RADIO Engineering

The Technical Magazine of the Radio Trade ~ *Edited by* M. B. SLEEPER

JANUARY 1926

VOL. VI NO. 1

20c

"These Eveready Batteries are the correct size for your set. With average use they will last you a year or longer"

"You have been one of the many who use 'B' batteries that are too small in capacity for their receivers. That makes you buy 'B' batteries twice as often as necessary. Fit the right size Evereadys to your set and add a 'C' battery,* if you haven't one, and you'll get maximum service at minimum cost."

The life of your Eveready "B" Battery depends on its capacity in relation to your set and how much you listen in. We know, through investigation, that the average year-round use of a set is two hours a day. Taking that average we have proved over and over on sets of one to three tubes the No. 772 Eveready "B" Battery used with a "C" battery will last a year or longer. On sets of four and five tubes, the larger heavy duty Eveready batteries used with a "C" battery will last eight months or more.

Here is the secret of "B" battery satisfaction and economy—

With sets of 4 or more tubes, use either of the Heavy Duty Batteries, No. 770, or the even longer-lived Eveready Layerbilt No. 486.

We have prepared a new booklet, "Choosing and Using the Right Radio Batteries," which we will be glad to send you upon request. This booklet also tells about the proper battery equipment for use with the new power tubes.

Manufactured and guaranteed by
NATIONAL CARBON CO., Inc.
New York San Francisco
Canadian National Carbon Co., Limited, Toronto, Ontario

*Note: In addition to the increased life which an Eveready "C" Battery gives to your "B" batteries, it will add a quality of reception unobtainable without it.

LEFT—*Eveready Layerbilt "B" Battery No. 486, 45 volts, for maximum economy on four, five or more tubes.*
RIGHT—*Eveready Dry Cell Radio "A" Battery, 1½ volts. The battery built especially for dry cell tubes.*

EVEREADY
Radio Batteries
-they last longer

EVEREADY HOUR
EVERY TUESDAY AT 9 P.M.
Eastern Standard Time

For real radio enjoyment, tune in the "Eveready Group." Broadcast through stations—

WEAF—*New York*
WJAR—*Providence*
WEEI—*Boston*
WTAG—*Worcester*
WFI—*Philadelphia*
WGR—*Buffalo*
WEAR—*Cleveland*
WCAE—*Pittsburgh*
WSAI—*Cincinnati*
WWJ—*Detroit*
WOC—*Davenport*
WCCO—*Minneapolis, St Paul*
WGN—*Chicago*
KSD—*St. Louis*

silent power

...from your lighting socket

THE most rigid specification set for the Duo-Rectron, the new RCA "B" battery eliminator, was that it be silent—hum-free. The hum of the 110 volt, 50 or 60 cycle line current has been filtered out by a special filter system. And the perfection of this system is guarded by minutest care in manufacture.

In many important points the Duo-Rectron meets demands never met before.

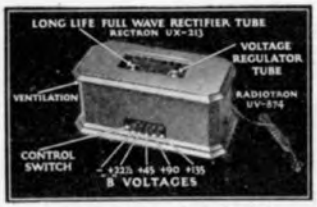
One new feature is a *voltage regulator*—a new tube that keeps plate voltages constant. The Duo-Rectron has taps for 22½, 45, 90 and even 135 volts. Hook up where you will, you get the voltage marked—no more—no less. This means that whether you have a one tube set or a ten, you can depend on the Duo-Rectron for the correct voltage, under any current drain, all the way up to 50 milliamperes.

The new rectifying tube, Radiotron UX-213, is built for long service—designed especially for this power unit.

Everything has been considered in the RCA Duo-Rectron — silent power, reserve power, economical power, constant power!

* * *

The RCA Uni-Rectron is a power amplifier for loudspeakers. Connect it with the first audio stage of any set and get super-power amplification from an A.C. socket. Price complete, **$105**



RCA Duo-Rectron, complete $65

RCA Duo-Rectron

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RADIO ENGINEERING

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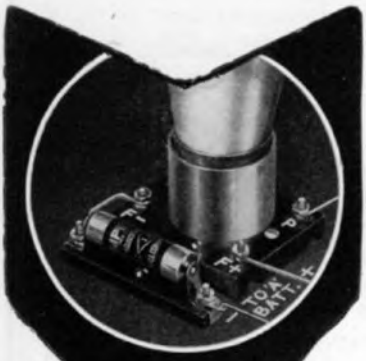
AMPERITE

REG. U.S. PAT. OFF

The "SELF-ADJUSTING" Rheostat



A BASIC Need in Every Circuit

BECAUSE—AMPERITE not only modernizes any set—it keeps it modern.

1—Eliminates Hand Rheostats, thereby simplifying control.

2—Permits use of the latest types of tubes or any combination of tubes.

3—Simplifies and reduces set-wiring, thereby making for greater compactness and avoids losses.

4—No moving parts, hence no grinding noises; clear and full tones.

5—Prolongs tube-life by keeping filaments at a constant temperature.

6—No filament meters needed.

7—Brings the most out of each individual tube — automatically—no guessing.

8—Makes every set-owner a master operator, no knobs to turn.

Write today for FREE Hook-Ups

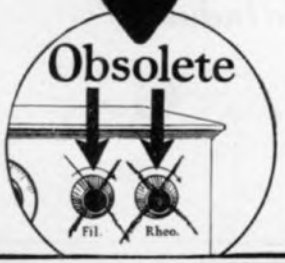
Sold Everywhere

$1.10 complete with mounting (in U. S. A.)

AMPERITE is used in every popular present-day construction set. Why? Because of its many outstanding exclusive features, and because it solves the perplexing problem of tube-control — COMPLETELY and AUTOMATICALLY.

For the new tubes:

Amperite No. 112—for the UX-112 and CX-112
Amperite No. 120—for the UX-120 and CX-120



TUNE-RITE

"The STRAIGHT LINE" FREQUENCY Dial

Radiall Company

Dept. R.E.—1, 50 Franklin Street, N. Y. City

Be sure that the set you buy or build is equipped with AMPERITE

Can You?

AT production cost valuation, there are between ten and fifteen million dollars tied up in worthless radio parts and sets which, if they can be sold at all, may not bring five cents on the dollar.

Over 150 companies which were advertising nationally last January have failed or stopped manufacturing radio equipment. What is the reason for this extraordinary condition?

This apparatus is worthless because it lacks technical merit. It was designed by men ignorant of radio requirements. It was rejected by the technical men in the dealer and jobber organizations, men trained by experience to recognize genuine worth which assures customer satisfaction.

An accurate test of your parts or sets is this: Can you advertise them in **Radio Engineering?** Do you have to keep away from the technical men in the dealer and jobber organizations? Must you put high pressure on their merchandise men to sell them before their technical men discover weakness in your products?

Or have you got something good enough that you can get the support of these men by telling the technical story of your equipment?

It is significant that the highest credit ratings in the radio industry are represented by companies advertising in **Radio Engineering.**

Radio Engineering readers absolutely control the buying power of the Radio Industry

This is the sixth of a series of six advertisements published to show frankly and truthfully, the exact status of Radio Engineering as a publication—its circulation, range of influence, editorial policy, class of readers, position as an advertising medium, and why it has been accepted as the leading technical magazine of the Radio Industry.

6

Separate All Stations Evenly

IT is not necessary to tear down and rebuild your present set in order to separate the stations evenly on the dials. By merely substituting *Rathbun Straight Line Frequency Converters* for your present dials—you will be able to secure real S. L. F. tuning.

Here is a variable vernier control that provides a ratio of 50 to 1 down where the stations are crowded—gradually and smoothly decreasing in uniform ratio over the full 360° of the dial. The stations are evenly separated around the entire circle. There are only two moving parts—a cam and a lever. The action is dependable and accurate—without a particle of backlash. Easier tuning and immeasurably better logging are obtainable from straight line capacity condensers with these new converters.

Remember that we build the *Rathbun Single Hole Mounting Condenser* with genuine Bakelite ends. This year's models are enclosed with transparent pyralin dustbands which preserve their high efficiency for life. They are small, light and rugged—*always reasonably priced.*

Ask your dealer for Rathbun Straight Line Frequency Converters
He has them in stock or will get them for you promptly

PRICE $3.50

RATHBUN MANUFACTURING CO., INC.

JAMESTOWN, N. Y.

Metaleak

—the new Dubilier Resistance Unit

THE METALEAK—an accurate and constant resistance unit—involves an entirely new principle of manufacture.

An extremely thin coating of metal possessing distinct properties of resistance, is deposited on a glass rod of thread-like proportions. This tiny glass rod is then hermetically sealed in a glass cartridge. Due to this filament, the Metaleak is absolutely noiseless in operation under all service conditions.

The Metaleak type is particularly adapted for use with the 640A Micadon in resistance coupled amplification, but it can be used in any grid mounting. In all standard values.

Guaranteed accurate within 15% of its rated value.

Dubilier

CONDENSER AND RADIO CORPORATION

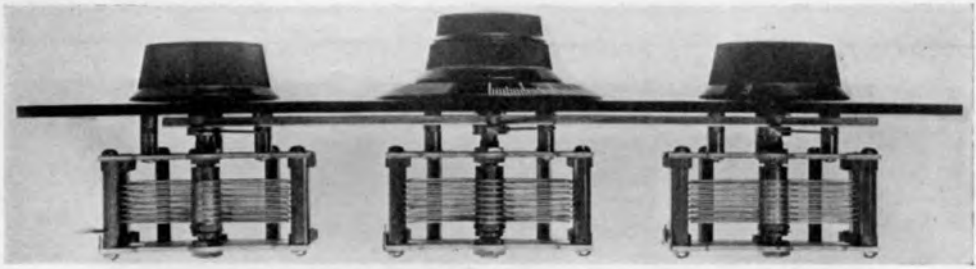


Fig. 1. The smaller knob on the center condenser turns all three units. The larger center knob, and the outer knobs are verniers.

Gear and Pinion Device for Uni-Control Tuning

A Uni-Control tuning kit for sets using three variable condensers

*—By Charles Shank**

MORE time has been spent this fall in devising methods for Uni-Control tuning than on any other part of radio receiving set design. There are several sets now manufactured which have single controls, with or without separate adjustments, but, for all the cleverness that has been put into the problem of single tuning, most of these arrangements have fallen down for purely practical reasons.

The Aristocrat E-Z-Toon Group Control Kit has been worked out to overcome the faults that both set builders and manufacturers have found in their attempts to solve this problem. Some of the first designers used single plate verniers, but the single plate adjustment, we found, has been abandoned by condenser companies for mechanical reasons, chiefly because of the difficulty in getting positive connections and at the same time maintaining enough freedom of movement between the main and vernier plates so that both would not turn when one was adjusted.

Multiple condensers have been made with one set of variable plates loose on the shaft, allowing a separate adjustment of the capacity on the first condenser. That idea was all right, but it did only half the work, for, when the main dial was turned to increase the capacity, it was only possible to reduce the capacity on the individually controlled plates. On the other hand, after the main control was turned to reduce the capacity, the separate adjustment could only increase the adjustable unit.

Actual experience shows that it may be necessary, after turning the main dial, moving all the condensers, to increase or decrease one of the separate condensers. That is a very important feature of the E-Z-Toon Group Control.

When the preliminary adjustment is made, the vernier on each condenser is set at approximately the center of its movement. Then a station is brought in by the master control which carries a calibrated scale. If, at any point in the wavelength range, a vernier adjustment is needed on any one of the three condensers, that condenser can be increased or decreased in capacity.

Sufficient compensation is allowed in this way to take care of any ordinary variations in the tuning inductances or errors introduced by distributed capacity in the wiring. At the same time, the skillful set builder will use as much care as possible to match the inductances.

Particularly if conductive coupling is employed to the antenna circuit, different antennas call for different settings of the first condenser. In that case, the rack is simply sprung up enough so that

* Chief Engineer Kurz-Kasch Company.

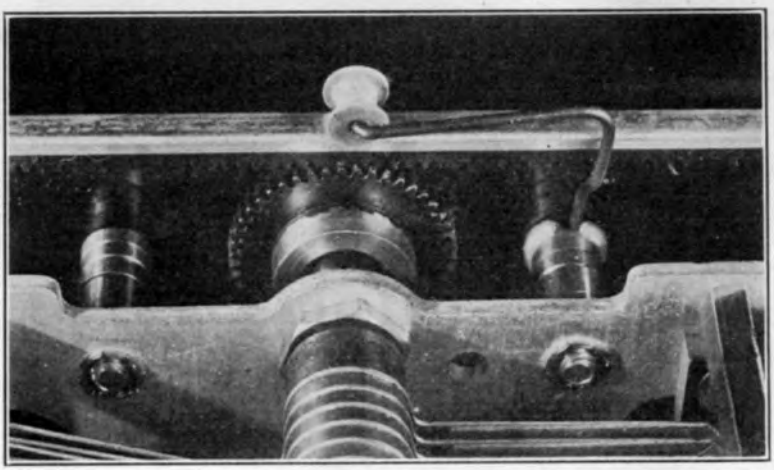


Fig. 2. Detail of the rack and pinion, showing the take-up tension. Note that there is nothing extra to mount on the panel.

the variable plates can be put at the nearest setting. In all probability, no additional vernier adjustment will be required.

As for the vernier knobs themselves, they provide a reduction of 50 to 1, and they are entirely without back-lash. The knobs can be pulled right off, without the necessity for using set screws. The vernier assembly can be removed by loosening the set screw which goes on to the shaft and the set screw on the brass collar of the Bakelite pinion. It should be noted that, with the Bakelite pinion and the Bakelite rack, reinforced by a nickeled ferrule, the condenser rotors are entirely insulated from each other. This, in some circuits, is absolutely essential. The master dial comes off by unscrewing the front knob and the chuck nut inside.

Here is some real material for the set builder or designer who wants satisfactory practical operation for a Uni-Control set.

Transformer First or Last?

The engineering answer to the question as to whether an amplifier combining one transformer and two resistance coupled stages should have the transformer first or last.

Shortly after the first resistance coupling units were brought out by manufacturers, Radio Engineering published an article on a combined transformer and resistance coupled amplifier planned to preserve most of the resistance coupling quality, combined with an increase in volume due to the use of a transformer instead of a resistance unit for the extra stage.

This arrangement has been employed in a variety of sets, from time to time. While the development of the RX-1 was in process, however, we discovered that the idea of using a transformer stage followed by two of resistance was very much in error from the point of view of producing quality.

It was rather surprising, therefore, to see one of our contemporaries show this combination in the design of a receiving set intended particularly for high quality.

The claims made for it are not in keep-

ing with the tendency toward conservatism. Moreover, the technique was faulty.

Occasionally one hears an argument concerning the amplification of distortion in an A. F. transformer when followed or preceded by resistance coupling. The common arithmetic of amplification shows that the amplification of distortion is the same regardless of the sequence of the stages.

The defect of an amplifier using a transformer followed by resistance stages is from an entirely different source.

In any resistance coupled amplifier, whether of three stages or of two stages with one of transformer coupling, the louder the signal the greater the negative charge on each tube. In an amplifier having a transformer stage first, followed by two of resistance, a very high negative charge is accumulated on the grid of the last tube. We all know that, as the negative charge is increased, the plate current falls, owing to the fact that the plate impedance is greatly increased. Therefore, the last tube, working from the output of a resistance coupled stage has a negative grid charge so high that the plate circuit, in which the loud speaker is connected, has an impedance several times its normal value. This impedance, made up chiefly of resistance in the tube, does not change appreciably with the A. F. frequency.

The impedance of the loud speaker, on the other hand, is high at high frequencies, and very low at A. F. frequencies up to 150 or 200 cycles. Therefore, we have the effect, at low frequencies, of a high impedance tube working into a loud speaker of very low impedance. This is contrary to all established practice which calls for an impedance in the loud speaker as high or higher than that of the tube.

The net result is that the low frequencies are practically wiped out.

Putting the resistance coupling first, and the transformer last, does not increase the effect of whatever distortion there may be in the transformer. This effect is present with either arrangement. It does, however, give the transformer a much better chance to make a good showing, for there is not the tendency to collect an excessively high negative charge on the grid of a tube working from a transformer.

In actual practice, other effects may be found which have a tendency to partly overcome the inherent disadvantage of an amplifier using a stage of transformer coupling first, or there may be effects which will enhance distortion from such a source.

Good design practice, however, based on a familiarity with the technique of amplifying circuits very definitely precludes the use of a transformer in the first stage of a combination circuit. Moreover, this is one of the effects predicted by theory which is borne out in practice. Consequently, the old-fashioned practice has been quite generally abandoned.

THE United States Civil Service Commission announces the following open competitive examination:

Chief of the Radio Service.

Receipt of applications for chief of radio service will close January 5. The examination is to fill vacancies in the office of the Secretary, Department of Agriculture, Washington, D. C., and vacancies in positions requiring similar qualifications.

The entrance salary for this position is $3,800 a year. After the probational period of six months required by the civil service act and rules, advancement in pay may be made without change in assignment up to $5,000 a year. Promotion to higher grades may be made in accordance with the civil service rules.

The duties are to supervise the distribution by radio of educational information from the U. S. Department of Agriculture. The chief of the radio service will be expected to make and execute comprehensive plans for the educational use of radio by all offices and bureaus of the Department, and to arrange for the preparation of addresses and assist in the adaptation of these to the needs of broadcasting.

Competitors will be rated on their education and experience; and a thesis and published manuscripts or lectures to be submitted with the application.

Full information and application blanks may be obtained from the United States Civil Service Commission, Washington, D. C., or the secretary of the board of United States civil service examiners at the postoffice or custom house in any city.

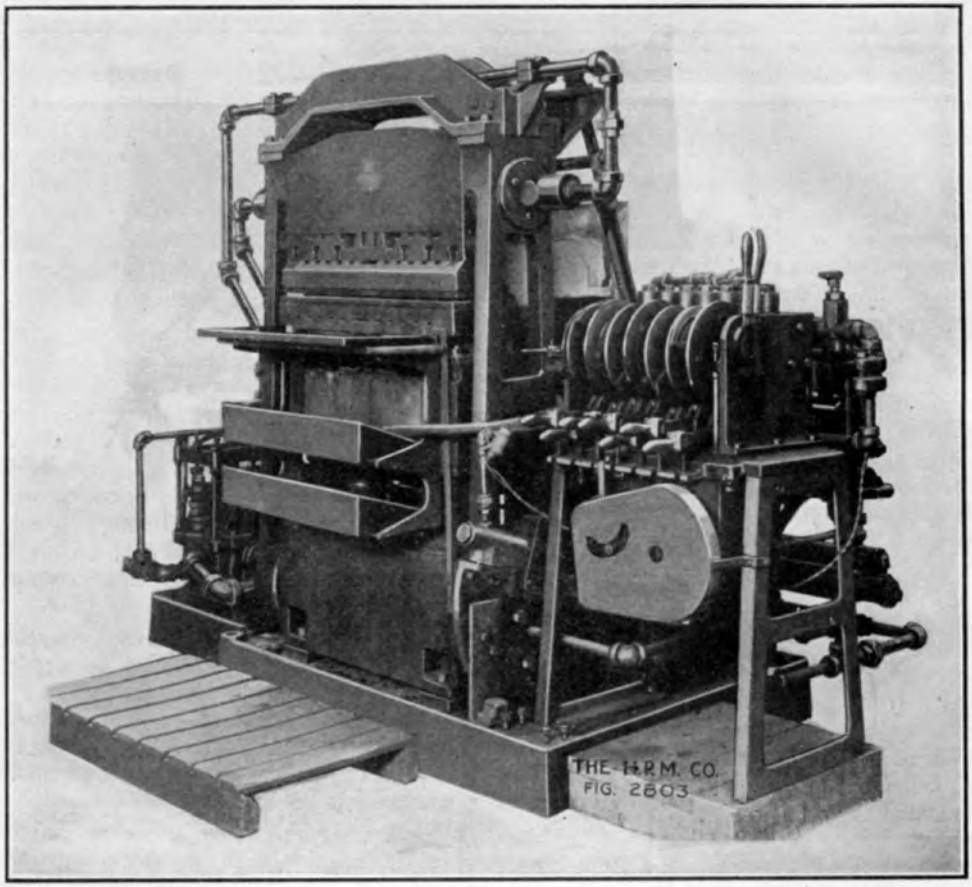


Fig. 2. This 7-unit press works all by itself. It does everything except to put the pieces in the shipping cartons. Free from the human elements it cannot make imperfect pieces.

Production Molding

Part 3. Equipment developed for quantity molding by mean automatically operated presses — *By H. E. Eddy**

THIS, the third and last of a series appearing in Radio Engineering, and devoted to the molding of bakelite and similar material, follows an article in the September issue covering the equipment for small production and another in the November issue describing a typical job molding shop.

We are now prepared to deal with the production of molded parts on a large quantity basis through the use of automatic equipment, with bakelite, shellac or cold molded material.

It is assumed in advance that those interested in automatic molding equipment desire to make long runs of certain parts and to thus warrant the expense of the multiple-cavity molds used in automatic presses.

Where such quantity production is possible, automatic operation results in reducing the cost of labor, eliminating defective parts, and makes possible the production of parts very difficult to make by hand.

The size and capacity of the automatic press should be governed by the part it

* Hydraulic Press Mfg. Co.

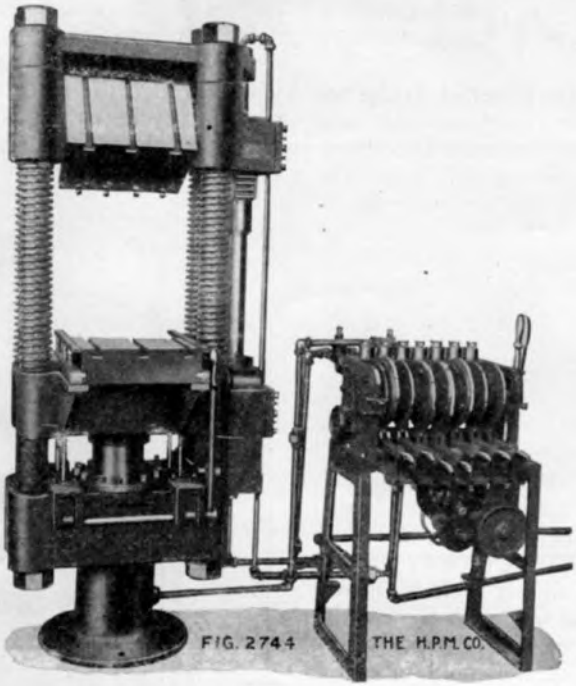


Fig. 1. A press with a revolving head and sliding tables fitted with a 7-unit automatic control.

is desired to mold. Economical operation prescribes the use of chambered multiple cavity molds, which entirely fill the press platen.

Automatic press platens are usually of a size and shape which will enable the operator to conveniently load and unload the molds.

Typical sizes are 16 ins. across the front by 10 ins. deep, 20 ins. across the front by 14 ins. deep, or 31 ins. across the front by 12 ins. deep. It is more convenient for an operator to handle a long narrow mold than one of greater depth.

As stated above, these molds should be made with as many cavities as can be placed properly within the given dimensions, each cavity to mold one part. A mold with forty cavities would therefore produce forty parts at one operation. The molds are drilled with passages through which steam is passed when heat alone is used or steam and water alternately when the molds are to be heated and chilled.

Automatic operation eliminates entirely the heavy manual labor due to lifting molds in and out of the press, common to hand operation. It also makes possible the use of girls or boys, or common labor and, for this reason, the two halves of the mold should be so located as to make it easy for the operator to clean and fill them, place inserts, etc.

Furthermore, for best results, the control of the application of pressure and of the timing and of the heat and cold cycle should be entirely automatic, and entirely beyond the province of the operator to regulate.

Much of the so-called automatic or semi-automatic molding press equipment now in use by the trade is automatic in trade parlance only.

The operator is depended upon to time the molding cycle, and when both heating and chilling are used, to regulate these by means of special valves, and to open up the press at the conclusion of the cycle.

In addition, it is almost impossible for the operator to examine the section of the mold attached to the head of the press,

facturing Company, is provided with a sliding table on the lower platen and with a revolving head.

Spacing blocks are attached to the tee slots provided in both head and table, and on these blocks are mounted the chambered molds. The sliding table brings the lower mold out directly in front of the operator, where it can be filled most easily and cleaned. In this position, the operator can remove the molded pieces quickly, which are automatically ejected from the mold at the conclusion of the molding cycle.

The fins, which often form between cavities of the mold, can be removed, the mold blown out by compressed air, and where inserts are to be placed in the lower section of the mold, they can be inserted readily. The mold is then filled with either a pre-formed piece or with powder.

At the time the sliding table is thrown out in front of the operator, the revolvinging head assumes a position where the upper section of the mold faces the operator ready for cleaning or placing inserts.

When operated by hand, a type of valve is used which, when the valve lever is thrown to one notch on a segment, will cause the sliding table to move into pressing position and the revolving head so that the two surfaces of the mold are parallel. Throwing the same lever one notch further will apply the pressure and the molds will close. With this method of operation, the time of the molding cycle must be controlled by the operator, and if both heating and chilling are used, it is necessary to install an additional valve, which will also be hand controlled. The press will automatically eject the finished pieces from either head or base without attention from the operator.

When so operated, a molding press of this type will eliminate the heavy manual labor incident to hand molding, but it does not eliminate the human element.

When however, it is operated by a positive mechanical timing control, as shown in Fig. 1, it achieves in their entireties the ends for which automatic molding operation is designed.

The operator merely handles the cleaning and filling of the mold and throws a control lever, which starts the timing control in operation.

The operator is then available for other work through the three minutes or so of molding cycle, as the automatic control will carry the press through the complete molding cycle and will open it up and

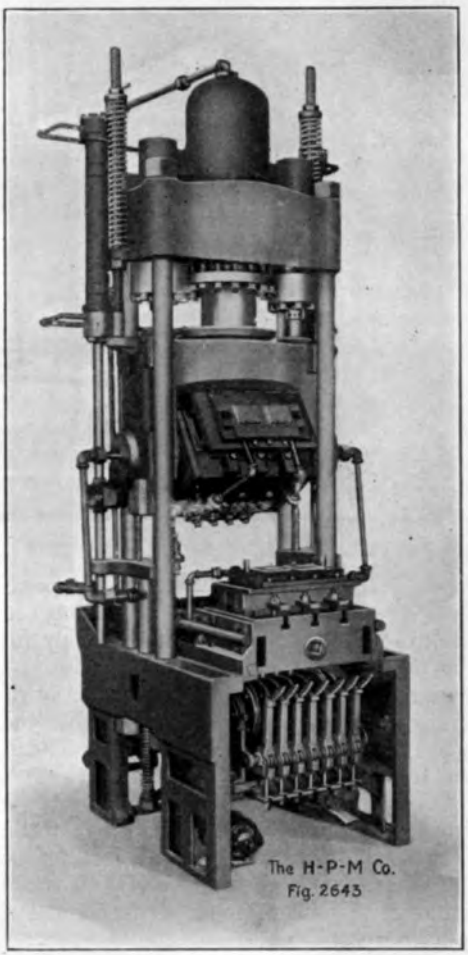


Fig. 4. Inverted press with built-in control.

eject the parts without any attention from the operator.

Furthermore, it is impossible for this particular make of press to close unless the two sections of the mold are in register. This is a most important feature, as it prevents damage of the molds, which would occur should they close out of register.

The human element, so costly in hand

except by going through certain contortions and putting his head in the press.

Such objectionable features are entirely eliminated when using the newer form of patented molding presses, similar to Fig. 1. This press, which has been developed by the Hydraulic Press Manumolding, is completely automatic. It is impossible to undercure or overcure, and the application of both low and high pressure, heating, and chilling is automatic and timed to the second.

The above remarks are applicable to the molding of bakelite or resins having the same general molding characteristics.

When used for molding shellac, the revolving head can be dispensed with, and

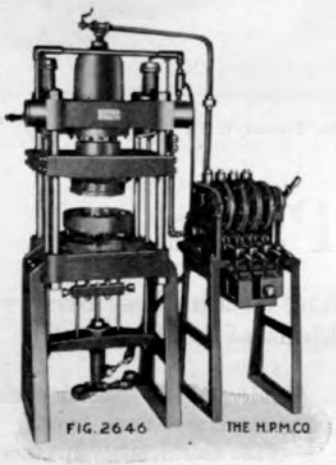


Fig. 3. A 4-unit control operating a press designed for cold molding.

for extremely rapid operation the sliding table is unnecessary, but the automatic knockout and automatic timing control result in economy and accuracy of operation.

The change from heat to cold in the mold being used for shellac is automatically accomplished by the automatic control.

For cold molding work also, certain or all of the features of this equipment are quite valuable.

There is also the inverted type of automatic molding press of a somewhat heavier design. This press is also equipped with a sliding table and tilting head, and has the automatic motor operated control built in the base.

Fig. 3 shows an automatic molding press together with motor operated control, designed for cold molding work. Through the cutting of the cams on the control, the ram can be made to drop and raise alternately a number of times in quick succession, to give the bumping effect necessary in certain cold molding work. This effect is very difficult to attain by hand operation. In the operation of such a press, the operator merely places the raw material in the mold and presses the buttons of the switches mounted on either side of the head of the press. The cycle of operation will, of course, vary but can be made to cover but a few seconds, when the operator removes the finished piece.

Where lack of quantity production renders it inadvisable to invest in chambered molds for automatic press operation, the mechanical timing so advantageous in automatic operation can be secured for the ordinary single-opening type of press, operating with either fixed or hand molds, provided the press is operated through an automatic motor driven control.

Fig. 2 illustrates a complicated type of plastic molding press, operated through such a control. Every part of the operating cycle is accurately timed, including some special movements of the press itself.

This control, perfected by the Hydraulic Press Mfg. Company, is available in a variety of sizes, from the two-unit control which merely applies and releases a single pressure to a nine-unit control which is adapted for successfully handling nine different operations during a definitely timed cycle, and to successfully perform during this cycle a series of complicated operations, for which several men and numerous valves would otherwise be necessary.

Automatic presses and controls similar to Fig. 1 or 2 may be used to take care of the production business of a job molding shop, and to operate from the same pump and accumulator system used for the hand operated presses.

Where quantity production alone is the object in view, they can be installed with high and low pressure accumulator and hydraulic pump, as illustrated and described in the November issue. When used continuously for the production of parts which do not require inserts, the low pressure accumulator can be dispensed with and the pressing accomplished entirely through the high pressure accumulator. If, however, a large number of these presses are operated, the high and low pressure system results in greatest economy.

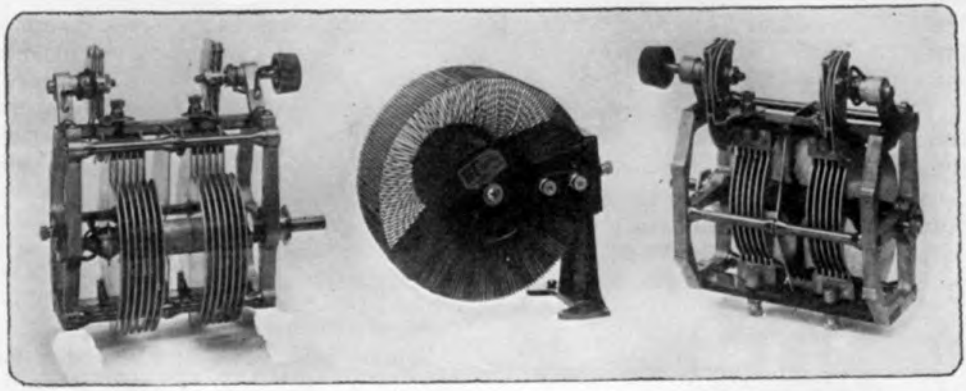


Fig. 2. Bremer-Tully tandem condensers and the Torostyle R. F. transformer.

New B-T Parts

Designed particularly for the Counterphase circuit, these Bremer-Tully parts are adaptable to all kinds of hook-ups.

The B-T universal socket, with side wiping contacts, is a real temptation to put a tube in it to see it work. Detailed views of the socket are given in Fig. 1. Molded in one piece of Bakelite, it is made with four slotted arms at the base. These guide the spring contact arms. Each arm has a semi-circular bend, to provide the spring action.

The ends of the springs are shaped so that the pins on the tube can be turned in only one direction. The movement is also limited by small shoulders on the circular molded part. Then there is just a slight depression so that, when the pins have been turned the correct distance, they slide into the depressions and stay in place.

The springs are of one piece, bent around to provide a soldering terminal, and fastened under the binding post nuts so that connections can be made with or without solder. The sockets measure 1 15/16 in. square on the base.

Fig. 1 also shows the Bremer-Tully neutralizing condenser. They are very small and neat, measuring 2¼ in. in length, 1 in. in height over the binding post and 1 3/16 in. wide over the binding post on the side.

A special feature of this condenser is that, as shown in the left-hand view, there is an indicator to show the position of the variable plate. This is moved up and down positively by a machine screw, the head of which will be seen on the top. This unit is also molded of Bakelite.

The right hand device in Fig. 1 is a special dual resistance designed especially for the Counterphase circuit. It is furnished with two separate resistance elements and contact arms, the purpose of which is to produce the final balance in the Counterphase receiver.

Fig. 1. Showing the new socket for UV or UX tubes, the neutralizing condenser, and special variable resistance.

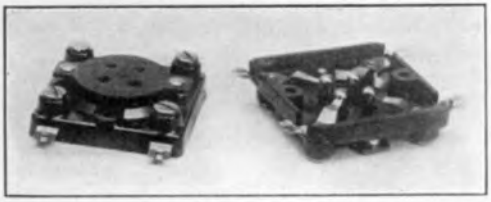
Those who are working on single-control circuits will welcome the introduction of the tandem condensers, the exact adjustment of which is accomplished by what the Bremer-Tully Company calls trimmers. A vernier is provided for each unit, the one at the rear arranged for fixed adjustments, when the circuits are balanced, while the forward vernier or trimmer is adjustable from the front of the panel. These are made in two sizes, having 0.00025, or 0.00035 mfd. in each unit. The variable plates are shaped to give S. L. W. calibration.

In detail, these condensers are similar to the standard Bremer-Tully Lifetime types which have been on the market for some time.

In overall dimensions the condenser measures 3⅛ in. from the shaft to the right hand side, 1¾ in. from the shaft to the left hand side, 1 13/16 in. from the shaft down, and 1 9/16 in. from the shaft up to the extreme point of the variable plates.

At the centre of Fig. 2 is shown the B-T Torostyle transformer, one of four furnished with the Counterphase kit. This is of very substantial construction, supported by a bracket of molded Bakelite, which also carries the binding posts.

The turns are held on the inside by a bobbin. On the outside, they are cemented to a strip of oiled silk. This very effectively holds the turns in the correct position and keeps them from getting out of order in handling.



Eby Makes a Socket

EVERYONE was much surprised at the announcement of the H. H. Eby Company that they are adding a Universal socket to their original line of binding posts. Now that the socket is on the market, it has been received with much enthusiasm. The illustration above shows the appearance of the top and the arrangement under the base.

Each spring is fitted at the end with a split cup-shaped contact, allowing the cup to grip the contact pin on the socket firmly. There is enough spring in the split sides to make it work with either UX or UV type tubes.

Connection can be made to a lug formed at the outer end of the spring, or to the binding post.

A plate of thin Bakelite, punched with holes of the correct size for UX tubes, is fastened to the socket just above the molded base. That keeps the contacts from pulling up when the tube is removed. When it is pushed in, the springs are pressed down on the panel beneath the socket, allowing a total movement of the springs of only 1/16-in.

The action is smooth, and perfect contact is obtained with either UX or UV tubes.

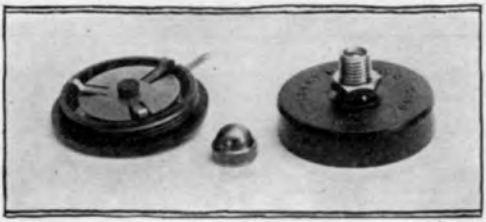


Fig. 2. You can tuck this condenser away, and yet keep it handy for adjusting.

Looking Inside Some of the Walbert Products

You will feel tempted to build a new set first to use these parts

*— By Byron Minium**

SOME time ago, it was stated in RADIO ENGINEERING that the losses introduced by dust collected on the insulation of variable condensers was greater than the losses eliminated by the typical low-loss construction. Our own experience has indicated that this is true, not only in sets which are used without cabinets, but even in the enclosed designs.

Accordingly, we set about the rather difficult task of designing an S. L. F. condenser of such proportions that it could be enclosed in a sealed case. In Fig. 1 you can see the condenser itself and the case which surrounds it. We feel that this condenser is quite an accomplishment, for we had to make the plates of such a shape as to give S. L. F. characteristics and at the same time fit inside a cover of limited dimensions. The condenser itself is of the usual low-loss design, but the insulation, as the illustration shows, is arranged in a vertical position. Therefore, the tendency to sag is along the length of the strip and not the width. Consequently, if, over a period of years, there is a tendency at all for the hard rubber to flow, it is in a direction parallel to the plates and not at right angles. Moreover, the strain is in the direction in which the strips are strongest.

The front and back plates of the shield are of nickel plated brass, fastened directly to the condenser end plates. The outside of the shield is of celluloid. While it would have been easier to make the shield of brass entirely, it makes a set a little more interesting to be able to see the inside of the condenser. The outside dimensions of the shield are 4 inches wide and 3¾ inches high, with a depth varying with the capacity.

We have also made several changes in the Univernier dial. At the time this dial was first brought out, it seemed to us that there was a distinct advantage in having a slight amount of play between the dial and the pointer, merely to make adjustment a little easier. Obviously there must be no play between the condenser shaft and pointer, but that was taken care of in the original Univernier by fastening the pointer directly on the condenser shaft.

However, the preference seemed to be for the elimination of all back-lash. Consequently, the new design, without affecting the ease of operation, which has always been a Univernier characteristic, we have taken out of play in the mechanism. In addition, we are now using a solid dial molded from Bakelite, held in place by a machine screw either threaded into the panel or passing through a clearance hole with a nut on the rear of the panel.

During the development work on the Isofarad circuit, we used a number of different types of neutralizing condensers, some of very small capacity, and some relatively high. Various mechanical

* Chief Engineer, Walbert Mfg. Co.

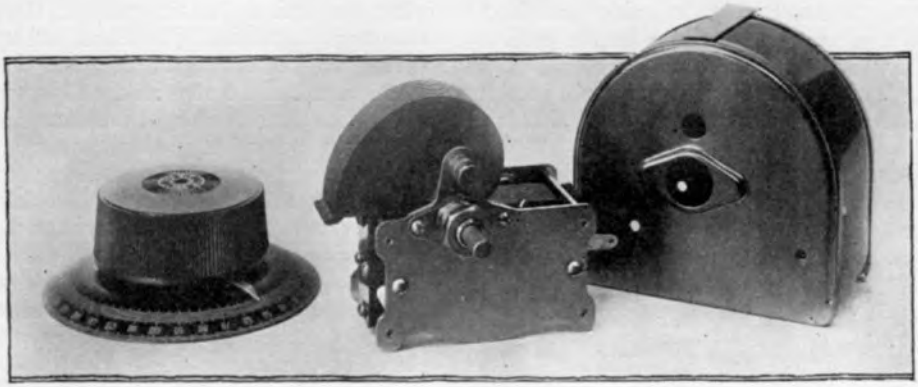


Fig. 1. All the back-lash has been taken from the 1926 Model Univernier. The only enclosed S. L. F. condenser.

limitation were encountered, difficulties in adjusting, and the draw-back of a limited capacity range.

Therefore, we decided to make a neutralizing condenser of our own, the design of which is shown in Fig. 2.

The molded Bakelite case, measuring 1¾ inches in diameter, by 9/16 inches thick, is in two parts, screwed together. On the bottom of the base is a phosphor bronze disc, connected by a rivet to a soldering lug underneath. Over the disc is a circular piece of mica. The other plate, shown in the picture, is of phosphor bronze, stamped out to have three supporting legs, one of which is extended as a terminal. In the center of this plate is an insulating pin. Inside the threaded brass mounting piece is a machine screw which, when turned down on the insulating piece, pushes the movable plate against the fixed bottom plate. In this manner, the capacity can be varied from almost 0 to nearly 100 mmfd. After the correct setting has been obtained, the cap nut is put in place, to cover the adjusting screw.

This little condenser works out very nicely in many cases where it is particularly handy to adjust the neutralizing condenser from the front panel, or to put the neutralizing condenser underneath the tube panel.

Thallium Compounds

Chapter V. Thallium Sulphide. The thalofide cell —

By Samuel Wein

IN the last twenty-five years, many contributions have been made with respect to the use of other metallic compounds which exhibit the peculiar actino-electric effect—change in ohmic value with light—until to-day, the number of materials that exhibit actino-electric effects is high. We will now review only those compounds or substances as are well known, and which are now used in laboratory or research work.

Thallium Sulphide. The use of this compound is accredited to Case.[1] In his earlier work, Case makes use thallium sulphide, and in later published literature, he refers to the use of thallium oxysulphide. The commercial name under which this cell is exploited is the "thalofide cell."

Manufacture of Thallium Sulphide. Pelabon[2] prepares this compound by adding hydrogen or ammonium sulphide to an alkaline or faintly acid thallous solution. The precipitate is washed free

from contaminating reaction products, and it is ready for fusing on the embryo cell. Thallium sulphide is a bluish-black compound, and generally crystalline. On exposure to air, it is oxidized to thallium sulphate.

Case prepares thallium sulphide in the foregoing manner, and spreads this material over the embryo cell form, and fuses the light sensitive material at about 650° C.—the fusing point of the compounds—and in the presence of a current of air, in this manner forming the compound thallium oxysulphide. The thickness of this compound is usually between 0.3 to 0.5 mm. After the material has been fused on the surface of the embryo cell, it is immediately and rapidly cooled.

Thalofide Cell Construction. The cell construction is somewhat like that reviewed in Chapter III, i. e., a quartz disc ¾ in. in diameter is coated with a film of lead, and this latter is cut into a grid form, already shown. Leads are soldered after the light sensitive material has been applied. This is then sealed into a glass bulb and pumped to a high vacuum.

The actual light sensitive surface exposed is about 2 mm. wide and 10 to 12 mm. long.

The average sensitiveness of these cells is such that their dark resistance is lowered by 50% in 0.02 foot candle when the source of light is a tungsten filament. Some of the best ones however, drop 50% in 0.004 foot candle.

Thallium oxysulphide seems to undergo a slow photo-chemical change without the use of the color filter, which is supplied with the cell.

The dark resistance of different cells may range from 5 megohms to 500 megohms. This difference in resistance is due primarily to the grid spacing on which the thallium oxysulphide has been fused, and the nature of the material used. Undoubtedly this high resistance can be considerably reduced by making a much finer grid, say with about 100 or more lines per linear inch.

The dark resistance of the thalofide cell varies inversely with the temperature.

As a general rule, not over 50 volts should be used on these cells. On amplifying the actino-electric current, the resistance is immediately lowered and upon cutting off the light, the original resistance is almost instantly reached, provided a very low source of light has been used. If a very sensitive galvanometer is at hand, you can make a characteristic curve of one of these cells on a potential of 10 volts when exposed to various light intensities. These curves vary with the individual cell used, the light intensity, and the applied voltage. Each cell should be studied under the conditions for which it is to be used.

For measuring much more intense light than that of stellar magnitude, the author suggests the reduction of the exposure to a fraction of a second in order to do away with any time change factor. A camera shutter operated at 0.01 or 0.02 of a second will give a good reading on a ballistic galvanometer and by comparing the throws of the source to be measured with the throws of a known calibrated source, very accurate results may be obtained. It is suggested that this method be tried for very high temperature measurements.

The thalofide cell is remarkable for its quickness of response, which is completed after a lapse of 15 seconds. On still longer exposures, the galvanometer deflection increases slowly, and sometimes irregularly. While the time—two minutes—to attain a maximum response was shorter than that of molybdenite, the present cell behaves somewhat like it, in requiring twice as long—four minutes—for complete recovery. For small deflections, as exposure of one minute, with two minutes for recovery, was sufficient.

Effect of Temperature. It was of interest to determine the effect of temperature upon the actino electric sensitivity of the thalofide cell. For this purpose the cell was placed in a bath of ice. Since the thalofide cell tube was not directly in contact with the ice or hot water, the actino sensitive material was probably not cooled to 0° C.

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Case. Phys. Rev. (2) vol. 15, page 289, 1920.
[2] Pelabon. Compt. Rend. vol. 173, page 142, 1921.
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EDITORIAL

THE statement previously made in RADIO ENGINEERING that the dealer, jobber, or manufacturer who finds fault with business this fall should take himself to task is substantiated by the developments from week to week.

The biggest surprise, perhaps, comes from Radio Corporation. Harry Gawler will tell you that, when he was with R. C. A., his hardest job was to live down the "R. C. A. hate." As recently as last spring editorial writers who found themselves short of subject matter were still putting R. C. A. on the rack.

In the space of the summer months R. C. A. has turned its reputation inside out. Two years ago, The Radio Corporation had a favorite stunt of holding up shipments on tubes until an artificial demand was created. Then, without warning, carloads of tubes were dumped on distributors.

Sometimes the prices were reduced, into the bargain.

This fall, R. C. A. production is well under control, with a steady, healthy shortage on tubes and sets, prices are beyond reproach, reasonable standards of quality are maintained, and to round out the picture, R. C. A., by close cooperation, has behind it a responsive, loyal network of distributors and dealers, thru whom it has gained the priceless confidence of the public.

No one has ventured a positive statement as to the responsibility for this change, but my own belief is that General Harbord deserves the credit. Contrary to the prevalent idea, he is by no means a figurehead in the organization. The truth is that General Harbord is in very active control of the Radio Corporation, and a dominant force in forming and carrying out the policies of the Company.

This new attitude of R. C. A., so strongly reflected by the response of the trade and the public, has benefited the entire industry, over which R. C. A. has always exerted the powerful influence of leadership. Anything well done helps all of us.

And now about Herbert Hoover. If our Secretary of Commerce wanted to establish himself as a personality extraordinary, he could not find a better way to demonstrate his ability than in his management of the Fourth Radio Conference, held in Washington on November 10th to 12th. To anyone who has followed closely the attempts to organize the radio industry, the idea that five hundred representatives of the radio interests, commercial, public, political, and governmental, could work together harmoniously for three days, and agree unanimously in the things accomplished is a wonderful tribute to Herbert Hoover's ability as an organizer.

At the Fourth Convention, the affairs of six hundred broadcasting stations with an audience of twenty-five million listeners were discussed by five hundred delegates. At the First Convention, thirty men considered the interests of three hundred thousand B. C. L's. and amateurs, when only two broadcasting stations were in regular operation. This is an excellent summary of four years' progress.

The results of the Convention will not appear immediately, but Mr. Hoover's statement of the unanimous opinion concerning the freedom of the air is definite assurance of useful accomplishment:

Broadcasting stations now in operation and those licensed in the future must establish their right to exist by demonstrating their usefulness to the public, and the life of any station will end when it ceases to provide this service.

M. B. SLEEPER,
Editor.

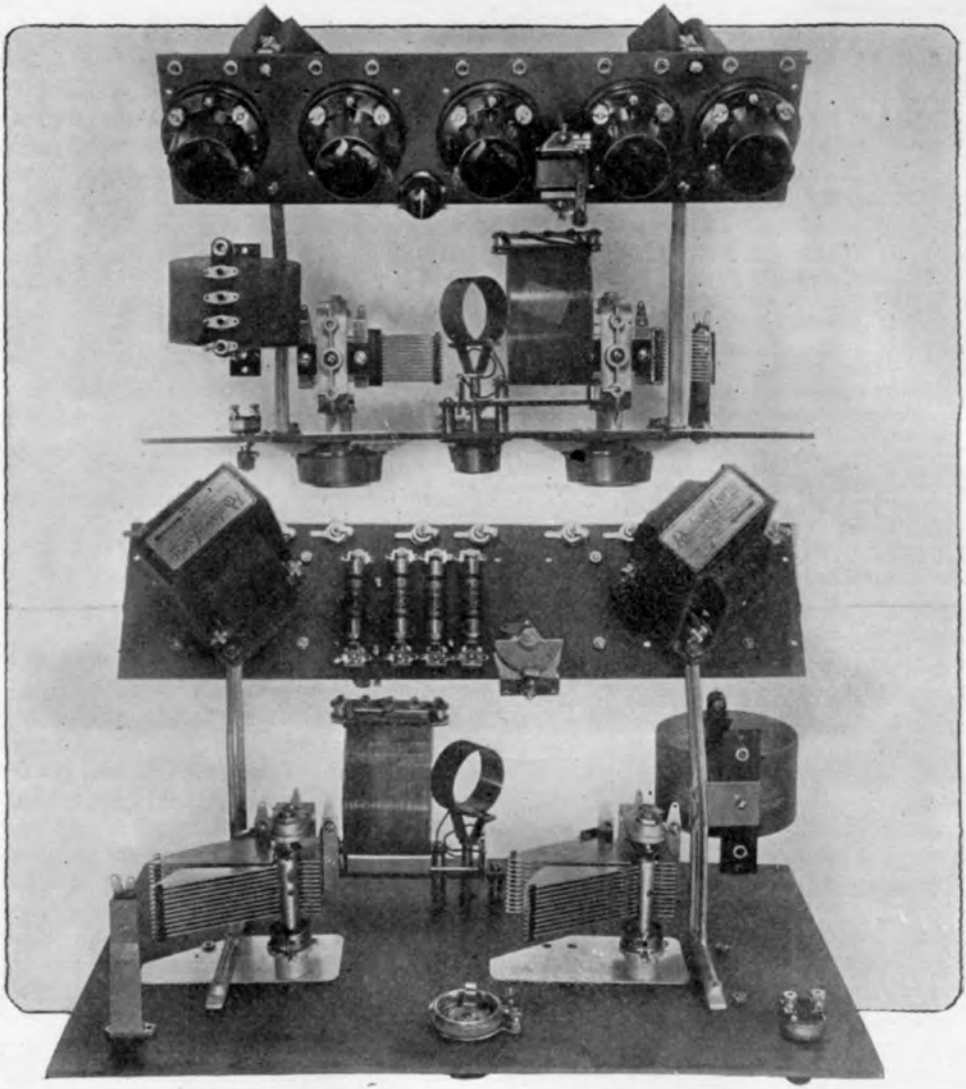


Fig. 1. Above, the arrangement of the parts as they are seen from the top. Below, an underneath view of the set.

Notes on the Hammarlund-Roberts

Some observations concerning the Roberts circuit set as it is now put up in kit form

ALTHO the instruction book provided with the Hammarlund-Roberts receiving set kit was carefully prepared to provide the information necessary for set builders, there are additional points, brought out by those who have built these sets, that will be of interest to those who are going to build outfits of this type.

One thing which has puzzled some set

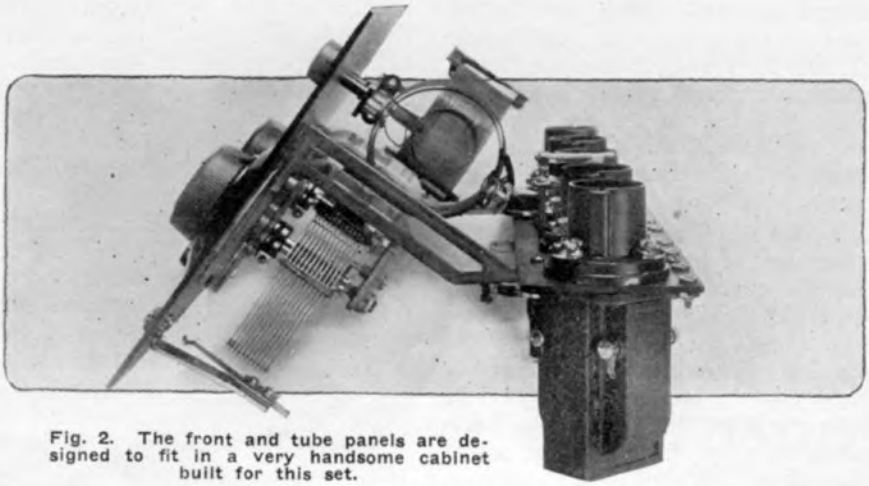


Fig. 2. The front and tube panels are designed to fit in a very handsome cabinet built for this set.

builders is the correct location of the condenser shields. Looking at the set from the front, the pointed ends of the shields should be toward the right. When the condensers are put on, they are fastened in place by two 6–32 F. H. mounting screws put through the panel and into threaded holes in the condenser frames. The nut on the shaft bearing, furnished for single-hole mounting, is simply discarded.

It seems to be the natural thing to fasten the frames on to the tube panel before putting the frames on the front panel. If that is done, they may or may not be put on in the right way, for the frames are different in shape. If you will examine them, and check with the accompanying illustrations, you will see that one frame has a short leg to be fastened against the front panel while the other has a longer leg. This is to take care of the shape of the variable condensers. The bracket with the long leg to go against the front panel should be at the right hand end of the tube panel, looking at the panel from the top.

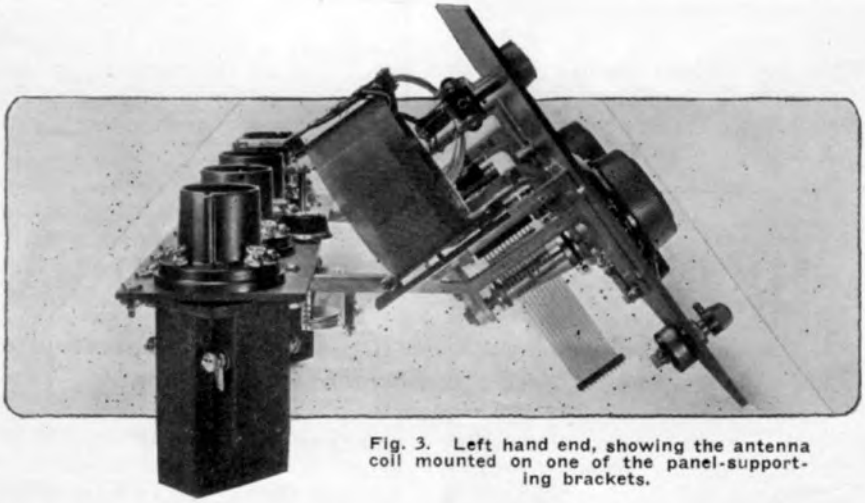


Fig. 3. Left hand end, showing the antenna coil mounted on one of the panel-supporting brackets.

The frames are fastened to the tube panel with two 8–32 screws. They are made extra long, for these screws also hold the transformers. The screws pass through holes in the transformer bases diagonally opposite each other. The left hand transformer, looking at the tube

panel from the top, has the F binding post to the rear, while the right hand transformer has the P post toward the rear of the panel. A special wrench is provided for tightening the nuts on the mounting screws, for it is difficult to get at the nuts with ordinary pliers.

The view of the left hand end of the set shows the antenna inductance mounted on a rectangle of brass which, in turn, is secured to the left hand bracket by means of two 6–32 R. H. screws. It is necessary to fasten the brass piece to the bracket first. Then the coil is secured to the brass piece by means of a single 6–32 R. H. screw which threads into the Bakelite mounting strip. Consequently, no nut is required.

The center socket, unlike the other four, is held by two 6–32 R. H. screws which are threaded into the tube panel. All the other sockets are fastened in place with screws and nuts. In the case of the center socket, there is no room between the Amperites for nuts.

The design of the Hammarlund condensers is quite unique and most attractive. The framework consists of a U-shaped yoke which is die-cast. One arm of the U carries the threaded mounting holes. To the center section of the yoke a single piece of insulating material is secured. Screws passing through the ends of the strip are threaded into brass supports on the fixed plates. The plates are spaced by solid brass strips to which they are soldered. This makes a very simple and effective method of assembly, at the same time insuring rugged construction.

There is no possibility that the excentric variable plates will fail to maintain their position at any point, for a very clever friction bearing is provided to act as a brake on the plates. At the same time, it is so designed that the shaft turns with perfect smoothness.

As for the complete design of the set, it has been worked out in a thoroughly simple way, giving it a most attractive appearance, as can be judged from the illustrations, and plenty of space is allowed so that the most inexperienced set builder can manipulate his soldering iron without feeling crowded.

It was very pleasing to find that all the parts of the set went together without a bit of trouble. This has been one of the great difficulties with construction kits in the past. Very likely the designers of the Hammarlund-Roberts kit had this in mind, for all the necessary precautions have been taken to make sure that the parts go together without the slightest bit of difficulty.

Special Carter Products

Devices developed by Carter Radio for Manufacturers

*—By T. Sheldon**

DURING the past season the Carter Radio Company has been called upon to develop a number of special devices for set manufacturers. Some of these are shown in the accompanying illustrations.

At the left in Fig. 1 is a flat top phone plug. This design was worked out to give a little better appearance to the set when it is inserted. Moreover, it is especially suited for sets that have hinged or sliding covers. With the long type, it is necessary to remove the plug before the cover of the set can be closed, but with the flat top type, it extends out such a slight distance that it can be left in place when the set is closed up.

A number of manufacturers have called upon us for fixed resistances of various values. Among the stock sizes which are widely used are values of 1, 3, 4, 6, 10, 15, 20 and 25 ohms. These are used in filament circuits and to obtain voltage drops for biasing. The 25-ohm unit is particularly recommended for sets

* Vice-President, Carter Radio Co.

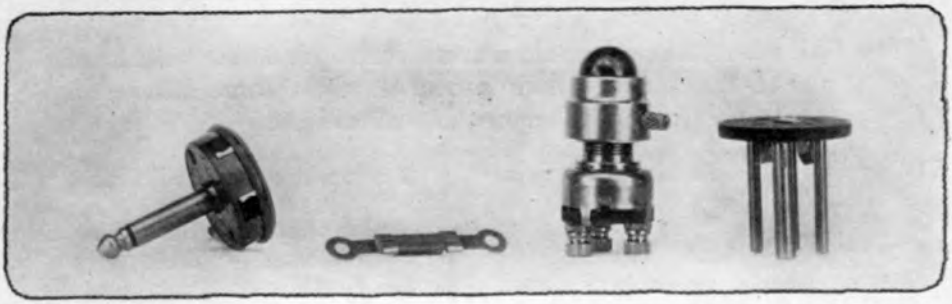


Fig. 1. Flat-top phone plug, fixed resistor, pilot light switch, and adapter for fitting UX tubes in WD-11 sockets.

using 199 tubes on six volts. Even though a rheostat is used to adjust the 199's, the fixed resistance is put in series so as to give a minimum amount of resistance always in the circuit. If, then, the rheostat is turned on full, the tubes will not be turned out by the 6-volt battery.

The pilot switch, also illustrated in Fig. 1, has been worked into a variety of circuit schemes, either when used by itself, or with the Dialite. So few manufacturers have peep-holes in the front panels, and they are of little value with the new tubes, that they have adopted the pilot switch as an indicator to show when the tubes are turned out. So little current is drawn by the bulb that it adds no noticeable drain to the storage battery. When the control knob, protruding from the socket of the bulb, is turned, the pilot light goes out and the filaments of the tubes are disconnected.

The odd looking adapter Fig. 2 was designed for the requirements of R. C. A. jobbers, who found the sale of Radio Corporation sets, built for WD-11 tubes, held back because of the demand for UX-199 tubes. This adapter fits a WD-11 socket and serves itself as a socket for a UX tube.

Two special switches are illustrated in Fig. 2. The one at the left is designed to extend horizontally from the front panel, while the one on the right drops down vertically or parallel with the front panel.

The particular contact combination in the left hand switch is for a A and B voltmeter. The actuating arm springs back to an off position, but when it is turned to the left, it connects the voltmeter to the filament circuit and at the right to the plate circuit.

The right hand switch stays in whichever position it is put. That can be used to switch telephones from the first amplifier circuit to the last amplifier.

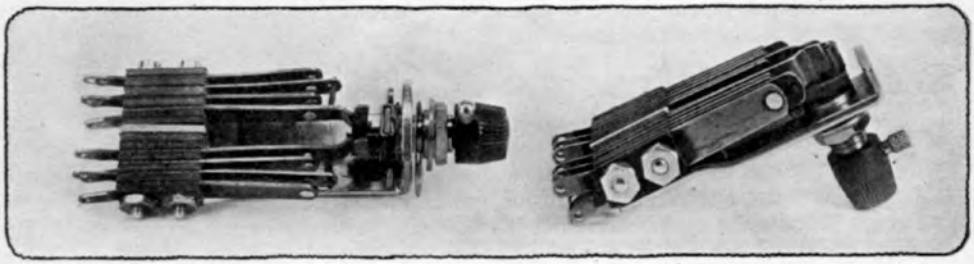


Fig. 2. Special horizontal or vertical switches, with fixed or spring positions. They are made in a variety of contact combination.

The New Yorker

ALTHO the picture wiring diagram, parts lists, and panel patterns were not shown in RADIO ENGINEERING for December, data prints can be obtained from the blue print department which give all this information as well as step-by-step instructions.

Summing Up the Situation

The following comments, taken from correspondence with heads of some of the largest radio concerns, gives some interesting sidelights on present conditions

Daven Radio, K. R. Moses, General Sales Manager — This so-called "Stabilization of the Radio Industry" does not seem to me to have arrived much closer to the goal of perfection in 1925 than it did in 1924. Most set manufacturers seemed unable to profit by the experience of 1924, and in consequence, we all saw the tremendous overproduction of sets repeated in 1925.

So long as the industry is filled with opportunists without the mental or engineering ability to manufacture good apparatus, and at the same time have honest merchandising policies, just so long shall we continue to see the present disorganized state of the industry. Daven business for 1925 shows a very healthy increase over 1924. We face 1926 with assurance that if we continue honest merchandising at a fair price, properly distributed, that we need have no fear of the future.

Photion Electric Corp., E. A. Quarrie, Sales Manager — Ours is a recently organized company, but previous to the organization the people now associated with us had developed with great pains a very efficient high class photo-electric cell — the Phototron. This cell is something that we are really very proud of. It is in use by a number of operators in photo-telegraphy, and is capable of application in a great many ways.

During the next year we propose to put on the market a high frequency light bulb, a complete kit for experimental transmission of pictures, and we also propose to do some picture broadcasting ourselves.

United Scientific Laboratories, Inc., D. Wald — We find that this season the volume of business seems to be more steady than the previous years without the extreme rush which set in about this time of year.

We think that this sort of business shows a more healthful sign for the industry, and has a tendency to lead to a stabilization, though credits are still a very delicate matter.

Bakelite Corporation, H. Swan, Manager of Sales — During the past year the Bakelite Corporation has established several sales engineers in strategic points throughout the industrial section of the country, in order to render personal and effective service to manufacturers who want to be advised regarding the possibilities of their material, or to discuss design of apparatus with a view to making more economical use of Bakelite.

That Bakelite has established itself as a pre-eminent insulation for radio use is borne out by the fact that the sale of Bakelite for radio apparatus during the past year has increased 21% over that of 1924.

The Bakelite Corporation has found that manufacturers can often cut costs and improve the quality of apparatus through changes in design which are made possible by the use of molded Bakelite, and we propose to give the radio manufacturers all the assistance possible with a view to furthering the use of their material by keeping in close touch and advising with the manufacturer regarding the economical application of Bakelite to his product.

All-American Radio Corporation, C. P. Cushway, Secretary and Sales Manager — The All-American Radio Corporation moved into its new quarters during June, 1925, a modern building of saw-toothed construction, containing 100,000 square feet of floor space. This new plant offers expanded facilities that are quite necessary for the plans that the Company has in operation for the production of its new apparatus.

In these days of rumors and facts; failures, and successes, it is no wonder that the average individual is quite perplexed about the stability and permanence of the Radio Industry and to such we suggest a review of the history of the All-American Radio Corporation. Started

Straight Frequency Line Tuning

Marks a new era in Radio progress—
Sweeping country like a tornado—
Fans welcome it with open arms—
Irresistible demand growing by leaps and bounds—

KARAS Started It—
and KARAS Is Carrying On!!

When we sprung the Karas Orthometric Condenser on a restless, hungry radio public—we knew we had started something. But we scarcely expected to be snowed under with such a literal avalanche of orders.

We inaugurated Straight Frequency Line Tuning at the psychological moment. Radio Fandom was waiting hungrily for something new. And here was something—not only new—but so perfectly simple—so thoroughly scientific—so downright sensible, that everyone wanted KARAS Orthometric Condensers at once.

Our scheduled production was like a drop in the bucket. Buyers pleaded—cajoled—even threatened. Our plans were doubled, trebled, quadrupled. But it all took time.

KARAS Orthometric Condensers could not be thrown together. It took months to train gangs to build them with the absolute *precision* KARAS demands. So tens of thousands had to wait or buy other makes, hurriedly assembled to supply the demand we had created.

NOW—after months of preparation we are able to produce enough KARAS Orthometric Condensers to take care of at least a fair share of the demand.

How KARAS Orthometric Condensers
Simplify the Tuning of Any Radio Set

Ordinary Condenser Arrangement of Wavelengths

Ordinary straight capacity condensers crowd 70 of the 100 wavelengths into the first 30 points of the dial.

Straight Wavelength Condenser Arrangement

With straight-line-wavelength condensers 57 of the 100 wavelengths are crowded into the first 30 points on the dial.

KARAS ORTHOMETRIC CONDENSER Arrangement of Wavelengths on Dial

Karas Orthometric Condensers insure absolutely equal dial separation of all wavelengths, 200 to 600 meters.

U. S. Gov't. separates all stations 10 kilocycles apart. Old type condensers—straight line capacity and straight line wavelength—crowded the low wavelength stations into the first few degrees on the dial. Difficulty in tuning—confused heterodyning interference—garbling of programs—these were the results. KARAS Orthometrics give low wavelength stations the same equal separation as high ones. It is the last word in making ***real*** selectivity possible.

Karas Orthometrics are both theoretically and mechanically perfect. Made entirely of brass—plates patent leveled and securely bridged to insure permanent alignment. Every joint soldered. Grounded frame and rotor. Adjustable cone bearings. Spring copper pigtail. In short, so beautiful a job that one engineer, on seeing the condenser for the first time, smilingly inquired, "How many jewels?"

If your dealer hasn't secured a stock of Karas Condensers

Order on this Coupon!

Note the long eccentric plates

Most good dealers everywhere, sell Karas Orthometric Condensers. If your dealer happens to be one who hasn't secured them, we will supply you direct on our 30-day Money-Back Guarantee. Just fill in and mail this coupon at once. Send no money. Pay your postman on delivery.

Sizes and Prices—
23 plate, .0005 Mfd., $7.00
17 plate, .00037 Mfd., 6.75
11 plate, .00825 Mfd., 6.50
5 plate, .0000972 Mfd., 6.50

KARAS ELECTRIC COMPANY
4053 North Rockwell Street, Chicago, Ill.
For more than 30 years makers of PRECISION Electrical Apparatus.

Karas Electric Co.,
4053 N. Rockwell St., Chicago

Please send me.....Karas Orthometric Condensers, size..... at $..... each. I will pay the postman the list price, plus postage, on delivery. It is understood that I have the privilege of returning these condensers any time within 30 days if they do not prove entirely satisfactory, and you will refund my money at once.

Name.....

Address.....

Dealer's Name.....

If you send cash with order, we'll send package postpaid

five years ago it has, during the intervening period, established a reputation for its products built on service and quality at a fair price, backed by a guarantee that the consumer has always found out meant more than a scrap of paper. As a result, its products, old and new, have never failed to find a ready market and are always looked to as standards of comparison.

It is our opinion tht the Radio Industry must realize that the buying spree and novelty interest of the public is over; also that it is a mistake to assume that this same public is going to buy its future radio requirements on price only. The real answer is an old one, "price based on quality and backed by service," which has been the answer that every established industry in the country today has had to finally accept and put into operation.

Eastern Coil Corp., G. Rathus—Since starting the manufacture of pickle bottle coils, we have found the demand for this extremely efficient type of low-loss coil to be so great that we were compelled to design types for all leading circuits.

This, we believe, proves that the radio market is very much alive, and that the amateur is always ready to change his set to improve results.

The matter of credits we find to be more reassuring this year than last — dealers and jobbers are buying conservatively, and replenishing their stocks often.

We will continue along the lines we have followed, and consider the outlook for the future to be promising indeed.

Rathbun Mfg. Company, F. F. Rathbon, President — For the past four years the Rathbun Manufacturing Company, of Jamestown, New York, has furnished to the radio set builders of the country as well as many of the prominent set manufacturers its share of variable condensers used in radio receiving sets. During the past year more than two hundred thousand variable condensers have been built complete, sold and shipped to all parts of the United States as well as foreign countries.

The increasing number of broadcasting stations makes it extremely difficult for the average set to tune in the stations that are crowded on the lower end of the dial.

The Rathbun Company's solution to the problem is the Straight Line Frequency Converter dial which will apply in the old type S. L. C. condenser, giving uniform separation of all stations over the full 360 degrees of the dial. The only change necessary is to take off the old dial and replace with the Converter Dial.

Dubilier Condenser & Radio Corp. I. H. Mitchell, Advertising Dept.—The Dubilier Condenser & Radio Corporation announces that no changes are in contemplation in its sales policies and in its general attitude toward the Radio Industry, jobber, dealer or consumer; that its most exacting specification will be to maintain its dominant position by continually — through its large corps of engineers — keeping all its products up to the most exacting requirements of the highly specialized art of radio, and to further assist, as it has always done in the past, the technicians among its many customers in the problems that are confronting them.

In spite of the increasing number of competitors offering products similar to theirs, the Dubilier Condenser & Radio Corporation has not only maintained its position, serving all the good friends who have done so much to put the Company in its most enviable position, but has most substantially increased its volume of business in all lines; this only being possible when the purchaser, through several years of experience, has learned that the motive behind the Company is not profit alone, but a sincere desire to produce the best products possible, plus the intent, at all times, to recognize the rights of the jobber and the dealer, endeavoring to keep their stocks properly balanced, promptly and cheerfully adjusting complaints — if any arise — and realizing at all times that a manufacturer can never be successful unless his customers are successful.

Electrad, Inc., A. Moss, Treasurer—Regarding the year 1925, we will frankly state that we were very well satisfied with the results achieved. We have consistently maintained quality and in spite of the gypping and the poor quality merchandise that has been marketed, our

growth has been consistent and gradual.

For example, the Electrad Lead-In is the highest priced item of its sort on the market. This is simply due to the fact that it is quality throughout. We have not stinted in any way nor have we sacrificed the quality of this item. The general trade and the public are beginning to realize that an investment of forty cents for a good lead-in is well repaid by actual results obtained in reception. The same holds true for practically all our other items. We intend, in 1926, to adhere strictly to this policy of Quality First.

H. H. Eby Manufacturing Co., W. MacMurtrie, Sales Department — You may find and probably will find, that the salesmen look on the Credit Manager as their greatest personal enemy — merely because he refuses to O. K. all the orders they bring in.

The Credit Manager's most important and authentic information should come from the salesmen. They are in close touch with the customer and can procure credit information without offending him. Then, too, the salesmen should be able to tell the credit man what other lines the customer is handling, so that credit experience can be exchanged with houses other than those given as reference by the customer. In the Eby organization the Credit and Sales Departments work together. Neither can function without the other. The Sales Department sits in on all credit conferences and the Credit Department understands fully the plans of the Sales Department.

William Stevens Co., Wm. Stevens, President — Because the enduring success of any enterprise is the natural outcome of useful service, we had reason to believe it well worth while to perfect even one of the smallest items now used in radio.

While it is obvious that the electrical functions of radio instruments depend upon effective contacts and moreover that the continuance of such functions implies the use of contacts that endure, nevertheless the inconspicuous little radio terminal has seemed little calculated to excite the inventor's interest in its development.

This oversight gave us our opportunity to develop the Lastite, beginning in January, 1925.

We have already been called upon to make some variations in the types of Lastites, the most important being a tubular rivet type; and those firms who are now using Lastites as original equipment are of a kind to justify our efforts of 1925, and our intention to cause further contact developments for 1926 for simplifying and expediting the production of radio circuits that will endure, because mechanically strong in every detail, thus helping to reduce the consumer's service costs.

American Hard Rubber Co., O. B. Carson, Sales Promotion Dept.— We believe that there will be a tendency during the next year to reduce the number of set manufacturers by the elimination of those who are not properly organized and financed and who are not producing sets of sufficient merit to meet the demands of a public that is becoming more and more discriminating.

This is a natural evolution in the business which is inevitable. This situaton, we believe, will require the production of higher grade parts and components and those manufacturers who have specialized in high class materials will naturally reap the benefit.

DX-1 Reports

IN the data on the RX-1 receiver, published in Radio Engineering, no claim was made for unusual DX reception or extraordinary selectivity.

We have been greatly pleased, however, to find that many set builders who have been operating RX-1 sets have reported the most extraordinary results.

Mr. Campbell, in Brandon, Manitoba, a city many hundred miles from most of the broadcasting, obtained such good results with his RX-1 that there are now twelve more in his city, as a result of Mr. Campbell's success.

Mr. John L. Halpin of Philadelphia, reports that, after tuning for four years, he heard the Pacific Coast for the first time on an RX-1 receiver.

The New York Telegram recently devoted almost a page to the DX report of Mr. Wilfred E. Boughton who is operating an RX-1 at Flushing, Long Island. Most of his DX work was done at the time when WIBI, three-quarters of mile away, was on the air.

Kurz-Kasch Aristocrat E-Z-TOON (EASY TUNE)

GROUP CONTROL

For set owners—For set builders

The group control can be had with either master dial control in center, or for engraved panel a pointer Knob is provided.

$7.50 LIST

Many thousands of R.F. set-owners using three condensers are prospects for this device. Few people like the triple dials to tune. The Aristocrat E-Z-Toon group control gives you single vernier control by the master dial (or pointer Knob for engraved panel) and by means of the other two Knobs, vernier control of each condenser.

Complete instructions with each Kit. Simple to install, comes complete, nothing else to buy. 2 complete Kits packed in mailing carton for dealers.

The Kurz-Kasch Company

Largest Exclusive Moulders of Bakelite

Dayton, Ohio.

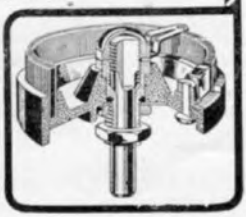
The "Works" of the DeJur one hole RHEOSTAT

Genuine Bakelite Throughout

Note below how the contact slider and shaft are made in one piece. Permanently set at the factory, this insures perfect contact throughout the entire resistance range. The one hole makes DeJur the easiest rheostat to mount and when mounted, it sets fixed and rigid. No screws to get loose and no back panel fussing. Compare the DeJur. You will readily recognize its superiority.

At dealers everywhere
Write for Latest Catalog

Pat. Appl'd For



DE JUR PRODUCTS CO.,
Lafayette & Broome Sts. New York

Perfect Selectivity and More Power for T. R. F.

Set Manufacturers! You can considerably better the power and selectivity factors of your product by using Aero Coils. And your dials will tune alike because Aero Coils are matched. Let us prove these things to you. Send us one of your sets. We will install Aero Coils and return the set to you for your own tests. Do this now.

Fans! Build a real set. Use the new Aero-Dyne Circuit which we furnish and a set of Aero Coil Matched T.R.F. Coils. You will have a receiver which will resonate on a knife's edge; which will cut through the strongest local interference; which will bring in distant stations with amazing volume and clarity.

Aero Coils are sold by good dealers everywhere. If by any chance your dealer is out, order direct. Tuned Radio Frequency Kit is $12.00 including brackets and diagrams.

AERO PRODUCTS, INC.
217 No. Desplaines St., Chicago.

AERO COIL
The Patented
Low Loss Inductance

RADION

is better insulation

FACTS and figures from authoritative, impartial tests prove it.

Whatever part you are manufacturing—if it requires insulation—there is every reason to believe that RADION will do the job better.

All designers and builders of radio equipment will find it to their advantage to consult us and get quotations on the "Supreme Insulation."

AMERICAN HARD RUBBER COMPANY
Department M N 9
11 Mercer Street, New York City

RADION

The Supreme Insulation

S-M PARTS

LOW LOSS INDUCTANCES

All-bakelite, low loss, interchangeable coils for 50-500 meters. May be used as oscillators, antenna adapters and R F Transformers in standard circuits. Each 3¼" long with winding diameter of 2".

Price All Types 50-600 meters.....Each $2.50
Sockets for any size coils.....Each 1.00

S L F CONDENSERS

S-M Condensers are particularly adapted for short wave reception because of their extremely low dielectric and eddy-current losses. They are the smallest SLF Condensers made. Supplied with special attachment for single control

Prices:
No. 310 .0005 $6.00
No. 311 .00035 5.75

IMPROVED RAYTHEON-THORDARSON B-ELIMINATOR SM KIT 650 includes all parts necessary.....$34
Building Instructions.....10c

Send for circulars describing S-M Products

SILVER-MARSHALL, Inc.
108 S. Wabash Ave. CHICAGO

DURHAM — make it easier to get Better Results

Variable
GRID LEAKS

$1.00 If your grid leak control was more convenient you would use it more often — and do better DX. DURHAM puts it on the panel in the space of a dime!

75c.

Standard type — for all standard or DURHAM bases and grid condensers having clips. Replaces present fixed leaks.

Both types in these sizes

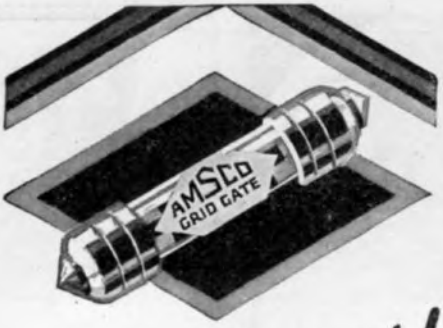
No. 100—1,000 to 100,000 ohms
No. 101—0.1 to 5 megohms
No. 201 A—2 to 10 megohms

DURHAM Bases—three styles, 30 to 45c

Use DURHAMS in all sets

Order by type and size number

DURHAM & CO., *Inc.*
1936 Market St., Philadelphia



Amsco's Newest!

Grid Gates, Resistors and Resistance Couplers

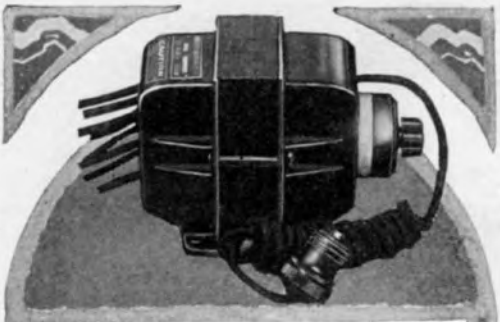
Grid Gates are the Amsco improvement on "leaks." They provide *measured and exact control* of the current flow. Extra large for noiseless service. Fit all mountings. Insist upon Amsco Grid Gates, Amsco Resistors, *Amsco Resistance Couplers.* The latter are made with .006 condenser in genuine Bakelite base with mountings for two Resistors.

The New Amsco Universal Sockets

Especially designed to fit all the new types and sizes of U.X. and C.X. radio tubes. Clicks into contact—making positive wipe connection. Most compact and foolproof socket made. One hole mounting. The Ultimate Socket—will be 1926 standard. Ask your Dealer.

AMSCO PRODUCTS, Inc.
Broome and Lafayette Sts., N.Y.C.

AMSCO



A Real Power Transformer

The modern home may now utilize its electric service for the operation of a Radio Receiver. Reception is greatly improved when efficient B and A eliminators are employed to use this steady power.

The AmerTran Power Transformer Type PF-45, 65 VA—60 cycles 110 volts primary, 450-8/4-8/4 secondary, is intended for use in converting the standard 110 volt, 60 cycle alternating house lighting current to a higher voltage for the plate and low voltages for filament supply. It can be depended upon to give good results when used in connection with the different tubes now available and is designed with the usual margin of safety. It is a real power transformer, in design, construction and usefulness.

The AmerTran Power Transformer Type PF-52 is another transformer of the AC Power Type similar to Type PF-45 except that it has a plate winding for 525 volts AC and a metal ground shield between the primary and secondary windings.

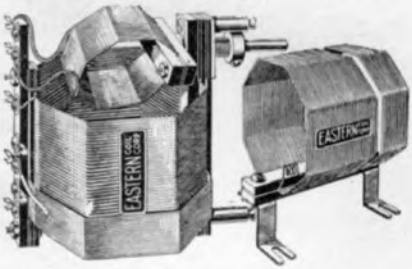
Price: TYPE PF-45 $15.00 ~ TYPE PF-52 $18.00

AMERICAN TRANSFORMER COMPANY
178 Emmet Street, Newark, N. J.
"Transformer builders for over twenty-four years"
SOLD ONLY AT AUTHORIZED AMERTRAN DEALERS.

The AmerChoke Type 854 is a choke coil or impedance of general utility designed primarily for use in filter circuits. It has a current capacity up to 60 milliamps. and a no load inductance of approximately 100 henrys at 60 cycles. Price $6.00 each.

We have prepared a booklet describing these and other AmerTran products, together with recommendations for their use. We shall be glad to send you a copy upon request.

Be sure to see the other AmerTran ad on page 40.



EASTERN KNOCKOUT COILS

(Type R) for the

Eastern Knockout Circuit

(The original unreflexed ROBERTS).

Designed in strict accordance with Radio Broadcast specifications, and approved for the "Aristocrat" and for all Roberts Knockout Circuits.....Per set, $8.50

The *"Eastern Classic"*

circuit is the latest achievement in efficient tuned R. F. reception, making the ideal five-tube set. Hookup free on request.

EASTERN CLASSIC COILS,
(Type EA, for use with .0005 condensers),
Set of 3, $6.00.

EASTERN CLASSIC COILS,
(Type EB, for use with .000 35 condensers),
Set of 3, $6.00.

Mr. M. B. Sleeper has specified and exclusively licensed Eastern ***pickle bottle*** coils for use in his RX-1 circuit, described by Radio Engineering.
RX-1 Coils, $6.00 per set.

Eastern Coils are all in the extremely efficient low loss ***pickle bottle*** form of winding, designed by M. B. Sleeper, and are endorsed by all leading radio editors and engineers. They embody every feature essential to perfect low loss coil design. All wires are kept free of collodion or other injurious substance.

No matter what the circuit, the use of **Eastern Coils** guarantees the best results that particular circuit is capable of giving—for power, range, and selectivity. The improved tone quality will also be recognized at once.

Eastern Coils may also be had for the following circuits:

BROWNING-DRAKE Circuit,
(Type BD) .....$8.00 per set

THREE CIRCUIT SET, in 3 types.
Type 3C Coupler, 200-600 M
Type M3C Coupler, 60-240 M
Type L3C Coupler, 19.7-81 M
} $6.00 each

DX SUPERDYNE CIRCUIT
Type S) .....$8.00 per set

TUNED R. F. Circuits.
Type A—....To be used with .0005 condensers.
Type B—To be used with .00035 condensers.
Per coil, $2.00 and for other circuits. Circular on request

At your dealers or direct, postpaid.

EASTERN COIL CORPORATION
22 Warren St. Dept. R.E. New York

When a Finer Transformer Is Made It Will Bear This Name-Plate

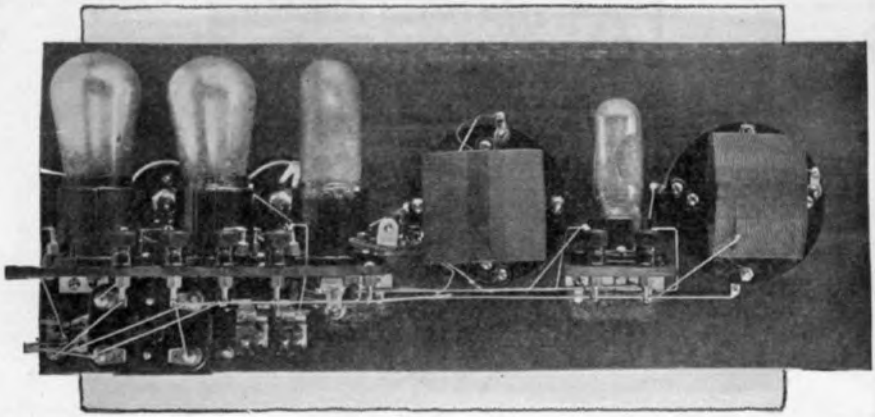
Radio moves rapidly. Perhaps some time there may be seen a *better* transformer than what we *now* know as Rauland-Lyric. It may sell at $9, or $10, or $15, or $7. But the careful observer of the past year's developments will entertain not a moment's doubt of one thing: when the better transformer comes it will come beneath the famous Rauland-Lyric name-plate. Behind this as a pledge rests the entire organization and resources of the All-American Radio Corporation

Rauland-Lyric is easily obtainable from better-class dealers everywhere. The price is nine dollars. Descriptive circular with technical data may be had on request to All-American Radio Corporation, 4201 Belmont Avenue, Chicago

Rauland-Lyric tone quality is now available in a complete receiver: the new All-American Model R (a five-tube tuned-radio-frequency set) now being shown. If your preferred dealer does not display it, send to us for descriptive booklet

What People Say About the RX-1

The names of these satisfied users will gladly be furnished on request: their expressions of RX-1 superiority are given here as evidence of RX-1 quality, tone and reception



From way up in Manitoba, Canada, where every signal's weak and they don't use first stage jacks.

"The RX-1 is sure a winner. We ran a test with an 8-tube super using a 15 ft. antenna, and RX-1 on the same antenna trimmed the super in every way."

In New York:

"I find that the most distant stations are just as easy to tune in as the locals — all received on a cone — the quality is as good as any and better than most sets."

In Erie, Pa.:

"Outside interference is bad at all times but I have logged 36 distant stations— RX-1 sure does deliver the goods."

Set owners who have been operating elaborate outfits are discovering that price does not buy quality of tone and ease of operation. Those who bought cheap sets are finding it less expensive, both in operation and maintenance, to build the RX-1.

In the RX-1 kit there are 151 separate parts. Coils, condensers, drilled and engraved panels, hardware, every item necessary to completely assemble the receiver, ready for the cabinet.

RX-1 kit, ready for assembly, postpaid $32.50

Add $1.00 west of the Mississippi

RX-1 SALES ARE INCREASING AS A RESULT OF COMPARISONS WITH OTHER SETS

D-21 Sodions are available in quantity — one is required in the RX-1 — shipment insured against breakage $5.00

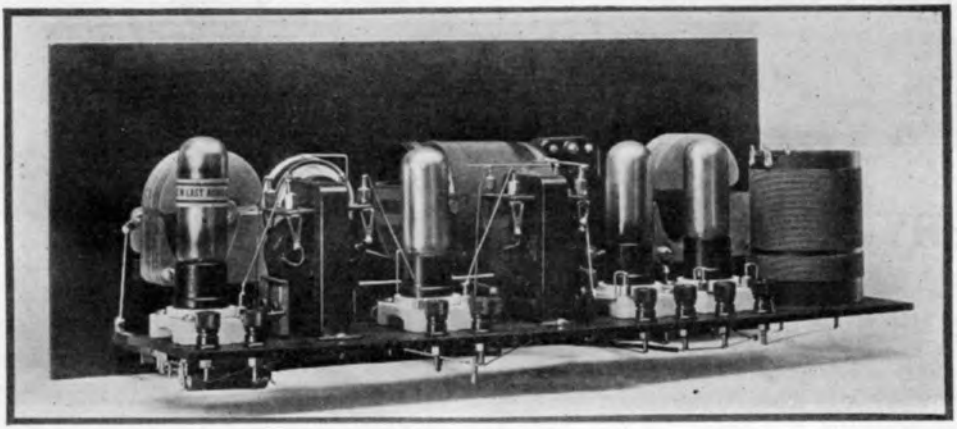
DURRANT RADIO, Ltd.

SUPPLIERS TO RADIO SET BUILDERS AND EXPERIMENTERS

T-52 Vanderbilt Avenue New York City

THE NEW YORKER

S. L. F. Tuning, Variable Selectivity



A Four Tube Tuned R. F. High Efficiency Receiver.

If your location requires hairline selectivity—build the New Yorker.

If you must use dry batteries but want big volume from a UX power tube —build the New Yorker.

Symmetrical front panel, two-dial control, a wavelength range of 200 to 600 meters, simple but sure neutralization are a few of the superior design features of the New Yorker.

Yet you can buy all the parts for $49.50 postpaid.

And your set when assembled (and with quality parts such as S-M, Samson, Pacent, Amertran), will be the equal of most and superior to many sets selling for three times the price.

PARTS LIST UX210 SUPER POWER AMPLIFIER AS DESCRIBED IN NOVEMBER RADIO ENGINEERING

1—PF-45 Amertran Power Transformer	$15.00	2—1 m.f. Aerovox condensers, 600 V.	2.50
3—Type 855 Amerchokes	18.00	2—.5 m.f. Aerovox condensers, 600 V.	1.80
1—Amertran De Luxe Transformer.	10.00	4—50,000-ohm Lavite resistors	6.00
2—2 m.f. Aerovox condensers, 600 V..	3.50	1—1-2-3000-ohm Resistor	1.50
		2—No. 82 Pacent Universal socket..	1.20

DURRANT RADIO, Ltd.

SUPPLIERS TO RADIO SET BUILDERS AND EXPERIMENTERS

T-52 Vanderbilt Avenue New York City

Whether You Build or Buy

Insist On

EBY Cushion Sockets

The most important elements in any set are the tubes. There's no getting around that! And what else but the sockets are responsible for the life and efficiency of those tubes? Whether you build or buy see to it that the tubes in your set are mounted on EBY Cushion Sockets.

The design of this revolutionary socket provides a three-point wiping contact on each of the four tube prongs. Each spring clip acts as a shock-absorbing cushion for the tube and is securely riveted to the base eliminating all microphonic noises and protecting the tube against damage from vibration.

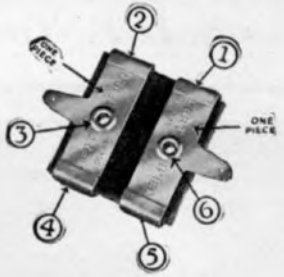
Furthermore, EBY Cushion Sockets, which are now ready for delivery, fit all standard tubes including the new U X.

Manufacturers, jobbers and dealers write for complete information.

Here is the socket that many of the foremost manufacturers and set builders depend on for 100% tube efficiency and protection. You can get them at most good dealers for 60c *each.* **60c**

H. H. EBY MFG. COMPANY
4710 Stenton Ave., Philadelphia, Pa.
Makers of EBY Quality Binding Posts

ELECTRAD



"*The* Six Point Pressure Condenser"

A certified fixed mica condenser that is a revelation in accuracy and design. Ingenious rigid binding and firm riveting fastens parts securely at six different points insuring positive electrical contact. Value guaranteed to remain within 10% of calibration. Standard capacities, 3 types. Price 30c to 75c at all dealers.

"ELECTRAD"
CERTIFIED GRID LEAKS

A dependable grid leak is a radio necessity. Buy Electrad's with solid, unbreakable body of high resistance material—unaffected by climatic or temperature changes. Quiet, smooth and dependably accurate. Supplied in ranges of ¼ to 10 megohms.

At most good dealers, together with other handy "Electrad" Guaranteed Radio Essentials—Variohms, Audiohms, Lead-Ins, Lightning Arresters, Royalty Variable Resistances, etc.

ELECTRAD Inc.

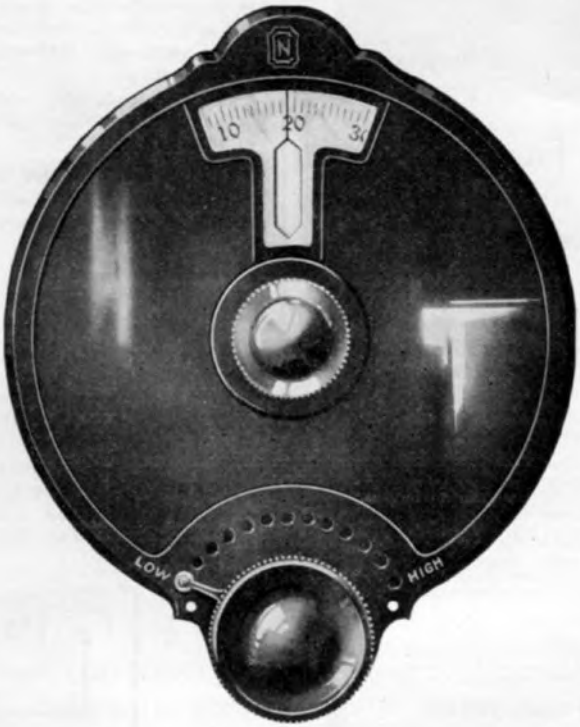
428 Broadway **New York City**

NATIONAL
VARIABLE *Velvet Vernier* DIAL

Positive Control

Easily Mounted

Gearless



Variable Ratio

Velvet Smoothness

Ornamental

TYPE B
Patents Pending

This dial embodies a modified application of our "Velvet Vernier" mechanism designed to facilitate mounting on the ¼" shaft of any standard type of variable condenser, without the use of tools other than a screw-driver. It will replace plain dials on any receiver where sharper tuning is desired.

Of special importance is a new and novel device which enables the user to adjust at will the **reduction to any ratio from 6-1 to 86-1.** This feature aids greatly in the separation of stations operating on the lower wave lengths. This new dial is moulded from black bakelite in a highly ornamental design with perfectly uniform graduations.

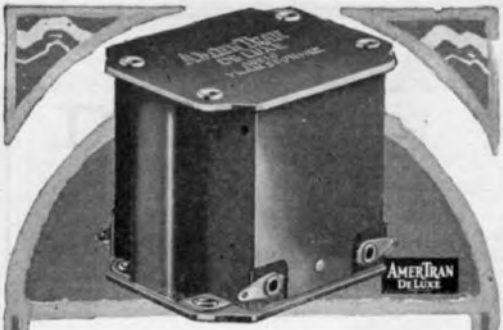
PRICE LIST

Catalog Symbol	*Specifications*	*Price, Nickel Finish*	*Gold Finish*
V. B. C	Clockwise 0–200 (360°)	$2.50	$3.00
V. B. C. C.	Counter-Clockwise 200–0 (360°)	2.50	3.00

NATIONAL CO., Inc.

Established 1914

110 Brookline Street **Cambridge, Mass.**



Volume with True Quality!

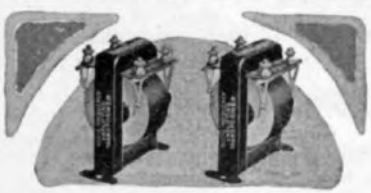
THE value of radio as an entertainer increases only with the realism and quality of reception. This requires good broadcasting—reception and amplification equal to, or better than, the broadcast range of audio frequencies—and a loudspeaker of uniform response over the same range. Heretofore one of the weak links in this chain has been the audio amplifier.

But it is now possible with AMERTRAN De Luxe audio transformers to obtain faithful, strong reproduction over a range of frequencies down to the lowest pitched audible sound. *This is nearly three octaves lower than that previously obtained.* The deep boom of the drum, the thrum of the base viol, and the thunder of the pipe organ are reproduced with startling realism—and at no sacrifice of the highest notes within the audible range. Once tried, the AMERTRAN De Luxe will be recognized as setting a new high standard of excellence in audio amplification.

AMERTRAN DeLuxe requires no special circuit other than the use of a large tube in the last stage to prevent overloading at the low frequencies bought out. It is made in two types.

Price, either type, $10.00

AMERICAN TRANSFORMER COMPANY
178 Emmet Street, Newark, N. J.
"Transformer builders for over twenty-four years"
SOLD ONLY AT AUTHORIZED AMERTRAN DEALERS



AMERTRAN Audio Transformers type AF6 (turn ratio 5) and AF7 (turn ratio 3½) have been substantially reduced in price. As before, they are today the leaders in their class. No changes have been made in the electrical characteristics since they were first sold. Either type now $5.00.

We have prepared a booklet describing these and other AmerTran products, together with recommendations for their use. We shall be glad to send you a copy upon request.

Be sure to see the other AmerTran ad on page 34.

LASTITE

CENTERED TERMINAL

Lastite

If your object is to attain excellence in radio structure, the basic importance of the Lastite will interest you as much as it does us.

The Lastite is the only radio terminal that eliminates any possibility of imperfect contacts.

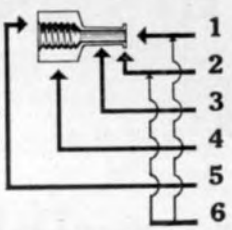
As Mr. M. B. Sleeper has said:
"With a bus wire soldered to it, the Lastite is its own lock nut."

There can be no structural element in radio more basically important than this feature of the Lastite.

Lastites hold the bus wires and, so, help you while you arrange them.

The Lastite is easier to solder to than a lug, is easier to put on, is stronger and looks incomparably better than any other kind of terminal.

Being more than just a contact, the Lastite is the only radio terminal which can be advertised and recommended, on its merits, for the service it performs.



1. Tube in which bus wire is inserted preparatory for being soldered. Tube will hold any size bus wire up to No. 14.
2. Thin, circular flange to which bus wire is soldered. The Lastite is thoroughly tinned, inside and out.
3. Thin wall of bus wire tube conducts little heat. Tube tapers toward the flange.
4. Quarter-inch hexagonal base nut.
5. Terminal base nut is threaded to fit 6-32 and 8-32 screws.
6. The tube and flange of the Lastite, being centered, vibration cannot act as leverage to work it loose. A bus wire locks it—permanently.

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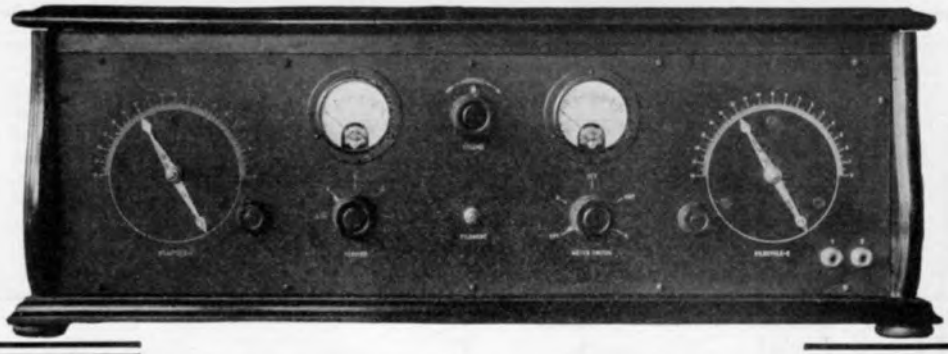

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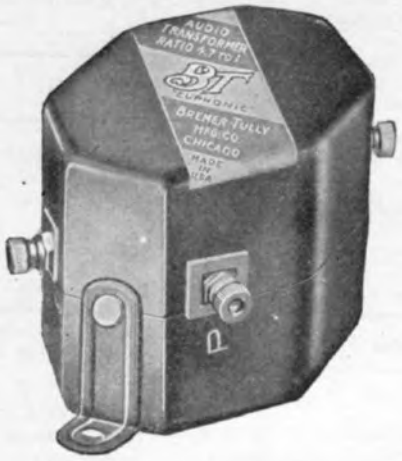

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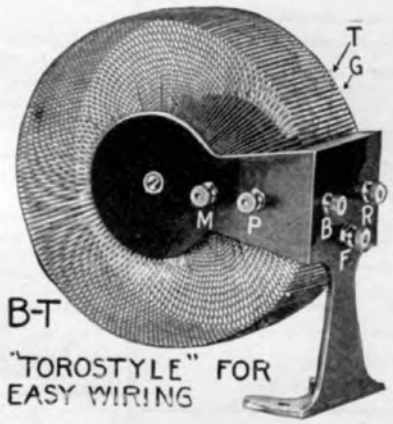

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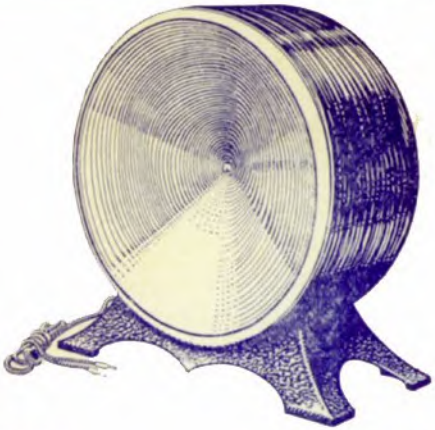

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