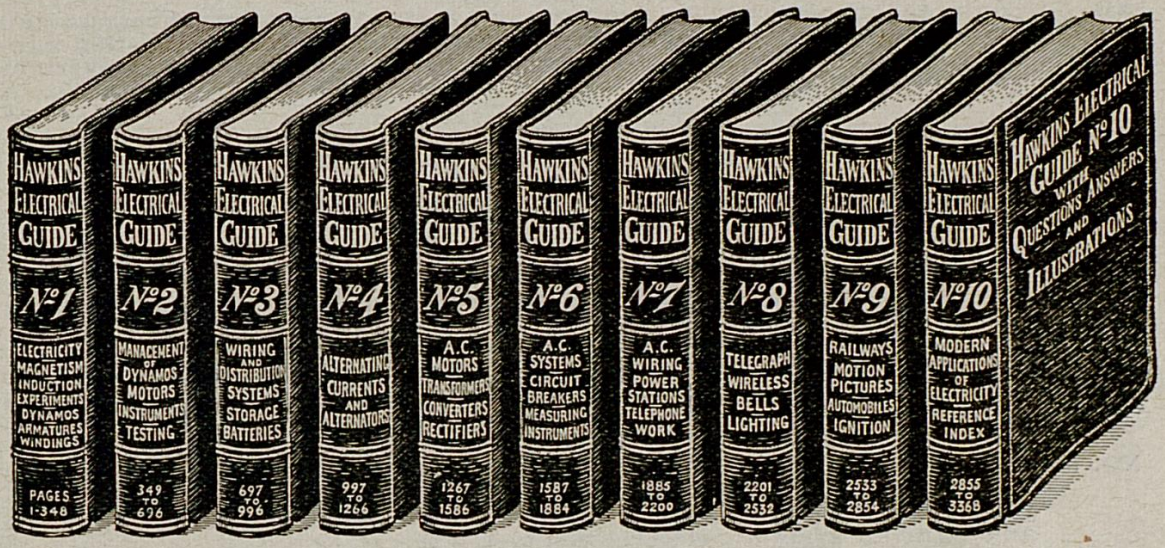
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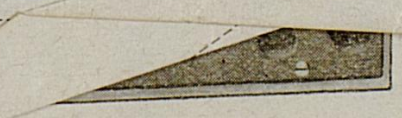
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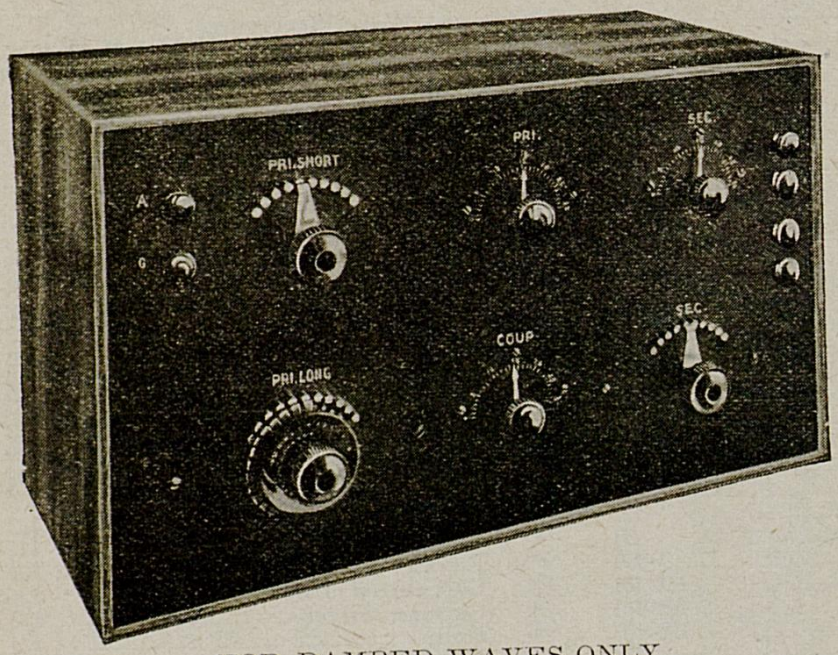
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ADDENDA

Cuts and descriptions of the following Wireless Instruments were not available for listing in proper place in Catalog.

No. 846 2 K. W. Hytone Transmitter, consisting of same instruments as the 1 K. W. set listed on page 9 of catalog. Price.....$525.00

TYPE S RECEIVING SET



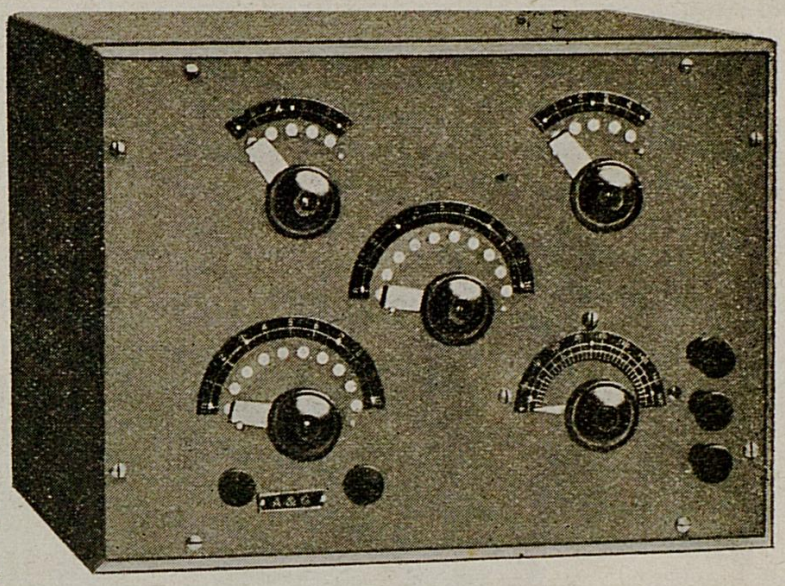
FOR DAMPED WAVES ONLY

This Receiving Set is absolutely modern in every particular, combining all the newest and most up-to-date ideas in receiving sets for spark stations. As shown in the illustration, the entire set is mounted on a single bakelite panel enclosed on all sides by a highly finished mahogany cabinet. Close attention has been given to every detail of finish, workmanship and design and each instrument has been carefully balanced with the rest to make one harmonious whole. The primary is equipped with a dead end switch which divides the primary into small groups of a few turns each and only connects into circuit such number of groups as are required. The first group is still further divided by the 10-point plain switch for close adjustment. Variable condensers are also connected across primary and secondary and the coupling is varied by means of the lower center knob marked "coupling.' This set will respond to wave lengths up to 3000 meters with an antenna 80 feet or more in length and is equally useful on short wave lengths on account of the dead end switch which eliminates the losses usually present. Rubber composition binding posts are used throughout and one pair of these are for antenna and ground connection. The two remaining pairs of binding posts are for connection to detector and telephones and special connections are made and suitably marked so that an Audion Detector may be connected to the set without any change in its wiring.

The beauty, convenience, and efficiency of this set cannot be excelled. This apparatus is listed without telephones or detector, a complete line of which will be found elsewhere herein.

Dimensions 18¼x11x8 inches deep. Shipping weight 18 pounds.

No. W780. Type S Receiving Set.....$100.00



Our Type "UL-5" receiving set has been developed in response to a great demand for a scientificaly designed receiver, with sufficient range to receive from the recently erected long wave, long distance stations operating on the undamped wave system.

There has been a well recognized tendency during the past few years towards very long wave lengths, for long distance transmission, and stations that before the war, were operating around 10,000 meters, have in some cases increased their wave length from 40% to 50%. When it is remembered that an increase of 41% in wave length, means 100% increase in the size or number of loading coils, with the consequent great difficulty in maintaining oscillations, it will be seen that these new very long wave stations will be difficult to receive.

The "UL-5" employs an entirely new system, which has a large number of startling advantages over anything previously offered. Although it has a guaranteed wave length range considerably in excess of 16,500 meters, yet the set is entirely self contained, and employs no external loading coils or couplers. The coupling to the antenna is variable by means of a special arrangement, which does not involve the use of a loose coupler either inside or outside the cabinet. One adjustment tunes both antenna and oscillating circuit, thus, eliminating the possibility of mistuning between these two circuits.

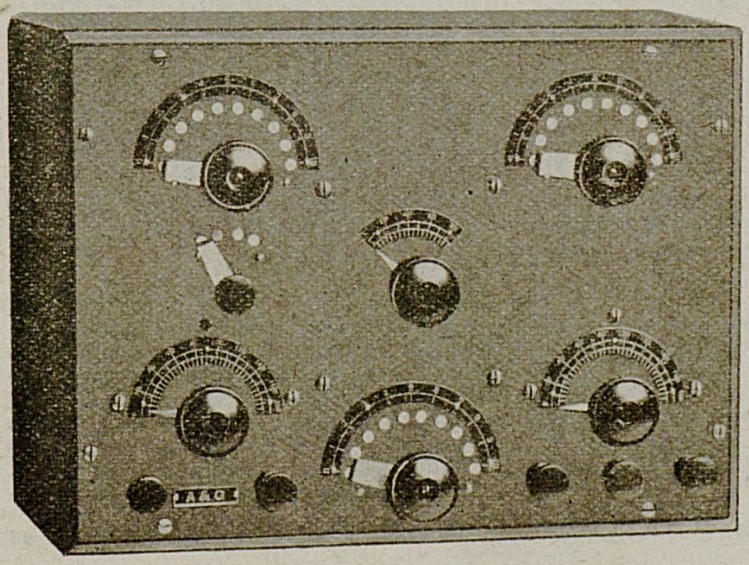
When used in connection with any of our panel detectors sets, with which it is designed to operate, it will easily oscillate over its entire range. When connected to a fair sized antenna at our laboratory, the following foreign stations were copied, in addition to numerous others at shorter distances:

Lyons, France; Nantes, France; Carnarvon, Wales; Rome, Italy; Nauen, Germany; Eilvese, Germany; San Diego, California; Pearl Harbor, Honolulu.

While it is manifestly impossible to guarantee that these results will be repeated on every antenna, yet with a fair-sized antenna results equally satisfactory should be obtained during favorable periods.

We unhesitating guarantee that this set will fulfill every claim made for it, or the purchase price will be promptly refunded.

Type "UL-5" Receiving Set ----------$50.00



The type "UM-3" receiving set is intended primarily for general spark reception and makes an ideal equipment for the advanced amateur. It has a wave length range from 200 to 2500 meters, and in this range covers nearly all spark stations operating at the present day. It is adapted for use with either bulb or crystal detector, but is especially designed for use in connection with our Panel Sets as a regenerative receiver of extreme amplification for spark signals.

A new circuit of extreme simplicity of op-

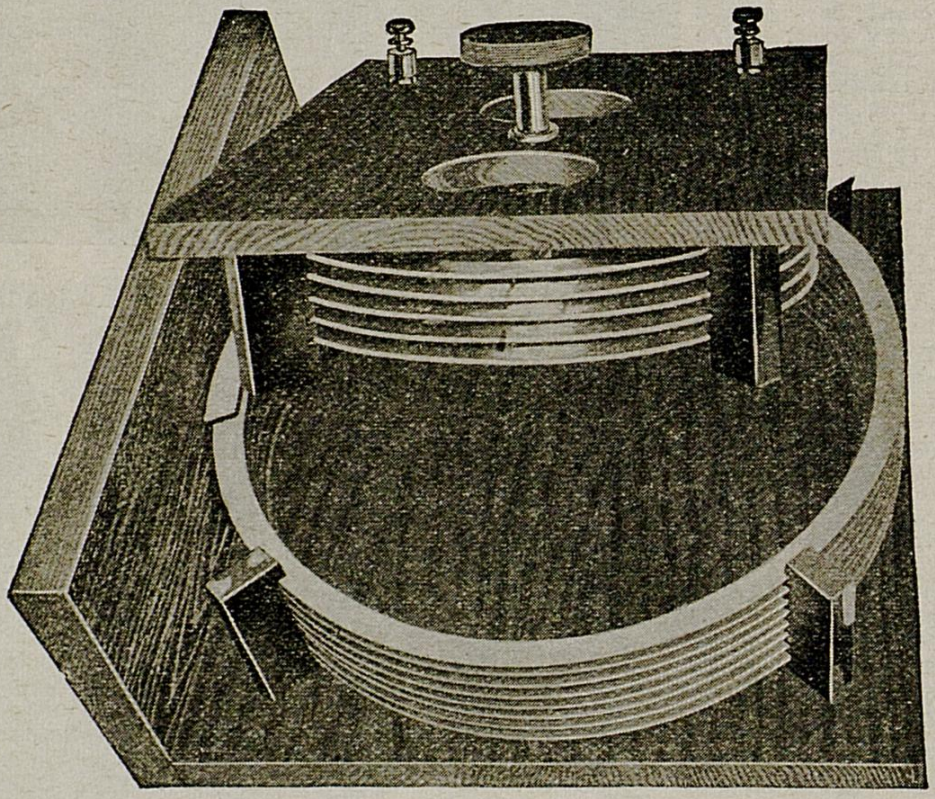
eration is embodied in this receiver and the experienced operator will immediately note the absence of the numerous and complicated adjustments, hitherto thought indispensable, with high amplification regenerative circuits and at the same time most remarkable amplification of signals.

By proper setting of the regenerative adjustment, the receiver can be made to oscillate and thus receive continuous wave signals in addition to the damped wave spark signals. This feature will probaby prove of increasing interest, as the use of continuous wave bulb transmitters, operating on short wave lengths, becomes more general .

The construction is of the highest grade in every particular and is a remarkable value for the price.

Type "UM-3" Receiving Set $60.00

BLITZEN RADIOCOUPLER



The Blitzen Radiocoupler is of a type commonly met with in commercial practice and offers all the advantages of the more expensive types at a minimum cost. The oak framework, finished dull black, carries slotted bakelite arms which support the primary and secondary windings. Primary consists of five turns edgewise copper strip, 7½ inches inside diameter; secondary six turns edgewise copper strip, 10¾ inches inside diameter.

The Primary is continuously adjustable by means of a projecting handle, as shown in the illustration, while helix clips of our standard type are fitted to the secondary. The instrument is 13½ inches long, 12 inches high and 4½ inches deep fully closed. Net weight 10 pounds. Shipping weight 25 pounds.

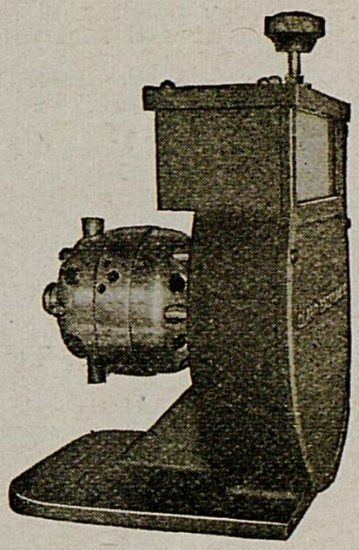
No. W652. Blitzen Radiocoupler $15.00
No. W651A. Helix Clip ..... .35

MOORHEAD TRANSMITTING OSCILLATOR. TYPE B, Price $6.50

Type B Moorhead Transmitting Oscillator is primarily designed for transmitting and is made in accordance with the latest discoveries relating to vacuum valve transmitting sets, although very good results are obtained by using it as a receiver. Using the circuits furnished with this bulb, sufficient radiation is obtained when 500 volts are applied to the plate to cover a distance of 200 miles, daylight, either telephone or telegraph. This bulb is exactly the same as those being furnished the United States Navy at the present time. Licensed under Fleming patent No. 803684—for amateur and experimental purposes only.

Type B Moorhead Transmitting Oscillator..... $6.50. Insured parcel post .07

THE CAMBRIDGE SEMI-QUENCHED ROTATING SPARK DISCHARGER



Completely enclosed. Glass front permits inspection of spark. Variable speed motor. A substantial Spark Discharger in one unit.

The Cambridge Spark Gap comprises a substantial iron casting, finished in black, which completely encloses the rotating and stationary sparking electrodes, largely eliminating the objectionable noise of the spark and removing the blinding flashes which are very injurious to the eyes, due to the large amount of ultra violet light usually present. The front of the casting is removable, however, and its upper portion is cut away and a glass window inserted to permit the operation of the spark to be viewed, if desired. The motor for driving the rotating element is the highest grade variable speed series wound motor obtainable and, unless otherwise specified with order, is wound for 110 volts 60 cycles A. C. This motor is bolted directly to the back of the spark gap housing, insuring a permanent relation between the rotating and stationary electrodes with a minimum of vibration. All electrodes are of pure copper, the rotating member being patterned something after a circular saw, rotating backwards so that there is an instantaneous break and no tendency for the spark to "drag." The rotor is insulated frmo the motor shaft by a bakelite disc of unusual thickness and is in itself a heavy copper casting, so that all danger of getting out of true and "wobbly" is avoided.

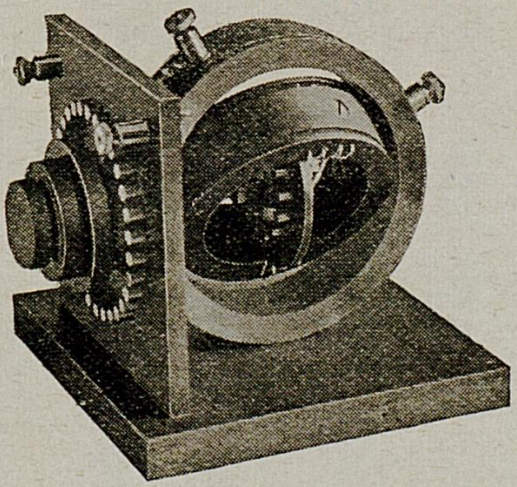
The solid, substantial construction of the Cambridge Spark Gap will outlast several of the ordinary kind, its correct design will increase the effiiciency of your circuit and the feature of variable speed, coupled with well-thought-out design, will give you almost any tone you wish. Variations of from 2000 to 8000 R.P.M. are possible and the rotary electrode has sixteen teeth or sparking points.

No. 741. Cambridge Rotating Spark Discharger complete with cord and plug ---------- $36.00

(Shipping weight, 18 lbs.)

No. 741A. Motor only on cast iron base and frame with cord and plug---- 18.00

BLITZEN RECEIVING TRANSFORMER



The Blitzen receiving transformer represents the latest advances made towards the ideal tuner. A large number of wireless experts and professional operators have a preference for this type of tuner. Our Blitzen Receiving Transformer has been brought out to meet the demands of an ideal tuner embodying, we believe, to the greatest degree of perfection yet attainable, all the best features of this type of receiving transformer. It is constructed entirely of hard rubber and finely nickel-plated brass, and is mounted on a highly finished mahogany base. It has two cylindrical coils, one siding in and out of the other. The cois are wound on two hard rubber rings, one inside the other the one coil arranged to rotate so that the coupling can be varied with the greatest ease. The sliding contacts are not on the wire, taps being brought out from both coils to switch points, 30 on the primary and 12 on the secondary. To give the greatest convenience in operating, all adjustments are made on the front of the instrument, and upon the square hard rubber front are placed three knurled concentric handles, one for tuning the primary, one for the secondary, and one for operating the coupling. The binding posts are also mounted in the most convenient and accessible manner possible.

This transformer will be welcomed by thousands of wireless operators, who will be quick to appreciate its many points of excellence. With average antenna, it will respond to wave lengths up to 1,500 meters. Weight, 24 oz. Shipping weight, 2 lbs. Dimensions, 4" wide, 4" high, 6" deep.

No. 60X68 Blitzen Transformer ---------- $12.50

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Every teacher of radio, whether teaching in college or Government training school will find this a valuable reference book for daily use.

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Part I.—Theoretical basis of radio measurements. The fundamentals of electromagnetism. The principles of alternating currents. Radio circuits. Damping.

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No. 1952 for local battery $1.00
No. 1953 for common battery 1.00
No. 1954 for detectiphone 1.00

Parcel post insurance extra 5c.

Note: The type for local battery is designed for use on two line telephone system. The type for common battery is designed for use in intercommunicating systems or where a common battery is used for several phones.

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"The Laundry Queen"

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The wringer swings to any position. You can arrange your rinse and bluing tubs and basket so there will be no lifting to do until the wash is ready for the line. The cover, with the dolly, swings also. Shift it over the rinse tub and the dolly does that work for you, too.

The wringer rolls turn in either direction, or remain motionless, by simply moving a convenient handle.

The wringer and washer can be used at the same time if you wish.

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The Washer stops the instant cover is raised, without disconnecting any lever or making any adjustments.



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The wringer of the **Laundry Queen** not only swings but locks in any position! You don't have to hold it steady. It is high enough to swing clear over stationary laundry tubs, too.

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As a precaution against injury to the rolls—in case a stick or clothes pin should inadvertently start through; here's a safety device which instantly releases all compression on the rolls. Whatever should happen to be between them may be easily removed without having to wring it back again.

NO LIFTING—NO STOOPING FROM THE LAUNDRY QUEEN TO THE LINE

This is going after Blue Monday with a vengeance. In using the **Laundry Queen** with detachable bench, your tubs and baskets can be arranged so you need do no stooping or lifting from the time you put the soiled clothes into the machine until they are ready for the line.

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One bench provides space for one extra tub, two for a tub and a basket and three for two extra tubs and a basket. When not in use these benches may be removed and placed under the main bench out of the way. Lugs on the extension fit over the main bench. No tools necessary to attach or remove.

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There is only one machine that will measure up to these requirements—the Laundry Queen.

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