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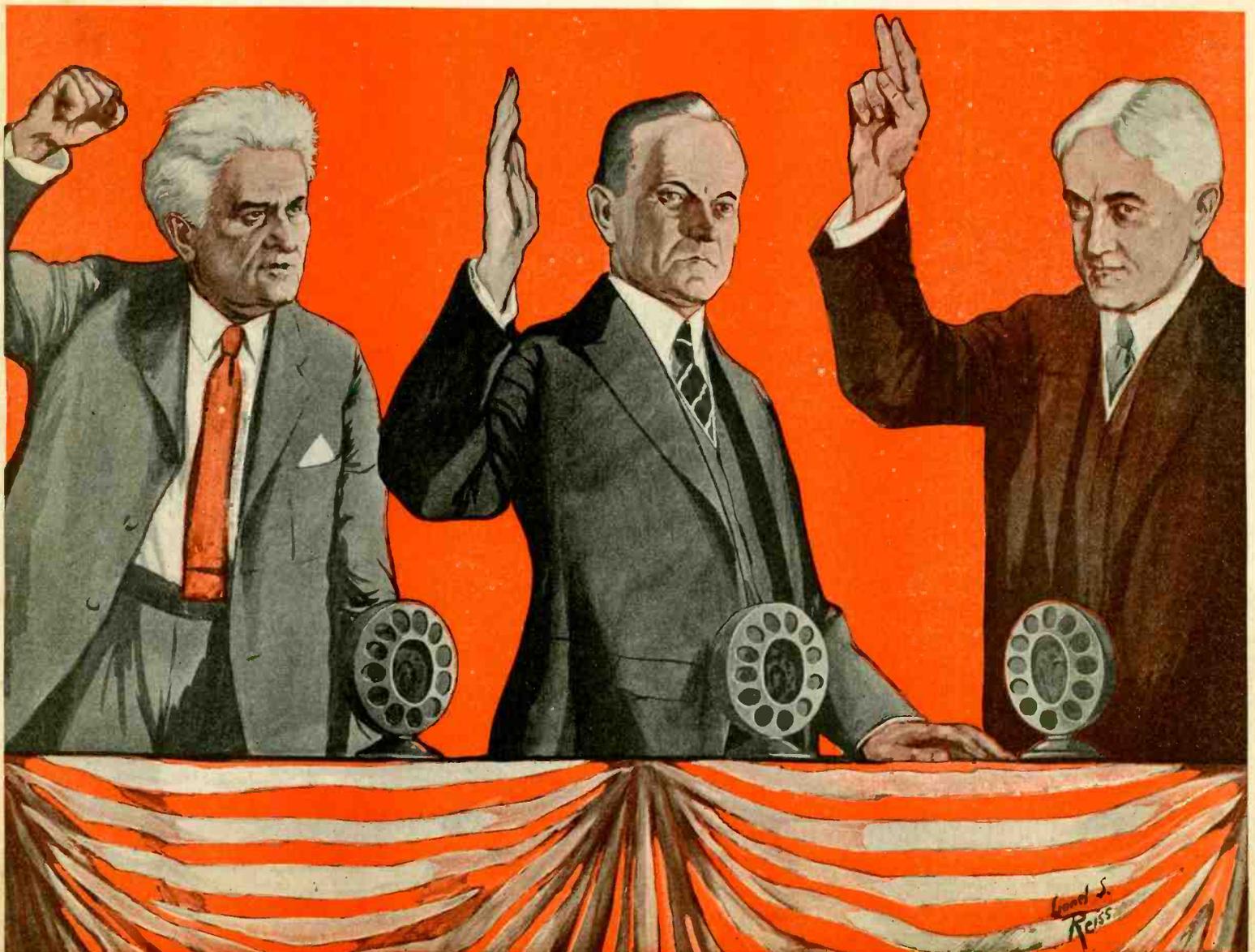
RADIO WORLD

Title Reg. U. S. Pat. Off.

VOL. 6. NO. 6.

ILLUSTRATED

EVERY WEEK



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(Names upon request)

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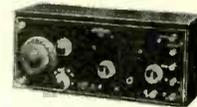
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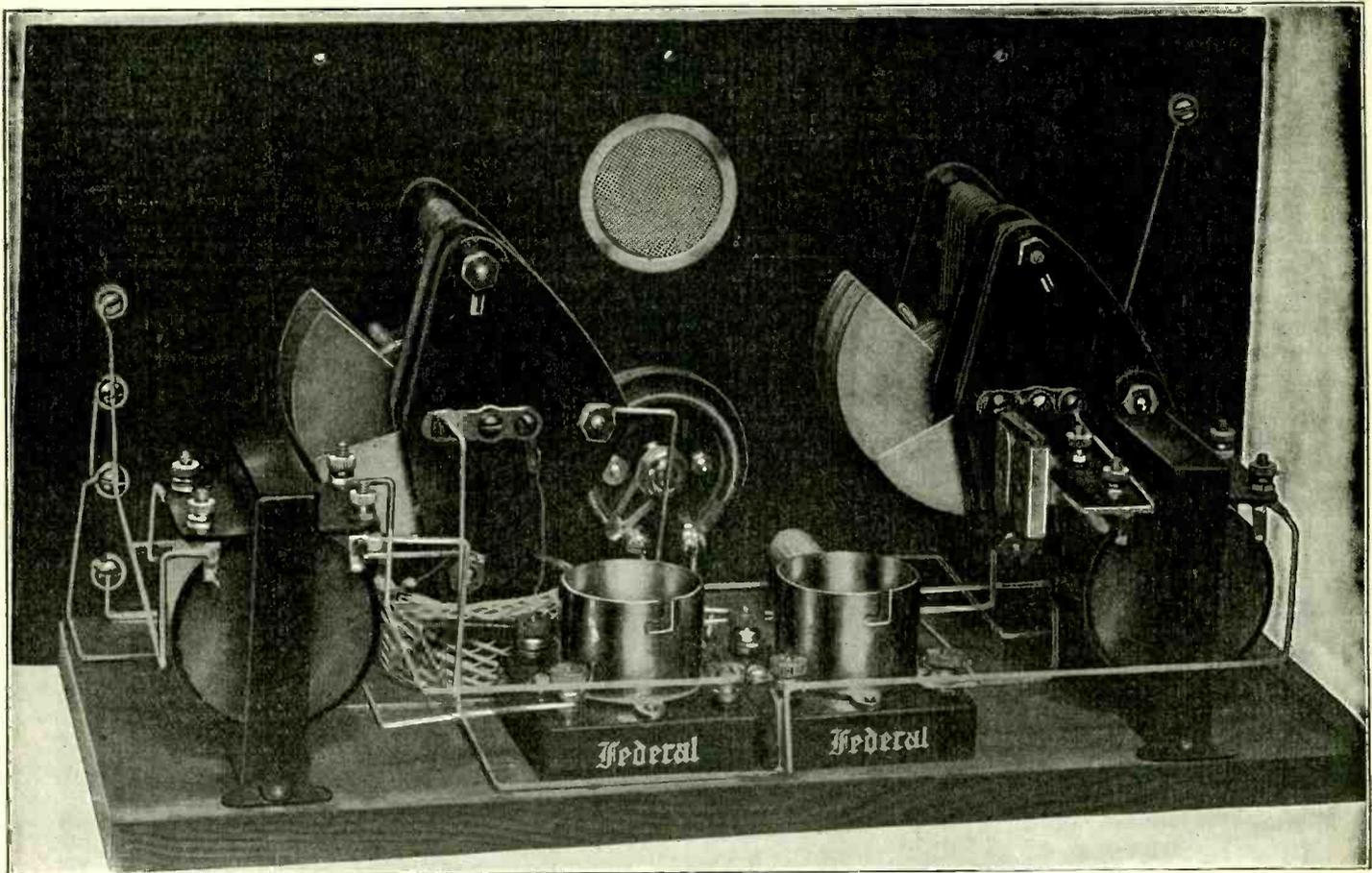


QUALITY REFLEX SET \$ 27.72

Here is the set illustrated and described on pages 4-5-6 in last issue of Radio World, Oct. 25

ON APPROVAL

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You have been wanting a real good set. Here it is!

This Quality Reflex "Sherma-Flex" set produces most unusual results. It is highly selective. It brings in local and distant stations with a fine clearness and so strong that many users say the volume equals that of a five-tube set! It has been subjected to numerous severe tests under different trying conditions and in many locations, and in every case it has proved extremely satisfactory alike to novice and expert.

We know it will please you, or we could not afford to make such a wide-open offer.

Just invest in a 2c stamp—say you are willing to look at the set in your express office. If you like it, give the agent the price, and take it away. If after testing and using it a reasonable time, you are not absolutely sure you got your money's worth, we will take it back and refund every cent you paid.

We Pay Transportation Anywhere in U. S.

The Set Complete, with all parts assembled, in a nice piano-polished, dark mahogany-finish cabinet, and with all accessories, ready to use—nothing more to buy—for only\$53.78

From New York brings in Hastings, Neb., using Ducon plug. Also Miami, Fla., on loud speaker, using aerial. Chicago comes in with great volume on loud speaker, using bare wire aerial, without insulation, in pouring rain! Greater distance on phones!

If you want to Save the Cost of Assembling, we will sell you the parts unassembled, including the cabinet for only.....\$27.72

As the price of all the accessories is only 16.06

The Whole Outfit, with Receiver, unassembled, then will cost you only \$43.78

You—anyone—can put the parts together in a few hours. Easily followed charts and instructions go with every set.

**Don't Let This Opportunity Get
Away—Write To-day!**

LIST OF PARTS

Two Kant-Short 26-Plate Vernaler Condensers.
Two Shermatran Transformers, 1 low and 1 high.
Two Honeycomb Coils, 75 turns each, Unmounted.
Two Fixed Condensers, .001 Capacity.
One Single-Circuit Jack.
¼ lb. No. 20 DCC Wire.
One Fixed Crystal Detector.
One Panel, 7x14 in., Drilled and Engraved.
One Baseboard, 7x13 in.
Two Federal Sockets.
Six Lengths Bus Bar.
One Double-Circuit Jack.
One 6 Ohm Rheostat.
Six Eby Binding Posts.
One Piano-Polish Cabinet to Fit.
One Piece of Hard Rubber, ½x7 in.

ACCESSORIES

Two UV-201A or 301A Tubes, One 6-Volt Storage A Battery, 90 Volts of B Battery, One Pair Guaranteed Head Phones, One Phone Plug.

Screws for mounting transformers, two long screws with nuts to mount the strip, on which are to be mounted the binding posts; brass strip; 100 feet 8-strand aerial wire; 50 feet No. 14 insulated lead-in wire; insulators, connecting wire, solder, lugs.

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RADIO WORLD

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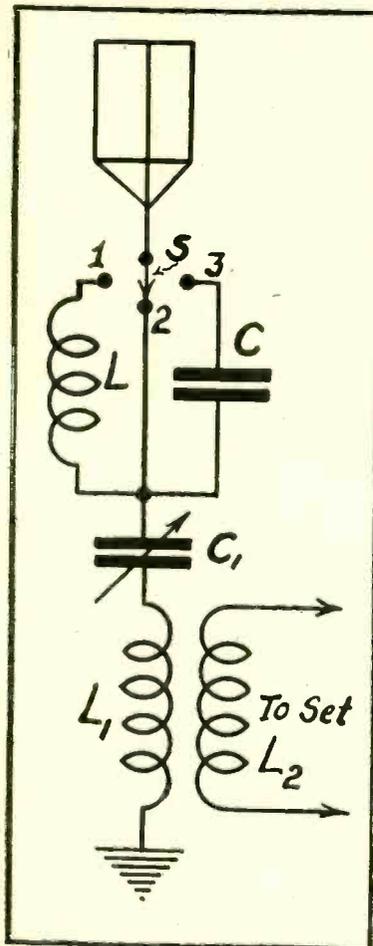
How to Make Any Receiving Set Meet the New Wave Band

[The Third National Radio Conference voted in favor of widening the wavelength band so that it will go down to 200 meters and up to 545. Now 222 is the minimum. The reallocation will be completed in a few weeks.—EDITOR]

By J. E. Anderson

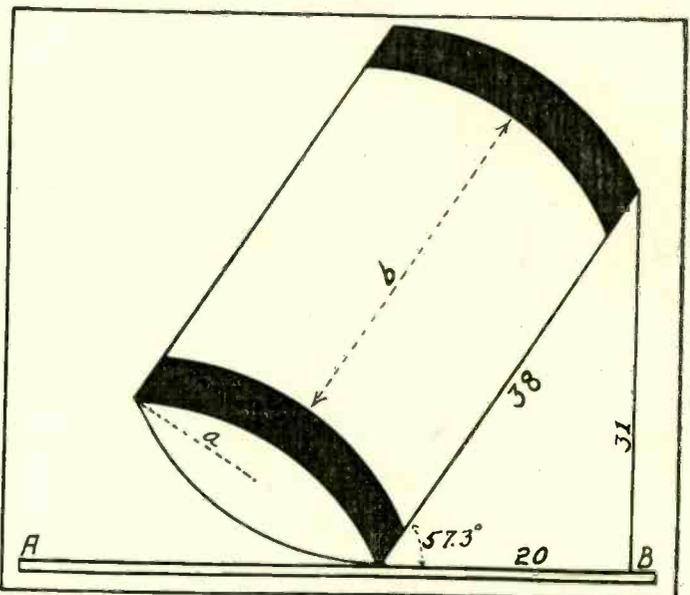
Consulting Engineer

THE old broadcast range of wavelengths was from 546 to 222, but now this has been extended downward to an even 200 meters. Most of the receivers now in use have been designed to cover the old range, but actually many of them cover a range from 600 to only 250. Thus they cannot tune in the shorter waves of the old range and of course they will not be able to tune down to the new lower limit. There are several ways of adapting your receiver to the new needs. If the antenna circuit is tuned its tuning range may be extended by inserting a loading coil in series with the antenna for increasing its wavelength, or by inserting a series condenser for decreasing it (Fig. 2). Try a 25-turn coil, No. 20 DCC wire on a 3-in. tubing. The antenna circuit is tuned by means of condenser C1, L1 being the primary inductance. To increase the wavelength the switch S is thrown to Stop No. 1, which connects the loading coil L in series with the primary. If it is necessary to decrease the wavelength the switch is thrown to Stop No. 2, which connects the condenser C in series with the tuning condenser. The series condenser method should hardly ever be necessary, however, because C1 may

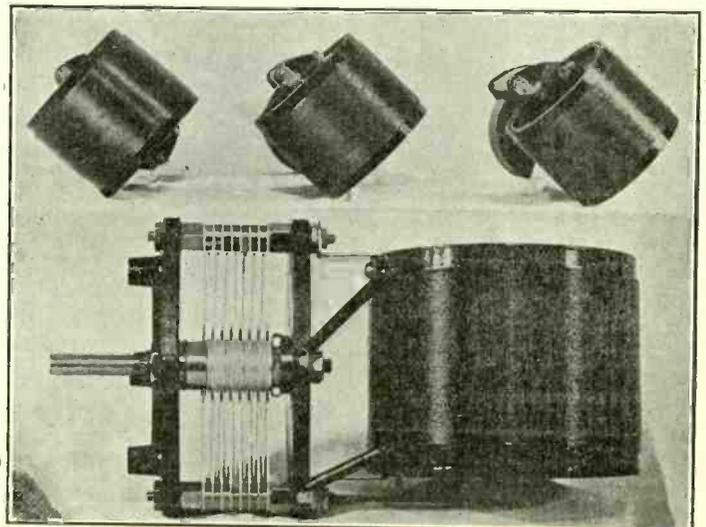


A CIRCUIT using a tuned primary may easily be made to cover the new wave band of 200 to 545 meters, if it does not do so now, by inserting a combination of loading coil and antenna series condenser, the coil L increasing the wavelength and the fixed series condenser C decreasing it. A switch, S, is used to cut one in and the other out. C1 is the aerial tuning condenser, L1 the primary inductance and L2 the secondary. (Fig. 2.)

which connects the condenser C in series with the tuning condenser. The series condenser method should hardly ever be necessary, however, because C1 may



IN THE NEUTRODYNE, the changes required are three-fold, due to the presence of three Neutroformers. As these coils must be mounted at an angle of 57.3 degrees and the coils would have to be removed for making the necessary changes, this diagram is published (Fig. 4) to facilitate re-mounting at the correct angle.

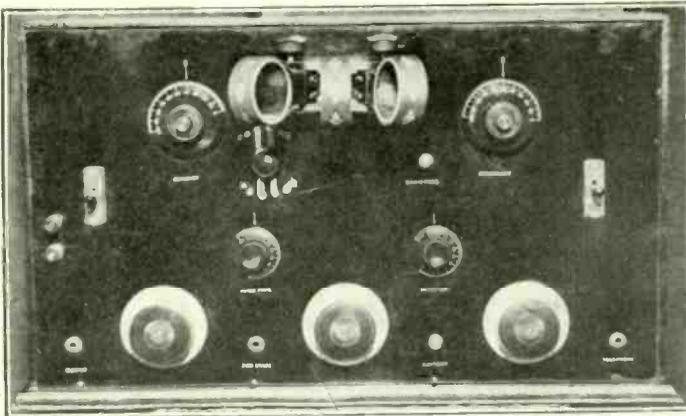


THE THREE NEUTROFORMERS are shown at top, mounted at an incorrect angle, to show what should be avoided when replacing the coils. If the angle is incorrect feedback results and neutralization is negatived. Nor should the coil be mounted straight up and down as shown in the lower part of the photograph. (Fig. 3.)

be made very small when in an antenna circuit in this way, say 13 to 17 plates. Another method of increasing the inductance in the antenna for increasing the wavelength is to use a larger primary L1 and provide it with taps. But that is not convenient on a circuit which is already built.

In most of the modern circuits the antenna is un-

Solving Your Wave Problem



THE DEMOUNTABLE TYPE of honeycomb coil affords an easy method of substituting the right coil to cover the new band, provided the matching condenser is of proper minimum and maximum capacity (Fig. 6). See table on opposite page.

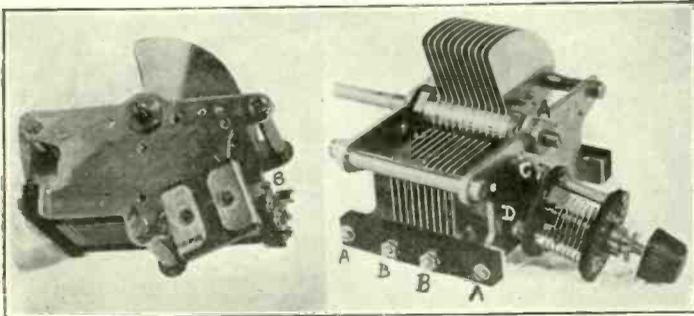


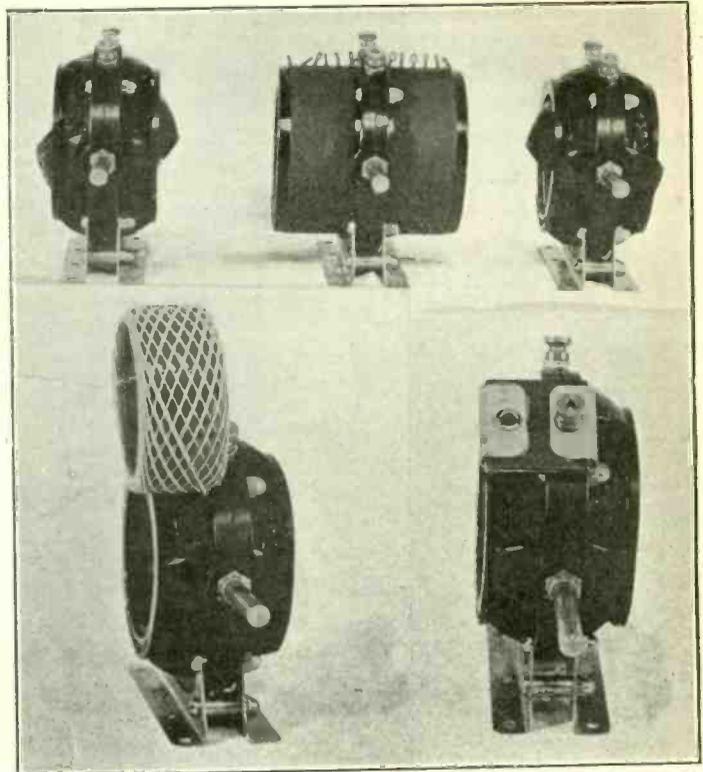
FIG. 7—A represents connection to variable condenser rotor, B the lead to the stator or fixed plates. A fixed condenser across the terminals increases wavelength. A small variable one (at right) may be used and when its proper setting is found this will remain permanent. (Fig. 7) C and D are the terminals of the small variable.

tuned and in that event it is not necessary to do anything with the primary to adapt it to short waves. Practically all Neutrodyne and similar popular circuits have untuned antenna circuits.

It is in the secondary circuit that changes must be made to adapt the receiver to the short waves. It is assumed that the receiver is tuned with a variable condenser rather than with a variometer and also that the receiver already reaches the upper broadcast limit, or that it goes considerably above it, so that it is only necessary to bring it down.

So that the variation of the tuning condenser from zero to maximum setting shall cover from 550 to 200 meters it is necessary that the change in capacity produced by the condenser represent at least 87 per cent. of the total capacity in the circuit at a maximum setting. If this percentage is greater the range will be wider. This, however, cannot be realized unless a large condenser and a small inductance coil are used. It is possible with a .005 mfd. condenser and with larger, but it is not recommended that a larger one be used. For smaller condensers, such as 17-plate, 11-plate, etc., it is difficult or impossible. The reason is that at zero setting there is a certain capacity in the circuit, which remains the same practically for all sizes of condenser, and this represents a larger percentage of the total for the small condensers than for large. This zero setting capacity should be kept as small as possible, and this should be borne in mind when selecting the condenser, when winding the coil and when mounting these instruments in the circuit. If this self-capacity is excessive not even a .005 condenser will cover the new broadcasting range. Many Neutrodyne circuits will not cover the range because the 17-plate condenser is used and because the zero capacity is large.

Suppose we have a circuit which tunes to wavelengths up to 600 meters but will not reach the short waves. Now for broadcast purposes it is not necessary to go higher than 550 meters. The set may therefore be changed so that it will only tune up to



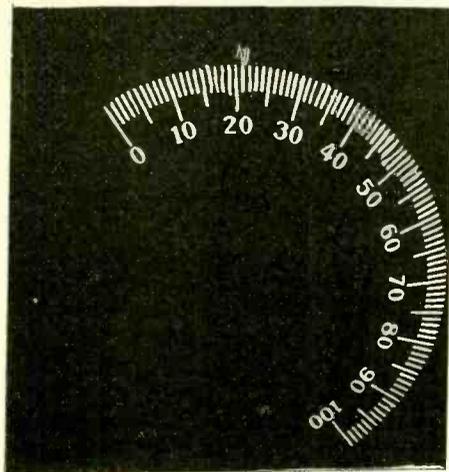
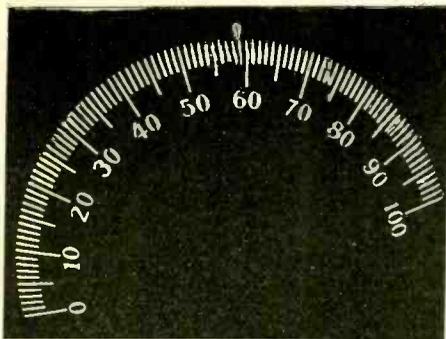
THE ORDER of inductances (Fig. 8) in the variocoupler-two variometer set, one of the most popular regenerators, is shown in upper part of the photo. The variometers usually will be found to cover the entire band. The coupler (center) may require a few more turns on the stator to reach 545 meters; as in Fig. 6. If the variometer does not go high enough a 25-turn honeycomb coil may be inserted in series with one of the variometer terminals, as shown in lower photo, left, or, as shown at right, a small fixed condenser may be bridged across the terminals.

550, and this will make it possible to tune in much shorter waves at the other end of the scale. To make this change, turns may be removed from the inductance coil until the circuit tunes to waves slightly in excess of 550 meters. There is only a slight change in capacity above the 95 mark on an ordinary condenser, but sufficient so that we may fix 95 degrees as the point at which we wish 550 meters to come in.

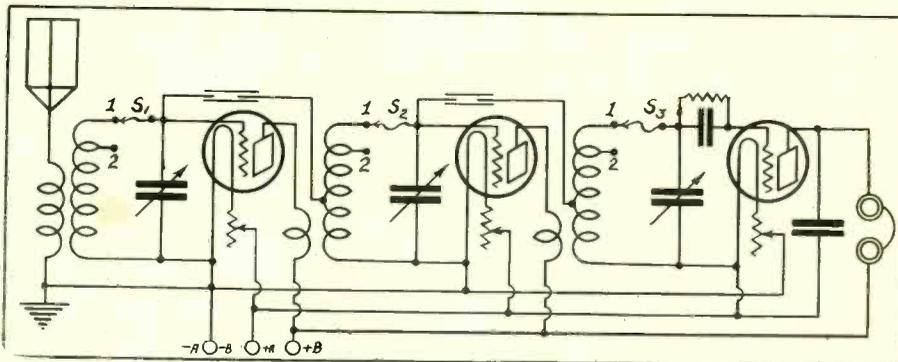
Now if a wave meter is available it is the quickest to use it to make the change. Set it for 550 meters and remove turns from the inductance coil of the receiver until this tunes in at 95 degrees. That is convenient and accurate. If no wave meter is available, tune in to some broadcasting station whose wavelength is the longest. Tune the receiver to it. Suppose that its wavelength is 492 meters and it comes in at 59.6 on the dial. That is not high enough and hence it will be necessary to remove turns. But how many? It is necessary to determine where the 492 meter signal should come in in order that the 550 should come in at 95. This may be done by applying the law that the condenser setting is proportional to the square of the wavelength. This neglects the zero setting capacity and is therefore only approximate. It gives $492^2 : 550^2 :: C : 95$. This proportion is satisfied if $C = 76$, which gives the point on the dial at which the 492 signal should come in if the 550 signal is to come in at 95. This may be made more accurate by assuming a reasonable value of the zero setting capacity, converting it into equivalent dial units, and making the allowance in the proportion. For instance assume that it is 30 mmfd., and the tuning condenser is a 500 mmfd. (.005 mfd.) Hence the allowance is 6 divisions. The new value at which the 492 meter signal should come in is 74.9 divisions. Having determined this, remove turns, one at a time, until this signal comes in at the point on the dial thus found. Then the 550 signal will come in very close to 95 on the dial.

When this has been done there is no useless tuning

Eliminating Useless Capacity



IF A STATION on a 492-meter wave comes in at about 60 on your dial, as shown in the top illustration, then you have useless capacity in your set and will not reach the low waves of the new band. The highest station, 545 meters, should come in at about 95, because the last five degrees are not very serviceable in affording proportionate capacity increase. Then 492 should come in at about 76, instead of at about 60, as shown. Likewise, if you find that the middle range stations, say about 350 meters, come in around 20, as shown in the lower diagram, you will still miss out on the low ones, the 100-watt stations.



THE NEUTRODYNE, accommodated to the new wave band. The taps on each Neutroformer are numbered 1 and 2. S is the switch. (Fig. 1.)

Wavelength Range of Various Coil-Condenser Combinations

No. of Turns	L mH.	C-O mμfd.	W-O	W(250)		W(350)		W(500)	
				Min.	Max.	Min.	Max.	Min.	Max.
25	.039	30	65	75	200	76	234	78	275
35	.0717	33	92	106	274	107	329	109	374
50	.149	31	128	149	394	151	457	154	486
75	.325	26	172	207	585	210	670	215	791
100	.555	24	218	263	750	267	874	274	1032

L represents the inductance in millihenries, C-O the distributed capacity of the coil in micromicrofarads, W-O the natural wavelength of the coils, W the wavelength range of duolateral coils with condensers the value of which is given in parenthesis—usually 250 is 15 plates, 350 is 17 plates and 500 is 23 plates. In determining the maximum and minimum values the distributed capacity of the coil and the zero setting capacity of the condenser have been taken into account, but not the distributed capacity of the associated leads in the circuit. In any actual circuit the range would be shifted upward slightly in each case.

range at the upper end of the dial, and considerable gain has been achieved at the lower end by spreading out the points at which the old stations come in and bringing in many other stations which were below the dial range before.

But it may be that the tuner will not yet reach down to the lower broadcast limit, which it will not if the zero setting capacity is too large a percentage of the total capacity in the circuit. The remedy is to tap the tuning coil, and then use a small switch to throw the circuit from long to short waves. To determine the point where to place the short wave tap the fact may be used that the wavelength is proportional to the turns on the coil, provided the coil is not too long and that the change in turns required is not great.

Suppose that the circuit will only tune to 222 meters and it is desired to tune down to 190. Then $222:190::N:n$, where N is the number of turns in the entire coil and n is the number included after the tapping. The reduction is about 14 per cent. of the original turns, that is, there should be a reduction of 7 turns in a 50-turn coil. For the long-wave range the entire coil should be used and for the short seven turns less.

In Fig. 1 is shown how a Neutrodyne may be changed so that it will bring in the shorter waves as well as the long. In each of the three tuned circuits a switch is inserted, represented by S1, S2 and S3. Stop No. 1 is at the top of the coil and Stop No. 2 is from 5 to 15 turns down. It is better to put the switch in the grid lead because here it will upset the balance of the circuit the least. The switch in each case may consist

of a very short piece of flexible conductor with a small clip at the end for gripping the taps. Other methods may of course be used, but however it is done it must produce the least possible change in the balance. In tuned circuits other than Neutrodyne the switch should be placed on the ground side of the inductance coil, for then the unused turns for the low-wave range will be at low potential, and losses will be less.

If duo-lateral or similar coils are used it is best to arrange the device so that different sizes may be plugged into the circuit in parallel with the tuning condenser to cover the desired range.

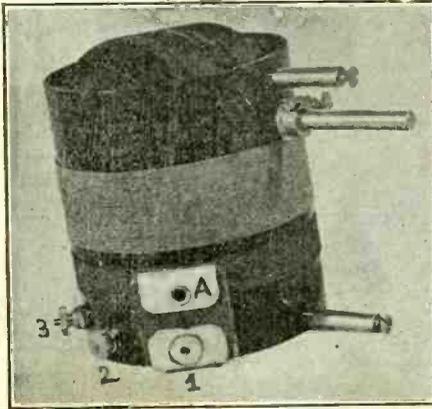
In case a flat spiral coil is used instead of a solenoid the method of tapping as was suggested above may be done provided the equivalent coil is considered. That is, when turns are removed or when the position of a tap is to be determined, average turns must be considered. The outside turns will contribute more and the inside less to the inductance than the average turn. In Fig. 4 is shown two coils which are equivalent, with dimensions and formulas for changing. When wire is removed from the spiral a turn may be determined by the length of wire which is equal to the length of the average turn.

Coils of the basket weave and the corresponding spiral forms may be considered as simple, single layer coils for approximate work. The capacity of these various spaced types of winding is considerably less than the corresponding close winding, and hence they are especially advantageous where the zero setting capacity must be kept very small.

In a circuit in which the condenser has an actual

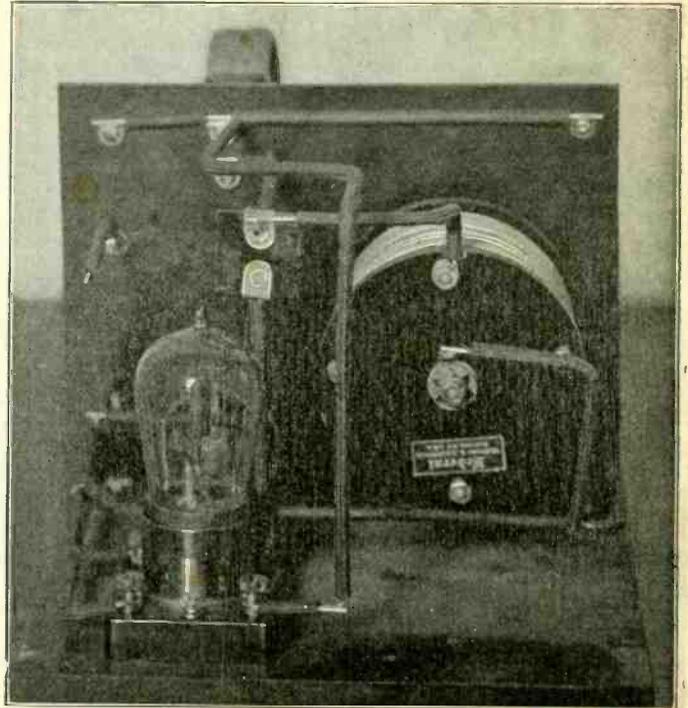
How to Calibrate Your Set

change of 500 micromicrofarads, the maximum allowable zero setting capacity is 76.2 micromicrofarads if the range from 550 to 200 is to be covered. If there is to be a margin of safety at either end of the scale the zero capacity must be considerably less. It is thus seen that it is of prime importance to keep distributed

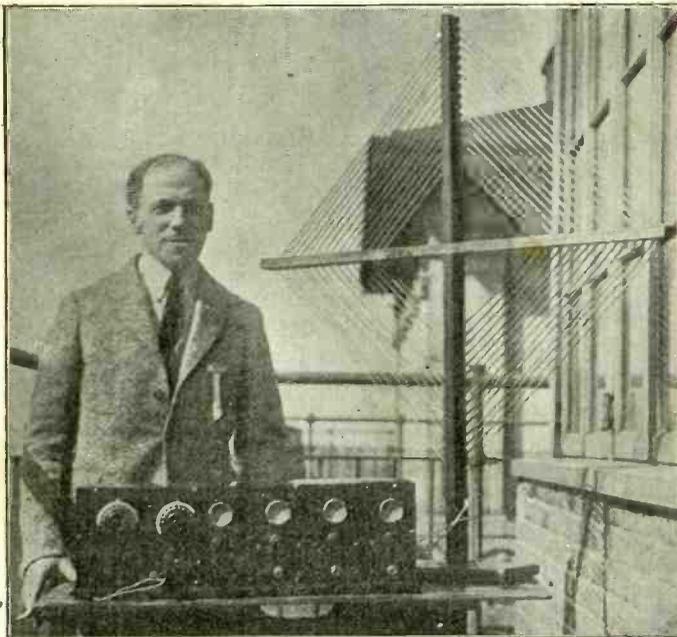


THIS type of coupler (at left) is often used in the 3-circuit tuner. Post 1 goes to aerial, 2 to ground, 3 to grid condenser. A represents a fixed condenser mounted directly on the binding post. If the open end of this condenser were connected to Post 2 and to ground, with the condenser of .001 mfd., the wavelength would be raised about 15 meters. This is a large size for a fixed condenser, but because the primary is aperiodic the wavelength increase is small. Across a tuned primary a fixed condenser as large as this would skyrocket the minimum wavelength of the set out of the broadcasting range.

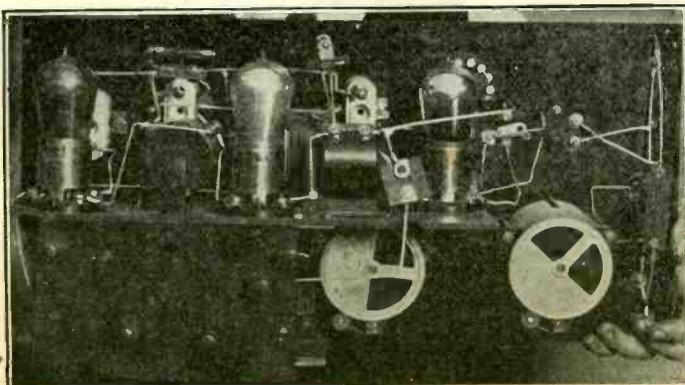
capacity as small as possible if taps are to be avoided in the tuned circuit. If the condenser has an actual change of 1000 micromicrofarads (.001 mfd.) the allowable zero capacity is 152 micromicrofarads. No difficulty would be experienced with that size condenser, as the zero setting capacity would not be much greater than with the smaller condenser, possibly not as great. Still the large size should be avoided for the short waves.



THE MOUNTED honeycomb coil set is easiest to readjust. Simply change coils to cover the new wavelength band. If the condensers are of the right capacity the new coils may remain permanently.



A LOOP, to increase the wave range, needs more turns, but most loops now cover from 200 to 600 meters, with the proper variable condenser.



4-Control Sets Among the Absent, Expert Finds

By Dennis J. O'Flaherty

OF all the hundreds of up-to-date sets I have seen, not one has had four controls. One way out is to use a so-called untuned RF transformer. The inductance consists of two fixed coils with a core of iron or air to broaden the tuning. Such an instrument has a fixed maximum voltage step-up known as its peak. It seems to be agreed among all radio technicians that as between tuned and untuned RF, the tuned variety is far better. For those who desire a 3-circuit tuner with each circuit tuned and who want to precede it with a stage of RF, there is no alternative save to use the fixed RF transformer. Some of these work very well. It must not be assumed because the tuned variety is preferable that the untuned type is not good. The problem in all aspects resolves itself into a matter of personal taste and desire.

In the case of a reflex, granted a crystal detector is to be used and a stage of RF, the RF must be tuned and so must the detector circuit, because of the inherent high resistance of the crystal rendering selectivity otherwise difficult. One stage of RF gets best results ahead of a crystal detector. If a variable crystal is used, that is, a catwhisker, you may decide for yourself whether the extra adjustment is to be rated as a control. The catwhisker may stay put at the most sensitive spot for several days. An alternative is to use the fixed crystal, and some of them are excellent, though variable ones are always as good or better.

The Super-Heterodyne has only two controls, no matter how much intermediate RF is used.

A \$20 DX Set of Great Volume

By Neal Fitzalan

HERE is a circuit that is not only a wonderful distance-getter, but brings in signals in volume, without distortion. This set probably may be built with equipment you now have. Under laboratory test a set employing this circuit made an average DX record of 1,000 miles, which means that many stations over 1,500 miles away were brought in.

The main feature of the set is the split variometer. There are two distinct parts to every variometer, viz., the rotor and the stator. In the purchased variometer, you will find that rotor is connected in series to the stator, that is, one end of the rotor is connected to one end of the stator, thus leaving two outside connections from the variometer—the remaining rotor side and the remaining stator side.

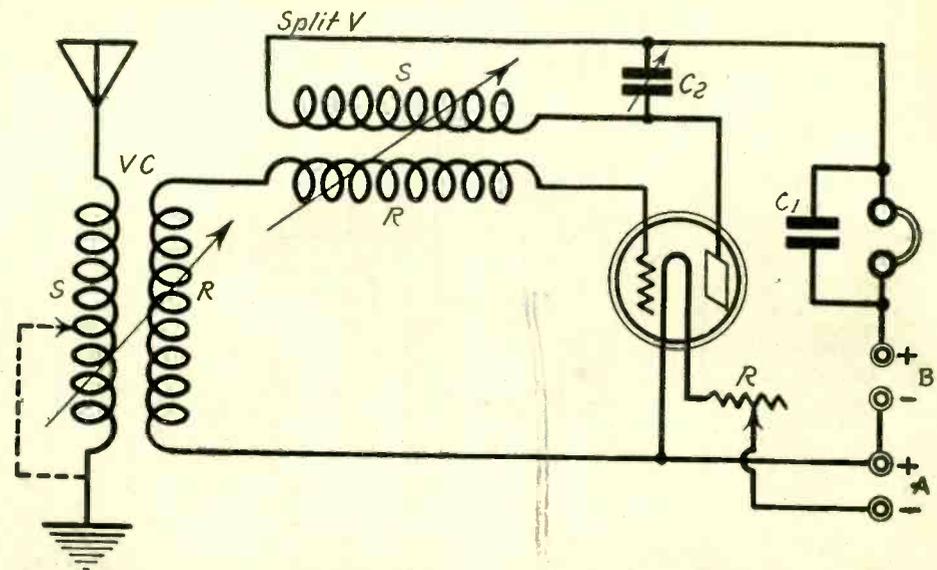
When splitting the variometer it is necessary to break the connection between the rotor and the stator. There are two ways in which this connection is made: by friction contact or by a pig-tail, a direct wire connection of the rotor with the stator. First determine what type variometer you have.

With the friction-contact type it is necessary to remove the front plate. This is easily done by merely unscrewing. Under the plate a wire will be found. This wire must be insulated from the plate that you have just removed. After the wire has been insulated, preferably by means of a piece of empire tubing, bring the wire out past the plate, as this will be one of the stator connections. Replace the plate.

If the connection is pig-tailed it greatly simplifies matters. Merely cut the connection in the center and you will have the four connections necessary for the split-variometer, the two original terminals and the two resulting from the clipping of the pig-tail connection.

Fig. 1 is the circuit. It is very necessary that the rotor be in the grid lead, as this is practically the only method of tuning the secondary circuit. The rotor of the variocoupler tunes the secondary to a certain extent, but this is used more for clearing up interference between spark code station and the undamped (continuous wave) broadcasting station.

The stator is the tickler or plate coil. This is tuned by a 23-plate variable condenser. A larger condenser may be used, but the tuning will become so sharp that tuning will be difficult. A verner adjust-



S AND R (at left) are the stator and rotor respectively of a standard variocoupler. The dotted line indicates that the primary may be tapped if desired. Referring to the split variometer, it is very important that the stator be in the plate circuit and the rotor in the grid. C2, .0005 mfd., is a 23-plate variable condenser. As the tuning is very sharp with this condenser, it would be well that it have a verner adjustment. C1 is of .001 mfd. capacity. No grid condenser is shown. It was found under laboratory test that the set worked better without one. However, it is advisable to try the set under your own conditions with and without the grid leak and condenser. A type 200 tube is advised, but the set works well with any type tube.

ment will be found a great convenience.

The circuit shows a tapless variocoupler. A tapped coupler may be used to advantage, although this may slightly complicate tuning. As you will no doubt note, the circuit does not show a grid leak or condenser. It was found under laboratory test that the set was far clearer and brought in distance better without the grid condenser than with one. However, it is advisable that you try the set with and without grid leak and condenser, as the individual instruments may have much to do with it.

The fixed condenser across the phones is .001 mfd. capacity.

A 200 or 300 is advised for the detector. However, if 201 A or 301A tubes are used, better control of the oscillations will result from the use of a 20 to 30-ohm rheostat. For reducing cost, yet still maintaining efficiency, the 199 or 299 type of tube may be used, with a 4½-volt dry cell.

There are three dials and the rheostat knob on the panel. The entire tuning is done by the split variometer and the variable condenser. The coupler is resorted to only in eliminating interference, and as a final adjustment. The rheostat is useful in losing the carrier-wave.

Tuning is not difficult, yet is not as simple as the Neutrodyne. However, after an evening's experimenting, tuning will become easy.

In tuning, turn the split variometer either to maximum or minimum, rotating the condenser from zero to 100 until waves are heard.

It is much simpler actually to tune the set than to describe the method of tuning. After all, every radioist tunes a set his own way, and after one evening's tuning you will devise your own system.

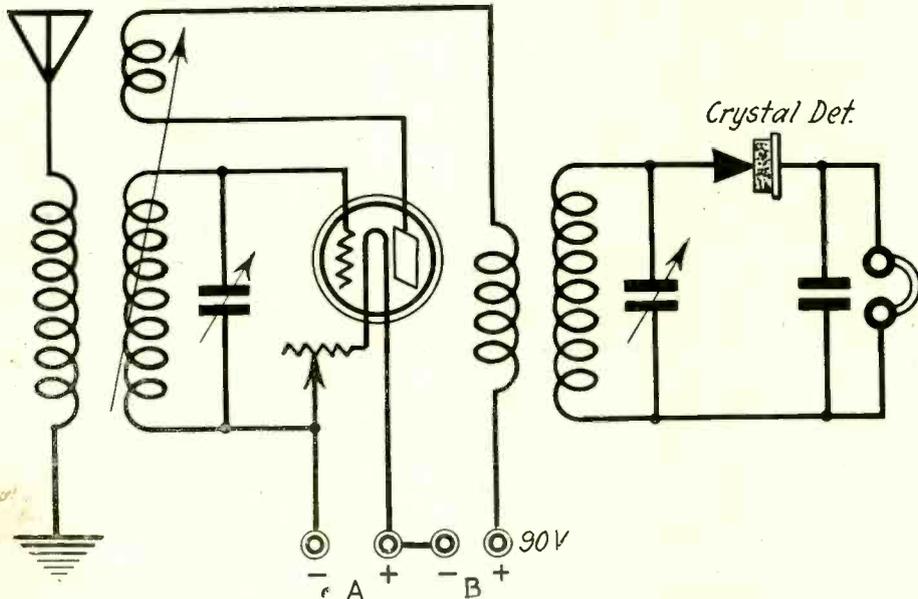
With two stages of audio-frequency amplification, this set is a whirlwind for distance and volume.

This set possesses all the distance-getting qualities of the regenerative set plus the volume and tone of the Neutrodyne. And all this, if 199 or 299 tube is used, is accomplished by an expenditure of \$20, including everything—aerial, earphones, cabinet—absolutely everything.

In hooking up the set the aerial goes to one end of the variocoupler primary and the ground to the other end. The secondary or rotor of the coupler is connected to one side of the rotor of the split variometer, while the other side of the secondary goes to the positive A battery. The other side of the split variometer rotor connects to the grid of the tube. The rheostat is placed in series with the negative A battery lead. One side of the split variometer stator goes to the 23-plate condenser, thence to the phones. The other side of the stator goes to the other terminal of the variable condenser and to the plate of the tube. The other side of the phones is connected to the positive 22 volts of B battery. A .001 fixed condenser is connected across the phones. Negative B is connected to the positive A battery.

In Summit, N. J., I brought in Davenport, Ia., on a speaker, using just this circuit—one tube and nothing more. Music was being played. The volume was not enormous.

Variations on the Theme of the 3-Circuit Tuner



A STAGE of regenerative radio-frequency amplification in conjunction with a crystal detector. This is not as good at DX as a one-tube regenerative set under experienced hands. But due to the better tone quality, the result of crystal rectification, it is favored by some. (Fig. 3).

By Herman Bernard

MANY experimenters have constructed the 3-circuit tuner and have had wonderful DX results. This is one of the most selective circuits that can be built at low cost. It employs regeneration in a very efficient combination, which accounts for its DX powers. Regeneration reduces the resistance in a circuit and this lowered resistance makes for sharp tuning. Without sharp tuning DX is impossible. Also the signal is built up at radio frequencies, which makes a regenerative set the equivalent of a non-regenerative tube set that employs a stage of radio-frequency amplification. Hence this circuit satisfies, as near as can be satisfied under the circumstances, the fan's DX craving. The tone quality, too, is good.

The tone quality may be improved at a sacrifice of DX powers; regeneration, if insufficient, may be pepped up; a stage of radio-frequency amplification may be added without the employment of any extra coil; a fixed radio-frequency transformer of the so-called "untuned" type may be placed ahead of the present detector circuit, or the existing make-up of the receiver may be used as an RF stage and the detector tube, always last, may be hooked up with the fixed transformer. These experiments are to enable the fan to try out such changes as he desires so that any improvement in the direction that interests him most may be conveniently made.

Suppose that the receiver as at present constituted is not regenerating well. This is often due to misplacing the instruments, occasioning interplay of radio currents where they should be kept severely apart. Sometimes it is due to the apparatus used, sometimes to the tube itself. The ideal condition is to have the tickler or rotary coil smoothly respond to its dial variations, reaching the maximum of regeneration without a "pop," the sudden sound so familiar to those whose sets coarsely regenerate. To make up for a deficiency in regeneration the experimenter may change his grid return, so that instead of going to

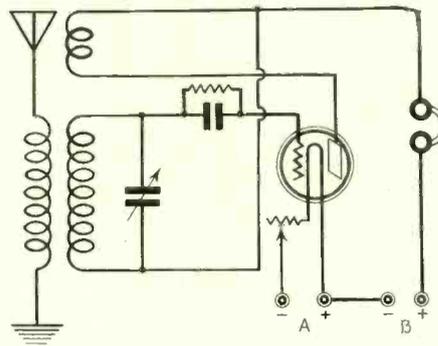
is to keep the positive plate charge off the grid.

The 3-circuit detector circuit may be used as a stage of regenerative radio-frequency by omitting the grid leak and grid condenser from that part of the circuit and changing the grid return from the A+ to the A-. The grid return is the connection from the end of the coil whose beginning goes to the grid. In all amplifier circuits, either at radio-frequencies or audio-frequencies, the grid return should be to the negative, while in detector tube circuits, except when the 200 type or 300 type of tube is used, the grid return is to the positive. With the 200 or 300 it works about as well either way.

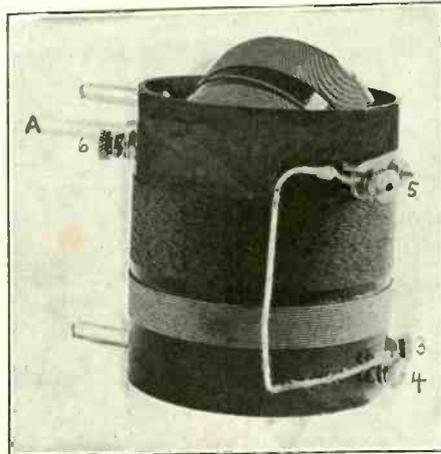
With the circuit converted into a radio-frequency amplifier of the regenerative variety it may be used in any of several ways. One is shown in Fig. 3, where the output of the tube is through the tickler and the primary of a radio-frequency transformer of the tuned type. The secondary of the detector coil has a variable condenser across it (in parallel), thus tuning the detector circuit to the wave of the incoming signal, the same wave to which the RF amplifier was tuned. The RFT used in the detector circuit may be made by any fan and may be of any of several types of construction. Perhaps the easiest way to make one is to get a 75-turn honeycomb coil, remove ten turns, cut the wire, bind the remaining wire with sealing wax, and wind the surplus wire right on top of the honeycomb coil, using the new winding as the primary, and securing the terminals thereof with sealing wax. If a spiderweb coil is to be wound, 50 feet of No. 22 double cotton covered wire is good as the secondary and 12 feet of the same wire as the primary. The secondary and the primary are wound together, side by side, until the end of the shorter length of wire is reached, when the winding is finished. In both these instances the variable condenser should be of .0005 mfd., normally 23 plates. The detector circuit condenser need not be vernier, although it is vital that the variable condenser used in conjunction with the 3-circuit coil be vernier. The use of low-loss condensers and coils is highly advisable. If a tubing is to be used, say hard rubber, composition, bakelite or cardboard, the primary may be wound first, on a tubing 3 1/2" diameter and 4" high, ten turns of No. 22 double DCC wire constituting the primary. A space of 1/4" should be left, then, starting with new wire of the same size, 55 turns are wound. Both windings should be in the same direction in all of these coils. This may be determined by seeing that the terminal of the primary and the terminal of the secondary point in the same direction. In a honeycomb coil the terminal is on top of the winding, while the beginning emerges from under the winding.

If a crystal detector is used, as shown, the beginning of the secondary of the RFT goes to one side of the crystal, the other side of the crystal going to one of the phones. The other phone connection is to the end of the secondary. As said before, these two terminals of the secondary are connected respectively to the rotor and stator plates of the variable condenser. It makes no appreciable difference in this case whether the rotor or the stator plates go to the beginning or end of the secondary.

The fixed condenser across the phones



A 3-CIRCUIT receiver of the ultra-audion type. This circuit is difficult to handle correctly. The grid return is to the plate. Lagging regeneration is pepped up, most likely overdone. (Fig. 2).



THIS shows how the end of the secondary is connected to the beginning of the tickler, giving a grid return to the plate. (Fig. 1).

the A+ it goes to the phone side of the plate coil. Under ordinary circumstances this Ultra-Audion effect is too much, when combined with the use of a regenerating tickler. The grid leak preferably should go from the grid post of the socket to the F+, although in the diagram (Figs. 1 and 2) it is shown in the conventional position. The advantage of the leak across the grid and F+

Getting Volume from Crystal

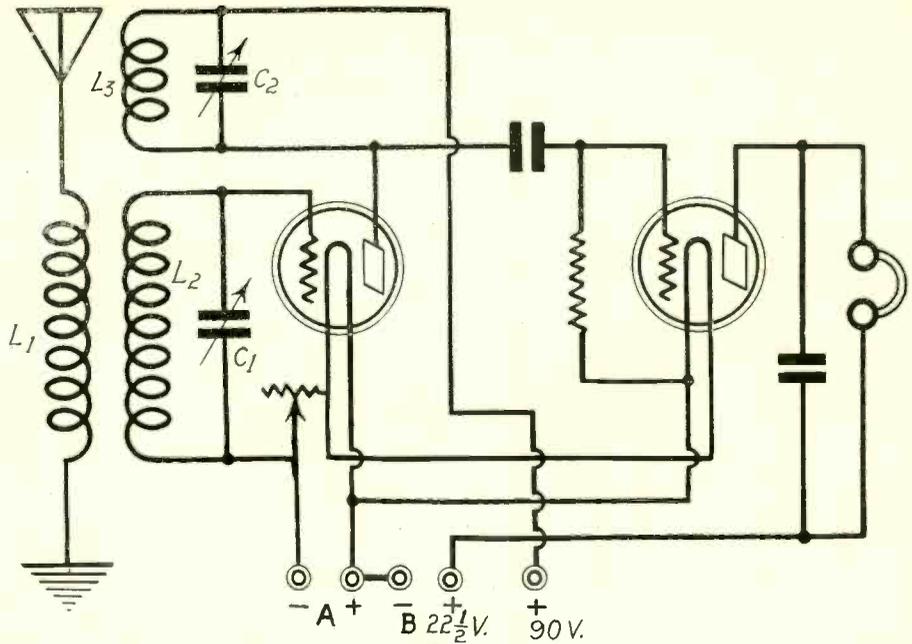
is optional. Try it. Maybe it will clear up the signals somewhat. I seldom find any advantage in using this condenser.

This circuit gives better tone quality, due to the use of the crystal for detection. This will appeal largely to music-lovers who have a discriminating ear and like to indulge their tastes to this qualitative extent. It is not attractive to the listener whose chief object is to get all the DX he can, for it is difficult to do any reaching out when a crystal rectifier is used in conjunction with only one stage of RF. When you reach out 150 miles with a set of this kind you are doing pretty well.

The aerial may be a long one, say 150 feet, and even 200 may be used to advantage, because the RF stage is so selective. That, by the way, makes possible the introduction of the crystal without a sacrifice of selectivity. As all who ever used crystals must know, the crystal, due to its high internal resistance, makes for broad tuning, but when the RF stage very sharply separates the incoming waves, the coil tuning the crystal is simply brought into resonance. This detector resonance point is sharp, but not critical. The signal may be heard well anywhere within two degrees of the detector condenser dial, although only one point will register maximum clarity and volume. In the RF stage, however, the vernier is still vital.

Ordinarily regeneration in an RF stage is hard to handle. But it is not so hard when used in conjunction with a crystal rectifier. The virtue of using regeneration here is to preserve to some extent the volume in the phone, since a crystal is a soft, velvety rectifier and when used with an RF stage that is non-regenerative causes considerable decline in volume under that of a straight tube detector. Those used to the lively volume obtainable from locals on a 3-circuit tuner, while conceding the increased quality occasioned by use of a crystal, often comment adversely on the volume drop, and regeneration almost makes up for this. The volume, however, still is a trifle under that obtainable from the detector tube alone. Yet it is quite sufficient.

As for the amount of regeneration, it is more likely to be too great than too little. That is due to the combination of the two coils—the tickler of the RF stage and the primary of the RFT. The total amount of inductance in use is likely to be too much. The specified number of turns on the primary of the RFT is a requisite for the transfer of sufficient energy from the tube to the crystal. Hence turns should be removed, if at all, from the tickler. Re-



RF may be added without an extra coil. It requires about one and one-half stages of radio-frequency amplification to compensate for the loss of regeneration, hence it is retained here. A coil like the one in Fig. 1 may be used. Note where the leak is. (Fig. 5).

move the turns one or two at a time, until the correct amount of regeneration is easily obtained. It may be found that the tickler dial is critical, in which case that dial should be provided with vernier, such as a rubber wheel that makes contact with the rim of the dial, or a vernier dial, mounted on the shaft instead of the plain dial.

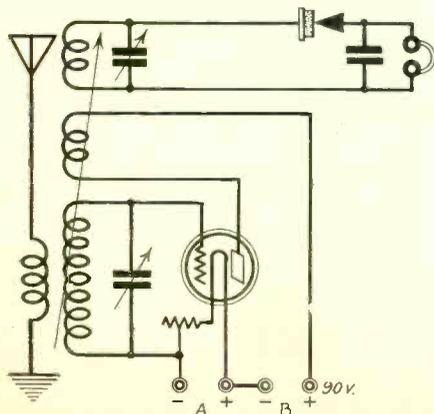
Another way of using a stage of regenerative RF ahead of a crystal detector is shown in Fig. 4. Here, instead of the primary of an RF transformer being used as a pickup coil to transfer energy from the plate to the crystal tuning coil, the tickler of the RF stage is itself used as the origin of the amplified energy and tuned impedance is used in the crystal detector circuit. As these two coils, tickler and impedance tuning, must be in mutual inductive relation, the number of turns on the added coil may be fewer than otherwise. About 35 turns would be enough used with a 23-plate condenser. This is because the tickler is tuned by the condenser across the new coil, and the total inductance involved is the sum of the inductances of the two coils, computed on the basis of mutual induction. This is not nearly as high as the sum of the number of turns on these coils, placed as a continuous winding on a single tubing, but is nevertheless a considerable factor. The 35-turn coil, in inductive conjunction with the tickler, also of 35 turns, is equal to about 50 turns, instead of the 70 that would result if they were in conductively coupled. The manner of mounting this extra coil will depend on the type of coupler used. With some types this may be a 35-turn honeycomb coil, or a 50-turn honeycomb from which five to ten turns are removed.

The turns may be placed directly on top of the present tickler winding, if the tickler is easily removable. Another method is to place a brass angle at each of two diametrically opposite points on the top of the stator, nearest the tickler, and mount the impedance coil on the same vertical plane so that when the rotor is turned it just avoids touching the new coil. Considerable regeneration is present, hence it is possible even to mount the impedance coil on the stator, at right angles to the secondary, even by tying it thereto with

string wound around the stator. This gives little inductance, hence may be resorted to if the condenser value proves too high when used in conjunction with an impedance coil mounted in closer coupling. The closer the coupling the greater the natural regeneration. Under test, with the impedance coil wound so it fits inside the rotor, that is, the rotor form separated this coil and the tickler, the regeneration supplied was great enough to obtain from the crystal as much volume as was obtained from the straight tube detector circuit. This was indeed considerable. But if the regeneration is forced beyond the resonance point, crowding past saturation, distortion results, and much radiation occurs. As distortion is a vice that inflicts itself only on the operator of the set or other listener thereto, he will do everything to avoid it, and automatically will be controlling the radiation, and thus not annoying neighbors' reception.

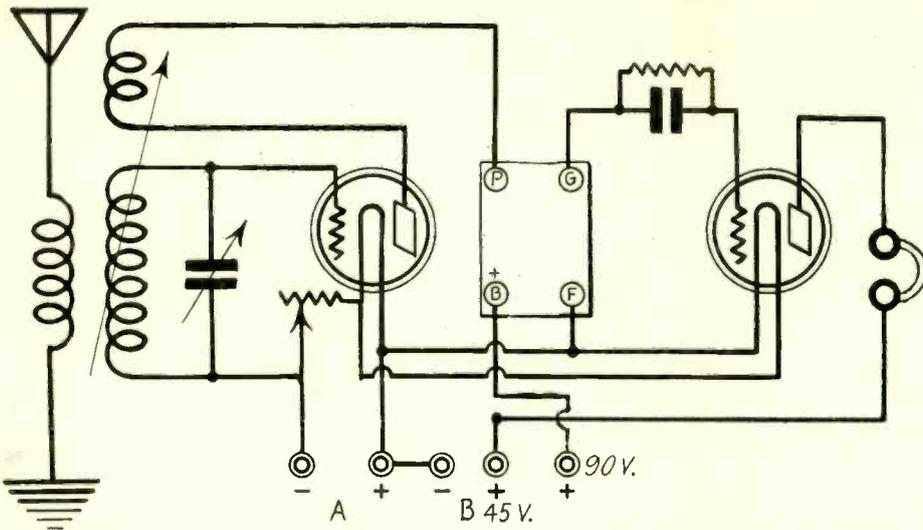
To make a coil that will fit inside the rotor, get a round form of just a trifle less diameter than the inside of the rotor form. Anything will do. I used a small vaseline bottle, taking care to cleanse it thoroughly. Four narrow strips of adhesive tape were laid the length of the bottle, and a couple of inches beyond, the gummy side up. The coil was wound, then the tape was turned over on the coil and secured to the coil by pressure. The excess lengths of tape were cut off. The coil could now be removed from the form and, being self-supporting, could be placed inside the rotor, fastened there with four lengths of linen thread. The thread was passed through eight small holes drilled in the rotor form just outside where the tickler winding began and ended. These holes were in pairs. Each pair represented a hole at top and at bottom and the pairs were equally divided around the circumference. The thread simply was passed through one hole and around the inside of the new coil, then out again through the companion hole underneath and around to where the threading was begun, and here the tie-thread was knotted.

The 3-circuit tuning coil you now use may be employed in a stage of RF and detector, a tube being used in both cases this time. (Fig. 5). Here we have the primary of the coil used in regulation

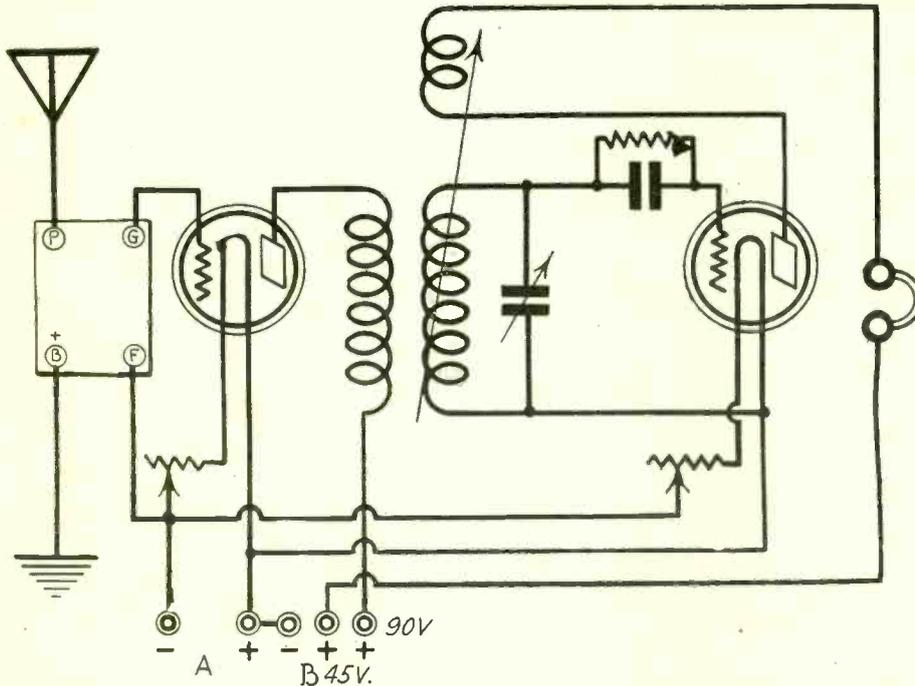


HERE is another way of adding radio-frequency amplification to a crystal. The pickup coil may be approximately 35 turns when used with a 23-plate variable condenser. The primary of this circuit is aperiodic. (Fig. 4).

A Variety of RF Circuits



IT IS better to tune radio-frequency transformers. Here we have a fixed or untuned transformer, easier to install, however. Sometimes it is preferred to the tuned type because it eliminates a tuning control. An extra control is objectionable to some, as they deem two controls enough. (Fig. 6).



PRIMARY and secondary aerial tuning devices may be done away with, if the radio transformer is of fixed type. The 3-circuit coupling transformer may be the one now used in any 3-circuit set of aperiodic primary design. This diagram (Fig. 7) differs from Fig. 6 because here a fixed RFT is used ahead of the variocoupler, but the author had better results from the circuit in Fig. 6.

fashion, also the secondary which, however, has its grid return changed from the F+ to the F-. The grid condenser is taken out of its present place and a direct wired connection made from the grid end of the coil to the grid post. A variable condenser, .0002 or thereabouts, say 11 or 13 plates, is shunted across the tickler coil. The grid condenser, taken out of the original circuit, is placed with one side at the end of the tickler coil, the same lead that goes to B+90 volts, and the other side to the grid post on the socket. The grid leak, instead of being across the grid condenser, goes from the grid post on the socket to the A+ post thereof.

This position for the leak is sometimes unhandy when a cartridge type leak is used. Buy a copper or brass clip for mounting a leak. The sides of the clip may be soldered to stiff bare wire which is connected to the socket posts. In all circuits using regeneration it is best to get a variable leak. The cartridge plunger type is good. So is the rotary type by which the resistance is

varied by immersion in the oil it contains. A variable grid condenser is advisable likewise. Once the proper capacity is obtained on this condenser the setting may be left that way forever, although with the leak some variation may be necessary to clear up signals from distant stations. It is surprising to many who have not used a variable leak in their regenerative sets what a great gain in volume is achieved when the proper resistance is obtained. The setting of the tickler also is governed by the leak, since looser coupling brings better regeneration when the leak value is correct. This value depends also on the tube, not only on the make of tube but also on the individual tube of that make, so that there is no telling what resistance is best without actual test on the very tube you use.

Granting that the leak is across grid and filament as described, try intercepting F+ and the side of the leak connected to it. Where the connection is opened insert a 100-turn honeycomb coil. It will thus be in series with the leak and the A+. Tracing the connection from

the A+ it will be: one end of the honeycomb goes to the A+, the other end of the honeycomb to the leak, the other end of the leak to the grid. The extra coil is used as a choke. Also try the leak as above but to the A- for possibly better results.

If, instead of using only a 3-circuit coil for a 2-tube set it is desired to use a stage of tuned radio-frequency, this stage may be placed either ahead of the detector tube, or after it. However, with regeneration in the RF stage, and a tube used as detector, one is likely to encounter troublesome oscillations. It is perhaps better for general purposes to leave the regeneration out of the RF stage and confine it to the detector circuit. When tuned RF transformer is used with the 3-circuit tuner the selectivity is very great, about equalling that of the Super-Heterodyne.

Greater volume, but less selectivity, is obtained when the RF stage is of the tuned impedance type, that is, a single coil shunted by a variable condenser, the coil going to grid and F-. Instead of this arrangement a variometer may be used for a stage of tuned impedance RF. It is obvious that with tuned impedance ahead of the detector, the aperiodic primary effect of an aerial circuit of natural wavelength far below the lowest broadcast wave is lost. The gain is almost exclusively in signal strength, not in DX. With this circuit local stations may be worked on the speaker without any audio-frequency amplification because (1) the aerial goes directly to the grid of the RF tube, and aerial-to-grid is the best volume combination known, and (2) the RF tube's detection of signals is utilized. The tuning is sharp enough to separate stations within 15 meters of each other when the receiver is six miles away from them and both stations are operating at 1,000 watts power, the greatest power the law permits for regular programs. As this severe condition is not to be expected in more than a very few places in the United States it can readily be seen that impedance RF ahead of the tuner gives all the selectivity that almost anybody will need. The transformer type of RF adds to selectivity at the expense of volume, for the aerial circuit remains too low to be in tune with any broadcast station, and the transfer of energy is by induction, a counter-volume move. The impedance coil would have about ten fewer turns than the secondary of an RFT.

A fixed RFT (Figs. 6 and 7) may be used instead of the tuned type. In this case the aerial goes to the post marked P on the RFT, the ground to the B or + post. G goes to the grid of the RF tube and F to the F-. The plate goes to the beginning of the primary of the tuner, the lead formerly connected to aerial. The end of this coil, which formerly went to ground, goes to B+90 volts. It is simpler to put the fixed RFT after the first or RF tube, because if a set is already made up the rotor coil dial is at left and there is no room to include the addition on that side of the set. The RFT and extra tube would have to be a separate unit, which is easy enough. But some experimenters may have a panel and cabinet with room for the fixed RFT and tube at right. In that event the regeneration would be in the RF side of the circuit. The grid leak would be mounted on the tube socket or on the grid post of the RFT. In all cases the grid leak and condenser must be moved over when a stage of RF is added. Increased volume and better DX may be expected, no matter on which side the fixed RFT is placed.

The Coil I Like Best

**Low-Loss, High-Inductance,
Great Signal Strength—What
Wire to Use and How to
Wind It**

CLEAR DX IS OBTAINED

By Abner J. Gelula

COILS, or rather, inductances, often are underestimated as to their relative importance in the receiving set. The inductance handles original energy. At best the power absorbed by the aerial is very small, and losses must be minimized. A good inductance means a coil that will carry the minute current with the least amount of loss, increasing the strength of the incoming signal and giving maximum selectivity.

Usually the greatest losses in coils are due either to resistance or insulation leakage, or too much distributed capacity.

Size of Wire to Use

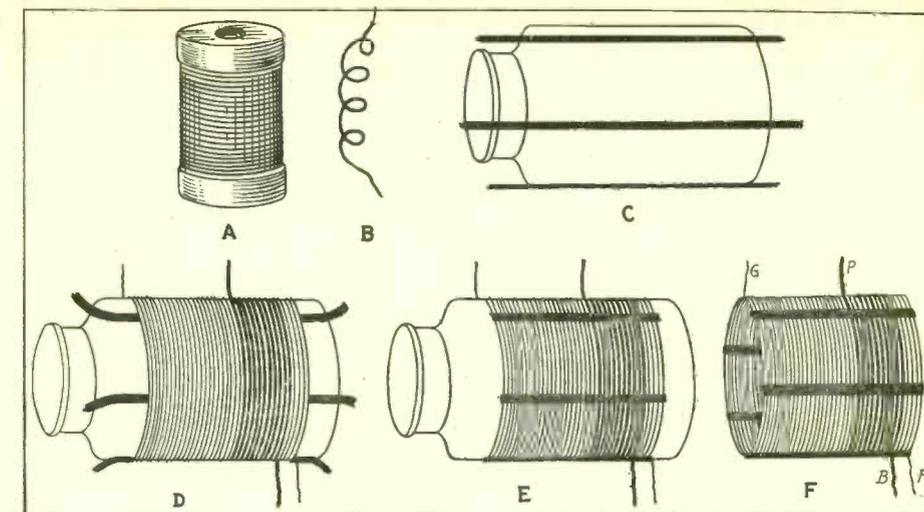
The excessive resistance in a coil is usually caused by improper size of wire. Small wire has a high resistance in radio work because of a condition known as "skin effect." High frequency currents travel around the wire, not, as popularly believed, through it. I therefore advise the use of wire No. 20 to 16, but as the wire gets larger the distributed capacity increases. The lower the number the larger the wire. The question then arises whether Litz wire isn't better, due to the claimed lower resistance. It is, on waves below approximately 300 meters, for amateur work, for instance, but for broadcast reception the good old solid copper is better. However, if you use Litz wire be very careful in taking the insulation off the end. The best way is to heat the wire to a dull red, immediately plunging it into alcohol. Litz wire is made up of a number of fine, separately-insulated wires. If one of these wires is broken the resistance goes up. Also, if there is individual insulation of the wires the resistance is likely to go above that of solid copper if this insulation is broken. It is, in my opinion, a chance not worth risking.

Resistance is to be avoided, except in the case of the grid-leak, amplifying resistances, rheostat and potentiometer or other purposeful uses.

The test of a good set is not how loud a local station comes in but rather how loud a distant station comes in. It is the improvement of the weak energy that bespeaks a well-constructed set. That is why the coil is so very important. Coils, as a rule, suffer greater losses than condensers, hence coils warrant first consideration. Low-loss variable condensers should be used so that the gain from using the best coil is not sacrificed by condenser losses. Also as much inductance should be used as is possible. To achieve that the distributed capacity should be low. Such capacity is equal to a fixed condenser of the same capacity across the terminals of a theoretical coil that of itself has no distributed capacity. Such a coil is theoretical because the very fact of using wire occasions capacity. Each turn is like the plate of a 3-plate condenser, the turns on either side being like the other plates.

Covering the New Band

The total distributed capacity is the sum of the capacities of the condenser effect of all the turns. Thus with the distributed capacity kept low, the variable condenser to be used across the coil may



THIS IS how to make Abner J. Gelula's favorite coil. A is a spool of No. 20 enameled DSC wire. B is 13 feet of wire, measured off and cut. C is an ordinary glass preserving jar with five strips of $\frac{1}{4}$ " adhesive tape, gummed side up, laid upon the jar. D shows the completed coil wound over the tape, the dark wire the aperiodic primary wound alternately with the secondary. E is the completed coil, the tape turned back to hold the winding in place. F is the coil removed from the jar winding-form. No shellac or varnish should be applied to hold the winding in place as this will materially increase the distributed capacity, thus decreasing the efficiency of the coil. P and B in Fig. F are the beginning and end of the primary, G and F, the beginning and end of the secondary.

be of lower maximum value than otherwise, because the inductance of the coil is greater. As resonance is the correct balance between capacity and inductance to afford best response to a wave, more inductance is brought into use, hence correspondingly less capacity is needed to achieve this balance. Inductance builds up signal strength. Capacity is likely to sap some of it. Therefore it is obvious that if a given combination of inductance and capacity is considered—your present coil and condenser, for example—and the distributed capacity is reduced in the coil, the condenser will cover a wider range in conjunction with the improved coil. This is of particular importance because of the impending widening of the wavelength band, as decided on by the Third Radio Conference in its report to Secretary Hoover. If your set will reach the lowest new wave, 300 meters, and will not reach the 545-meter maximum, perhaps remaking your coil will solve your difficulty, because the same maximum capacity you've been using would be employed in conjunction with greater inductance. Indeed, by using a few less turns you might thus cover the whole new band with a 50-turn secondary of an RFT and a 23-plate condenser (.0005 mfd.)

Use Enameled Silk Wire

For winding coils the question is always raised as to the best insulation for the wire. The best is enameled double-silk covered. My laboratory tests have proved that double cotton covered wire may be every bit as good as the silk covered in a dry atmosphere, but that the cotton will absorb dampness from the air, thus lowering the quality of the insulation. Merely enameled wire is not advisable because the enamel insulation comes off too easily.

As to the form on which the coil is wound, give me the good old cylinder. Spider-web is supposed to give a lower radio-frequency resistance than the cylindrical coil, but I failed to confirm this in actual tests. However, I did find that spider-web coils have a tendency to tune a little sharper, but that advantage is so slight that I don't believe it is worth the disadvantage of convenient mounting.

The Preferred Coil

The insulating value of the cylindrical form is very important. Dry cardboard forms, unvarnished or treated, are best. However, the trouble lies in keeping the

cardboard dry. Phenolic substances (bakelite, etc.) create a greater loss than the dry cardboard. But in the long run the phenolic substances are better, because of the likelihood of the cardboard absorbing moisture. I always use wood forms. They are cheaper, just as good, but do not look quite as beautiful as the shiny phenolic forms. For obvious reasons it is very important that the wood be dry.

It is good practice in determining the size of the cylindrical form to have the length of the form 2.3 times the diameter, with the coil beginning and ending $\frac{1}{2}$ " from the circumferences. This gives best inductance.

When winding two coils on one form, the inductive relationship will be strengthened by winding two wires at once. For instance, we have a primary and a secondary coil to be wound on the same form. Say there are 12 turns on the primary and 40 on the secondary. Five turns of the secondary may be wound first, then the primary may be wound together with the secondary side by side, so that the wire will be alternately primary and secondary. When the end of the primary is reached the secondary winding continues on.

For all my experimental work I use an ordinary glass preserving jar, place five thin strips of adhesive tape, gummed side upward, and proceed to wind the coil upon the jar and over the strips that run at right angles to the winding. After the coil is completed I turn the flaps of the tape back on the core, to secure the winding, and remove the coil from the jar. We have next to no losses in such a coil. The leakage from the tape is negligible.

It is popular to shield the panel of a set to reduce body capacity. Often the advantages of shielding outweigh the disadvantages. Nevertheless shielding does have its disadvantages. A metal placed in the field of a tuning inductance, for instance, will increase the resistance of the coil as much as .5 ohm. Never allow a tuning or radio-frequency inductance to be placed less than 2" from the shield. The less metal there is in a set, the less resistance.

If you must use taps, use very small ones. There is a comparatively large leakage between the taps. If possible it is best to do without them. Keep the leads from coil to taps short.

To point out the detrimental effects of
(Concluded on page 28)

Test Circuit for Calibrating

The Radio University

A Question and Answer Department conducted by RADIO WORLD for its Readers by its Staff of Experts. Address Letters to Radio University Department, RADIO WORLD, 1493 Broadway, New York City.

I HAVE a single coil and condenser which I wish to use with a 1-tube receiver. Will you please publish a diagram showing how the connections go?—Joe Lewis, 333 Adams St., Scranton, Pa.
Fig. 41 shows how to connect a single coil and condenser for radio reception. This circuit is not selective but is a good one to start learning.

WHAT is a good way to mount a honeycomb coil on a variable condenser?—Al Oberender, 367 75th St., Brooklyn, N. Y.

An easy way of mounting such a coil is to take a strip of insulating material, like that used for panels, or even wood, and mount it at right angles to the baseboard, using a brass angle. The strip is notched in two places where the circumference of the coil would touch it. As these notches are made just a little more than the thickness of the windings, the coil may be inserted therein.

IS IT practical to add a stage of resistance-coupled AF? 2. Would it be used as the first stage or the last? 3. Would the enclosed diagram be O. K.?—F. C. Meislahn, Admiral Hotel, San Diego, Cal.

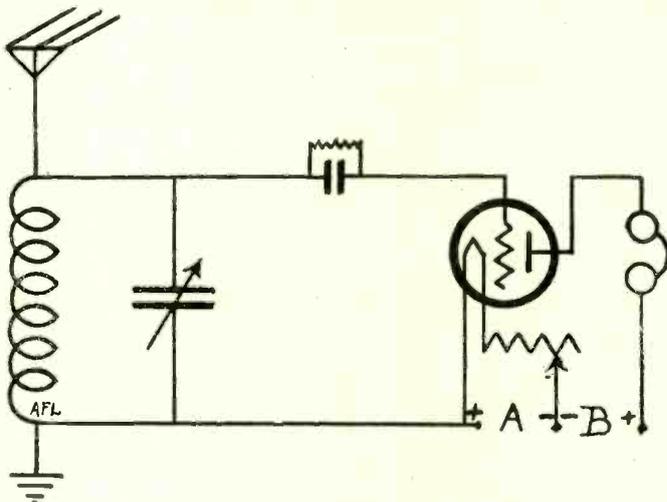
1. Yes. 2. Last. 3. Yes.

MY 3-tube Super-Heterodyne, as copied from the Aug. 9 Radio World, is working fine but I can take out the other two RF tubes and receive just the same. I have had several experts look at the set, but they couldn't find any trouble. Can you help me?—W. F. Plasterer, 5308 24th N. E., Seattle, Wash.

No doubt your radio-frequency stage is acting as a detector, and the oscillator does not work. Be sure that you haven't 1,200-turn coils instead of 1,500. The values of the fixed condensers are critical. Switch various fixed condensers until the correct capacity is found, or use a variable grid condenser in parallel with .00025 fixed. The honeycomb coils must run the same way. Reverse the leads of these coils. Two more honeycomb coils may be put in the secondary, raising the ratio to 3 to 1, for more volume. However, do not add coils until the set is working right, as this will merely increase signal strength. See that the polarity of the batteries is correct. Check up the oscillator connections with the diagram on page 1 of Aug. 9.

[The above also answers question of S. G. Lepert, 371 Mayville Ave., Pittsburgh, Pa.]

DOES it make any difference whether the rheostat is on the positive or negative side of the filament?—Frank Lange, 202½ Shearman Ave., Newark, N. J.
No. It is considered good practice to connect



A SIMPLE TEST CIRCUIT (Fig. 41), but of no use for broadcast reception these days, because it is not selective. However, if a coil and condenser are to be matched so that they will cover the wave band, this hook-up may be used. One end of the coil goes to the aerial, the other end to the ground. The stationary plates of the variable condenser go to the aerial and one side of the grid condenser.

to the rheostat that pole opposite to the grid return. Hence, if the grid return is to A-, put the rheostat in the + side.

IN THE ISSUE of Sept. 27, Page 11, 2-tube reflex, RADIO WORLD, what ratio transformers (audio) shall I use?—R. C. Rivers, 20 Missions St., Glens Falls, N. Y.

The first AFT may be 6 to 1, the second 3½ to 1.

HOW may I obtain a copy of the July 19 issue of RADIO WORLD?—V. S. Hurbur, Greene, N. Y.

Enclose 15c in stamps, and a copy will be sent you.

I NOTICED in the issue of Oct. 11, RADIO WORLD, in the pictorial section, a picture of the apparatus on the S.S. Republic. How can I get in touch with the operator of the boat, as I have a set just like it but can't hook it up.—Wm. B. Somers, 139 Wilder St., Philadelphia, Pa.
Address a letter to Radio Operator, S.S. Republic, c/o Postmaster, New York, N. Y.

IS THERE any possible way that the tuning controls of the Superdyne may be cut down? I notice that Tuska have only two dials. How is it done?—C. E. Heinz, Picher, Okla.

The Tuska set uses a special condenser, in which there are two distinct sets of rotary plates and a common stator for A-. This condenser takes the place of two. The 200 or 300-tube must be used in the detector.

HOW may I reduce body capacity? 2. There is an awful crackling noise in my set when the variable condenser plates are half-way out; there

is not a short in the condenser.—Wm. Hunger, 1138 22nd St., Milwaukee.

Body capacity may be eliminated by placing a sheet of aluminum, tin, or copper behind the panel, grounding the metal. Be careful that the metal does not touch any of the instruments. 2. The bearings do not make wiping contact. Solder pigtails from stator and rotor plates to condenser terminals.

I HAVE a 3-tube set using 12 type tubes. I was told that a C battery would prolong the life of the B battery, increase volume and improve tone. I followed the suggestion but it decreased volume and ruined the tone.—C. E. Mosher, Summit, N. J.

A C battery is a very good addition to an audio-frequency amplifier. It does prolong the life of the B battery, but you state in your query that your B batteries are now 5 months old. It seems that you've locked the stable after the horse was out. Buy a new set of B batteries if the voltage of the old ones is below 16, then add the C battery.

IS IT possible to use the 11 tubes in the Superdyne?—M. McCutcheon, 45 Pembroke St., Toronto, Canada.

Yes, but 199 tubes are better for this circuit and the 201A type best.

IN REFERENCE to the 9-tube Super-Plidyne appearing in issue of March 8 RADIO WORLD, what make is the aerial condenser? 2. Will the set as shown work on a loop? 3. Do the same number of turns for the coils hold true for litz wire? 4. Would litz warrant the additional cost?—Wm. Hendart, 27 S. F. St., Chicago, Ill.

1. Any standard 23-plate condenser. 2. Yes. 3. Yes. 4. The standard wire is preferable.

REFERRING to B. J. Bongart's 4-Tube Super-Heterodyne in July 26 RADIO WORLD, what is the wavelength range, inserting a fixed coupler instead of variocoupler—A. W. La Bega, Box 66, St. Thomas, V. I., U. S. A.

Wavelength range depends on the number of turns on the secondary. With a .00035 condenser use 60-turn secondary.

FOR the 1-tube DX set described in the issue of Oct. 4 RADIO WORLD, do I use one or two B batteries?—C. N. Critcher, Petersburg, Fla.

Either two 22½-volt or one 45-volt B battery may be used.

REFERRING to the article on the low-loss Neutrodyne in the issue of Oct. 18 RADIO WORLD (page 13), how many plates should the condensers be? Did Byrt C. Caldwell have 23-plate condensers in mind?—Wm. S. Freize, 1768 58th St., Brooklyn, N. Y.

The condensers should be 13 plates. Mr. Caldwell was not considering the use of 23-plate condensers in the Neutrodyne.

I FOLLOWED the construction article on loops in both the Aug. 2 and 30 issues of RADIO WORLD. The loop works fine, but not as well as my old 2x1 box type. Kindly tell me how I may fix it up correctly?—Henry A. Rand, Holicong, Pa.

A condenser across the loop is necessary. Use a clip for one of the leads and tap it at various points. It is important that the natural wavelength of the loop be correct.

IN the low-loss 2-tube reflex by Byrt C. Caldwell, Oct. 11 issue of RADIO WORLD: 1—How many plates should the .00035 variable condenser be? 2—Would .005 variable condenser work? 3—Where do the various leads from letters on the audio-frequency transformer go? 4—Can I purchase the radio-frequency transformers? 5—What make radio-frequency transformer do you suggest?—Donald E. Parker, 729 Central Nat. Bank Bldg., St. Louis, Mo.

1—17 plates. 2—You state that you have a .005 variable condenser. No doubt you mean a .0005; a .005 is around 60 plates. A .0005 (23-plate) condenser will work, but the tuning will be rather critical. 3—There are P, B, G and F on the audio-frequency transformer. P goes to the plate of the preceding tube. B goes to high voltage B battery, if the transformer is used on any stage but first; in which case B will go to the 22½-volt B battery. G is connected to the grid of the following amplifying tube. F goes to the minus filament lead. 4, 5—Yes, the radio-frequency transformer may be bought, if you prefer. Any reliable make will be suitable. We cannot undertake to specify trade names.

I AM an absolute novice. Is it possible for you to show a hookup other than in schematic diagram, by making actual drawing of the various instruments? I have two amplifying transformers, a potentiometer, two sockets and two jacks, and desire to construct two stages of audio-frequency amplification. Also please include a C battery.—A. J. Iig, 1532 Atlantic Ave., Atlantic City, N. J.

You will find Fig. 42 the circuit as you desire it. Mount the transformers at right angles to each other, although they are not so in the drawing,

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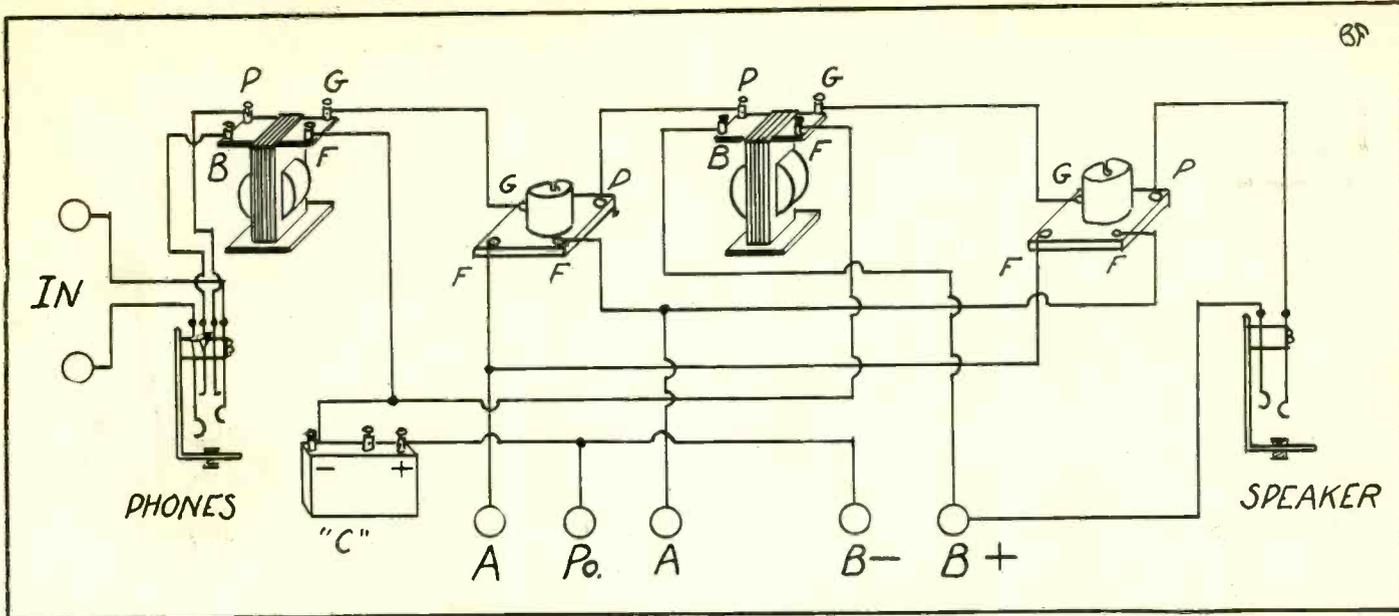
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Adding Two Stages of AF



where they are arranged for clearness. The C battery is placed in the filament lead. There should be 1-volt adjustments on the C battery. If you use the C battery correctly, you will find that a lot of extraneous noises are eliminated, as well as making the entire circuit more sensitive and more stable. This is an unusual but effective way of inserting the C battery, the C- going to the F posts of the transformers and the C+ to the movable arm of the potentiometer Po, A+ and A- being at the terminals of Po. The usual way of connecting a C battery is without any potentiometer, the C+ going to the A- and the C- to where the A- formerly went, that is, the F posts of the AFT. The F- connections to the sockets remain undisturbed.

HOW DO YOU MAKE a wavetrap? Is it really useful in eliminating interference? — Howard Morton, 190 Claremont Ave., N. Y. C.

Fig. 43 shows you how a wavetrap is made. The center illustration indicates the back of the panel. The figure on the right shows how a wavetrap may be made without mounting and with the use of a honeycomb coil. If a cylinder coil is desired, 35 turns of No. 20 DCC wire should be used in conjunction with a 45-plate variable condenser. It is very useful in reducing interference. Also, if you are going to re-adjust your receiver to meet the requirements of the new wave band you will find a wavemeter (and your wavetrap will be such) a very handy thing.

AT RIGHT is the diagram of a two-stage audio-frequency amplifier without C battery. The diagram shows the B battery tapped for the first stage. This is not absolutely necessary, although it helps clear up distortion.

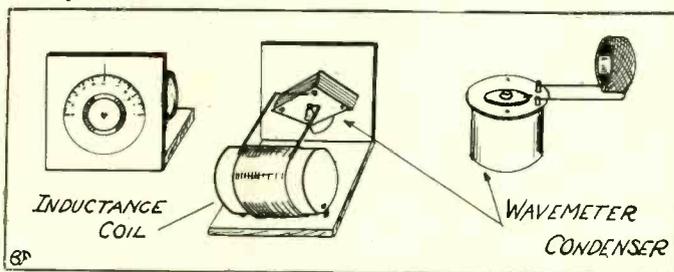
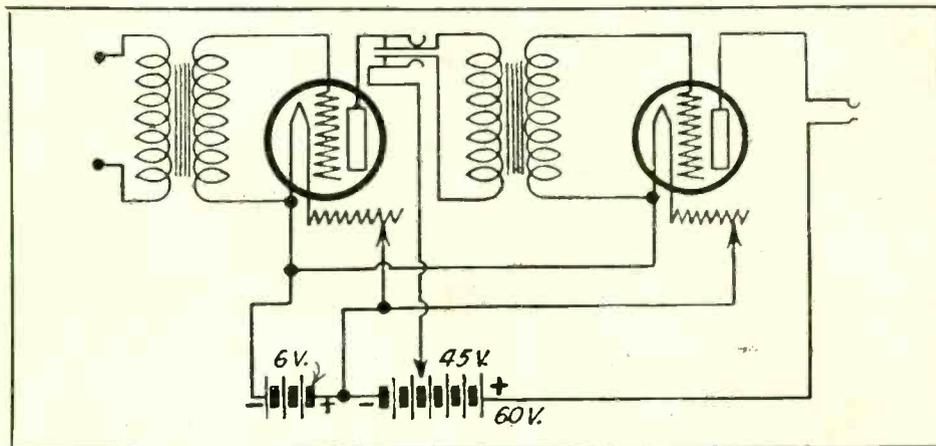


FIG. 43, showing diagrams for the construction of a wavetrap for the elimination of interference. This device may be used as a wavemeter. Brainard Foote explained this thoroughly in the Aug. 30 issue of Radio World.

I, as well as other radio fans in the neighborhood, am troubled with fading of stations. Is there no way that this may be eliminated?—C. E. Bergboem, Langley Field, Va.

This is a natural phenomenon, noticeable in some places more than in others. It appears that you are unfortunate in being located in a position that is especially annoyed by this more or less prevalent trouble. There is no cure. Some times increasing the sensitivity of the set helps. Some report that using a well-insulated wire placed a few inches beneath the surface of the ground helps or entirely eliminates this trouble. Use approximately 75 feet of No. 14 insulated wire buried in straight line away from the set. Be sure the clipped end is taped so that the ground will not touch it directly.

CAN you print a circuit of a wavetrap that will help cut out some interference?—O. E. Spott; 307 N. 2nd St., Richmond, Va.
See Fig. 43.

KINDLY give me the list of parts and AFT ratios for the Reinartz circuit that appeared in the Sept. 6 issue of Radio World, Page 15. Is the regular Reinartz coil used?—H. B. Williams, Bernice, La.

One Reinartz coil, two 23-plate variable condensers, 10 switch-points, 3 switch-knobs, 2 meg. grid leak, .00025 fixed condenser, 1A battery (6 volts), three 45-volt B batteries, 4-volt C battery, 2 double-contact jacks, one single-contact jack,

three rheostats, three sockets, one 3 to 1 transformer, one 6 to 1 ratio transformer. Panel, wire, binding posts.

RADIO WORLD'S
Broadcast University

Questions and Answers On the Air Every Wednesday Evening at WLS, the Sears-Roebuck Station, Chicago — Department Conducted by Mat H. Friedman, RADIO WORLD'S Chicago Representative.

I HAVE a Radiola 5. I am not satisfied with the volume. The set has three tubes—detector and two state audio amplifier. How can I increase the volume?—John M. Alexander, Lincoln, Neb.

Volume may be increased (1) by addition of more B battery voltage up to 90 volts; (2) considering the aerial and ground system. A satis-

factory way is to add a stage of resistance coupled audio-frequency amplification.

MY SET IS a single coil affair, coil 64 turns No. 26 DCC wire, one stage of radio and one of audio. The set works well on wavelengths above 300 meters, but below it's very weak. How can I improve this condition? (2) Would one or two C batteries be right? (3) What ratio transformer should I have on the last stage of audio?—Earl E. Erickson, Wright, Minn, Box 105.

1. Wind your coil 45 turns No. 20 DCC. You have too large a primary. 2. One in the audio will be sufficient. 3. If you refer to the second stage of audio, it should be approximately 6 to 1. The first stage should be 3 to 3/2 to 1.

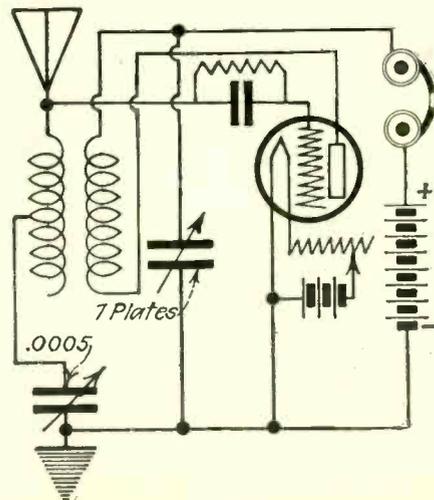


FIG. 44—Tuned primary regenerator.

PLEASE publish a diagram for a 2-circuit tuner, using two variable condensers.—J. Kirsch, 911 24th St., Chicago, Ill.

Fig. 44 answers your query. A 7-plate and a 23-plate variable condenser are used.

Election Results Tuesday

BROADCAST PROGRAMS

The time given in programs is Eastern, Central, Mountain or Pacific, depending on the station's location!

Thursday, October 30

KDKA, East Pittsburgh, Pa., 326—9:45 A. M., stockman reports; general market review. 11:55, time. 12 M., weather; stockman reports produce markets. 12:15 P. M., concert by Scalzo's Orch. 6:30, concert by KDKA Symphony. 7:15, Hallo-wen Story, for the children. 7:30, talk by Automobile Club. 7:40, stockman reports produce markets. 8, program by the National Stockman and Farmer. 8:30, concert KDKA Symphony Orch. 9:55, time; weather. 11, barn dance.

WJAX, Cleveland, O., 390—7 P. M., Austin J. Wylie and Golden Pheasant Orch. 10, dance music.

KHJ, Los Angeles, 395—12:30-1:30 P. M., Coy Barkley and his Palace Ballroom Orch. 2:30-3:30, musicale. 6-6:30, Hickman's Concert Orch. 6:30-7:30, children's program. 7:30, talk on "Art." 8-9, Piggly-Wiggly Girls; Ruth Florence, soprano; George Hood, reader. 9-10, program to be announced. 10-11, Hickman's dance orch.

WOC, Davenport, Ia., 484—10 A. M., market quotations. 10:05, household hints. 10:55, time. 11, weather. 11:05, market quotations. 11:10, agricultural bulletins. 12, chimes concert. 12:15 P. M., weather. 2, closing stocks and markets. 6:45, sport news; weather. 7, Sandman's Visit. 9, orch.; Ralph W. Fuller, baritone.

WMAQ, Chicago, 447.5—4 P. M., household hour, 4:30, music. 6, organ. 6:30, Hotel LaSalle orch. 8, garden talk. 8:15, boy scouts' program. 8:45, investment talk. 9, lecture from University of Chicago. 9:15, Chicago Heights quartet.

WHN, New York City, 360—12:30-1, Strickland's Palais D'Or Orch. 2:15 P. M., Mrs. Bob Schaefer, the radio girl. 2:30, Louisville Jazz Band, Christie Maisto leader. 3, Bob Miller and Ira Schuster, popular songs. 3:45, joint recital Lydelle Kippelman with Jean Berman, pianist. 4:15, Arthur Ball, tenor. 4:30, Victor Wilbur, baritone. 4:45, Loretta C. Lynch talk. 5, Dixie Five. 6:30-7:10, Huston Ray's Alamac orch. 7:10-7:30, welfare period. 9:30-9:37, current news. 9:37, Elias Cohen, violinist and Ruben Kroll, pianist. 9:45, Edwin Preble, lyric tenor. 10, Spear's Dance Orch. 10:30, Lannin's Dance Orch. 11, Jack Merrise, tenor. 11:10, Fain and Mile, harmony. 11:20, Gene Austin, baritone. 11:30, Lou Gold's orch. with Loretto McDermott, Adler, Herman and Weil. 12-12:30 A. M., Ted Lewis and His Symphonic Clowns.

WJY, New York City, 405—7:30 P. M., weekly French lesson. 8, organ. 8:45, Question Gage. 9, Reiser's Club Ferreri Orch. 10, "Among the Aleuts," Harold McCracken. 10:15, Alice V. Conklin, mandolin; Josephine Arena, accompanist. 10:30, "Uncle Charlie," songs and stories.

WJZ, New York City, 455—10 A. M., menu, Mrs. Julian Heath. 10:20, talk, Mrs. Roberts. 10:30, talk, Vance Thompson. 10:40, "Dress Embroideries," by editor of Needle Art. 10:50, Eleanor Gunn's fashion talk. 1 P. M., Nathan Abas' Orchestra. 4, Ruth M. Donaldson, soprano; Keith McLeod, accompanist. 4:30, Bernhard Levitow's Tea Music. 5:30, State and Federal agricultural reports. 7, Levitow's Dinner Orchestra. 7:55 P. B. Kennedy 8, Wall Street review. 8:10, NYU Air College "Economics," Prof. Reid L. McClung. 8:30, National Republican Rally. 10:30, Waldorf-Astoria Dance Orch.

WQJ, Chicago, 448—11 A. M.—12 N., Home Economics Programme under the direction of Helen Harrington Downing. 3-4 P. M., Cora Beeman, Assistant Director of Home Economics. W. P. Heath, Eminent Food Scientist at Chicago. 7-8 P. M., dinner concert by Ralph Williams and His Rainbo Garden Orchestra. Mrs. Lydia Lochner, Contralto. Marion Henry, accompanist. Manuel Rodriguez, Spanish Tenor. Mardene Borrison, Baritone. Ralph Nixton, Illinois Automobile Club, "Safety." 10-2, Rainbow Skylarks. Axel Christiansen, Pianologues. Grace Wilson, Contralto; Hill, Hirsch and Gorny, Harmony Singers. Edna Solomon, Contralto. Rosemary Hughes, Soprano. Will Rossiter, "The Daddy of Them All."

WEAF, New York, 492—11:12 A. M., Minnie Weil, Pianist; Talk by William A. Johns of Swirt and Company; market and weather reports. 4 P. M., musical program. 4:15-5, Carrie Chapman Catt, speech from Columbia University. 6-12, music from the Hotel Waldorf-Astoria; mid-week church services; Arline Thomas, soprano; talk by Proctor and Gamble; Harry C. Shafran, violinist; Maude Foote, pianist; talk; touring, George E. Cooley; Benjamin Lucatorto, pianist; Cordes and Marks dance orch.; Vincent Lopez and his orch.

WEEL, Boston, 303—1 P. M., Boston Chamber of Commerce luncheon. 6, dance, Dok Eisenbourg and Sinfonians. 7, Radio Rally, by Mayor Jas. M. Curley. 7:10, Boston Edison Big Brother Club. 7:45, Arthur K. Bayley, tenor. 8, Boston Federation of Churches. 8:30, concert by Norman Church. 9, program from New York studio.

WDAR, Philadelphia, 395—11:45 A. M., daily

almanac. 12, organ recital; features; Arcadia concert orch. 2-3 P. M., Arcadia concert orch.; artist recital. 4:30, artist recital. 5, question period in the series of educational talks, Peirce School of Business Administration. 5:45, sporting results. 7:30, boys and girls.

WRC, Washington, 469—6 P. M., children's hour. 7, music. 8, dance, Better 'Ole Club orch. 8:30, talk. 8:45, Florence Sindall, soprano; Thelma Smith, contralto; Horace A. Lake, baritone. 9:30, Claude Miller, piano. 9:55, time.

WLW, Cincinnati, 423—10:45 A. M., weather, business reports. 1:30 P. M., business reports. 3, market reports. 4, lesson in French, Madame Teimpidis. 10, three-minute message, U. S. Civil Service. 10:03, Doherty Melody Boys. 10:30, Millnor instrumental trio; Senator Schultz. 11:30, Crosley Arabian Nights.

WIP, Philadelphia, 509—1 P. M., music. 1:30, weather. 3, artist recital. 6, weather. 6:05, music by Charles Sansone. 6:45, livestock and produce reports. 7, children of Uncle Wip's Kiddie Klub. 8, "Timely Topics for Motorists," Gene Hogle. 8:15, direct broadcast from the Eastern State Penitentiary. 11:05, Marburger and vaudeville orch.

KYW, Chicago, 536—6:30 A. M., calisthenics. 9:30, late news financial and commercial market. 10:30, farm and home service. 11:35, table talk by Mrs. Ann J. Peterson. 2:35-4 P. M., "Afternoon Frolic." 6:02-6:18, news, financial and final markets by Union Trust Co., Chicago Journal of Commerce, and U. S. Dept. of Agriculture. 6:35-7, children's bedtime story. 7, J. DeBabary's orch.; Coon-Sanders Nighthawks. 7:20, Joska DeBabary's orch. 8, "Twenty Minutes Good Reading," by Rev. C. J. Pernin, S. J. 8:20, music. 9:15, "Safety First" talk by Mr. Z. C. Elkin. 10, "At Home"; Coon-Sanders Nighthawks.

WOR, Newark, N. J., 405—7 A. M., gym class. 2:30 P. M., Virginia P. Wells, violinist; Mabelle Cowan, piano. 2:45, Cecile M. Berens, pianist. 3, Virginia P. Wells, violinist; Mabelle Cowan, piano. 3:15, Cecile M. Berens, pianist. 3:30, Norma Mitchell, actress. 3:45, Elsie Kissam Eaton, mono-actress. 6:15, Albert E. Sonn, "Radio for the Layman." 6:30, Jimmie Lent orch. 7:15, day's sports with "Jolly Bill" Steinke.

Friday, October 31

CNRM, Montreal, Can., 440m—8 P. M., Quartet; songs; talks on potato industry.

WEEL, Boston, 303—6 P. M., dance, Blum and Famac Inn orch. 7, Radio Rally by Mayor Jas. M. Curley of Boston. 7:10, Edison Bib Brother Club. 7:45, talk, Child Labor Amendment. 8, musicale. 9, program from New York studio. 11, dance. Dok-Eisenbourg and Sinfonians.

KDKA, E. Pittsburgh, Pa., 326—7:30 A. M., freehand exercises, C. Shannon. 9:45, Stockman reports; general market review. 11:55, time. 12, weather; Stockman reports of livestock and produce markets. 12:15 P. M., Sunday school lesson presented by James C. Mace. 6:30, organ, Samuel W. Elliotson. 7:15, The Radio Children. 7:30, "Why Take the Trouble to Vote?" Senator David A. Reed. 7:40, Stockman reports of livestock and wholesale produce markets. 8, address, delegate of the Rep. Nat. Committee. 8:15, "Health Talk" by member of the University of Pittsburgh. 8:30, Chaminade Concert Company, Irma L. Carpenter, soprano; Mary Jane Paul, reader; Elizabeth P. Coles, violinist; Adalaine Merrill Blidde, accompanist and director. 9:55, time, weather.

WLW, Cincinnati, 423—10:45 A. M., weather and business reports. 1:30 P. M., market reports. 3, stock quotations. 4, French lesson by Madame Teimpidis; recital by pupils of Leo Stoffregen.

WOC, Davenport, Ia., 484—10 A. M., opening market quotations. 10:05, household hints. 10:55, time. 11, weather and rice forecast. 11:05, market quotations. 12, chimes concert. 12:15 P. M., weather forecast. 2, stocks and markets. 6:45, sport news, weather. 7, Sandman's Visit. 7:20, educational lecture, "The Growing of Apples," by C. F. L. Clemons. 8, musical program, Fred Sutterlin, ukulele; Jesse Clinton, Hawaiian guitar; Edw. Brown, guitar; group of artists from Orion, Ill.

WMAQ, Chicago, 447.5—4 P. M., "English as She Is Spoke," Alexandra Carlisle Jenkins. 4:30, Bush Conservatory of Music. 6, organ. 6:30, Hotel LaSalle orch. 8, weekly Wide-Awake Club program, directed by Mrs. Frances M. Ford. 8:30, musical geography, Mr. and Mrs. Marx E. Oberndorfer. 9, Hilda Butler Farr, pianist; Flora Waalges, soprano.

KSD, St. Louis, 546—8 P. M., concert, Infantry band.

WBZ, Springfield, Mass., 337—11:55 A. M., time, weather, market reports. 6 P. M., dinner, trio, from the Hotel Kimball studio, Springfield. 7, market report 7:10, book review. 7:30, bedtime story. 9:55, time, weather. 10, concert, cello, violin, piano. 10:30, recital, tenor. 11, concert, trio. 11:30, dance music.

WQJ, Chicago, 448—11 A. M. to 12 M., Fred Mann and Sunday dinner menu. 3-4 P. M., Helen H. Downing, director of home economics, "Answers to Questions"; Mrs. Harry T. Sanger, travelogue. 7-8, concert by Rainbo Garden orch.; Dorothy Schubert, soprano.

WHN, New York City, 360—2:15 P. M., Hitter's Romance orch. 2:45, Judith Roth and Al. Wilson, songs. 3, Billy Burke, tenor; Matty Levine, pianist. 3:45, chat to children. 4, Mabel Livingston, children's poet. 4:15, Joseph C. Wolfe, baritone. 4:30, Kathrynre R. Behnke, contralto. 4:45, serial story by Wm. J. Stuart. 5, Alja and orch. 6:30-7,

Ray's Alamac quartet. 7-7:30, Ray's Alamac orch. 9:30-9:37, current ewa. 9:37, Dan Gregory's Crystal Palace orch. 10, Prof. LaFontaine, ukulele solos. 10:10, Melody male quartet. 10:30, Henderson's dance orch. 11, Rady O'Flynn, tenor. 11:10, Lou Fordon and Leo Jacobs, popular songs. 11:20, James A. Kendis, tenor, popular songs. 11:30, Sam Wooding's Club Alamac orch. 12-12:30, Ted Lewis and his Symphonic Clowns.

KPO, San Francisco, 423—12 M., time; reading of Scripture. 1-2 P. M., Rudy Seiger's orch. 12:45, talk. 4:30-5:30, Seiger's orch.

WJY, New York City, 405—7:30 P. M., Wynne's Greenwich Village Inn orch. 8:15 talk, Dem. National Committee. 8:30, S.S. De Grasse orch. 9:30, "Income Taxes," by Frank Shevit. 9:40, Max Kalfus, tenor. 10, current topics, Dr. Wm. H. Allen. 10:15, Leopold Busch, violinist.

WJZ, New York City, 455—10 A. M., Housewives League menu, Mrs. Julian Heath. 10:20, Review of Reviews. 10:30, "Be Your Own Decorator," Amy Mali Hicks. 10:40, "Shoppers Guide," Mrs. Pauline Peck. 10:50, Eleanor Gunn's fashion talk. 1 P. M., Zanden's Hotel Ambassador trio. 4, organ, Leo Riggs. 5, Hazel F. Bailey, soprano. 5:30, State and Federal agricultural reports; farm and home reports; closing quotations of the N. Y. Stock Exchange; foreign exchange quotations. 7, Savarin Ensemble, Naham Franko, director. 8, Wall Street Journal review. 8:10, NYU Air College, "Economics," Prof. Reid L. McClung. 8:30, Norma Gradstein, pianist. 8:45, V. L. Reynolds, candidate for Vice-President of Socialist Labor Party. 9, Norma Gradstein, pianist. 9:15, Wright and Bessinger, the Radio Franks. 9:30, Pavlova ballet music direct from Manhattan Opera House. 10:30, Duke Yellman's Irene Castle orch. direct from Knickerbocker Grill. 11:30, Rep. midnight theatrical review under auspices of Rep. National Committe.

WWJ, Detroit, 517—8 A. M., setting-up exercises. 9:30, special talk. 9:45, Public Health Service bulletin. 10:25, weather. 11:55, time. 12 M., music. 3 P. M., orch. 3:50, weather. 3:55, market reports. 7, orch.; baritone; male quartet.

WEAF, New York City, 492—11 A. M., health talk. 11:30, organ. 12 M., market and weather reports. 4-5 P. M., club program, Arthur Stone, blind pianist. 6-10:30, dinner music; stories for children by G. R. Kinney Co.'s story teller, Blanche Elizabeth Wade; Marie Nicholson, lyric soprano; The Happiness Boys, Billy Jones and Ernest Hare; G. Schirmer's half-hour of newly published music; B. Fischer Astor Coffee orch.; Van's Collegiate orch.

WDAR, Philadelphia, 395—11:45 A. M., daily almanac. 12 M., organ; concert orch. 2-3 P. M., Arcadia concert orch.; playlet by members of the National School of Elocution and Oratory. 4:30, dance. 5:45, sporting results. 7:30, with the boys and girls. 8, "Turning the Pages," a book review, Arnold Abbott; "WDAR Walter Greenough Players"; the Atlantic City R.R. band. 8:10, Penn football talk. 8:50, address by the Honorable J. Hampton Moore, auspices of the Rep. National Committee. 10, meeting of the Morning Glory Club from 10 to 1; Arcadia dance orch. 1, features from studio.

KYW, Chicago, 536—6:30 A. M., calisthenics, director of the Y. M. C. A. 9:30, news and comments of the financial and commercial markets. 11:35, table talk by Mrs. Anna J. Peterson. 12:30 P. M., "Progress of the World." Review of Reviews. 6, news, financial and final markets; Dun's review, and Bradstreet's review of Chicago trade. 6:35, children's bedtime story told by Walter Wilson. 7, Joska DeBabary's orch. 7:10, Coon-Sander's Original Nighthawks. 7:20, Joska DeBabary's orch. 7:30, program from KYW's studio. 8:20, "Farm Juniors at the International Livestock Exposition," by B. H. Heide; "What the Illinois Farm Bureaus Are Doing," by H. C. Butcher. 9, midnight revue, Coon-Sanders Original Nighthawks; W. Remington Welch, organist.

WGY, Schenectady, N. Y., 380—11:55 A. M., time. 12:30 P. M., stock market report. 12:40, produce market report. 12:45, weather. 2, music and address, "The Citizenship of Women," Mrs. Florence E. Tabor. 6, produce and stock market quotations; news bulletins. 6:30, stories for children. 7, Sunday school lesson. 7:45, health talk. 7:50, harvest program.

WRC, Washington, 469—3 P. M., fashion, by "Women's Wear." 3:10, Arthur McCormick, baritone. 3:20, "Beauty and Personality," by Elsie Pierce. 3:25, current topics by "The Review of Reviews." 3:35, piano. 3:50, Magazine of Wall Street. 4, song. 6, stories for children by Peggy Albion.

WOR, Newark, N. J., 405—7 A. M., gym class. 2:30 P. M., Helen F. Gregory, soprano. 2:45, Rev. Edmont Hains, tenor, and John A. Scott, pianist. 3:15, Helen F. Gregory, soprano. 3:30, Margaret Lawrence, star of "In His Arms." 3:45, Countess De Bruce, in Hallow'en Superstitions. 6:15, orch.; Ruth Forbes, contralto. 6:30, "Man in Moon" for the children, Josephine Lawrence, W. F. B. McNeary. 7, orch.; Ruth Forbes, contralto. 7:15, day's sports, "Jolly Bill" Steinke.

WEBH, Chicago, 370—7 P. M., concert, Edgewater Beach orch.; Helen Snyder, soprano. 9, dance, Edgewater orch.; Frederick Agard, tenor; musical bits, Riviera Theat; Rita McFawn, soprano. 11, dance, Edgewater Beach orch.; Winter Garden orch.; Edgewater Beach trio.

Saturday, November 1

WDAF, Kansas City, 411—3:30-4:30 P. M., orch. 5:50-6, marketgram, weather, time, road

Davis from WJZ Nov. 1, 9 P. M.

report. 6-7, School of the Air: The Tell-Me-a-Story Lady. 11:45-1, Nighthawk Frolic.
WLW, Cincinnati, 423-10:45 A. M., weather, business reports. 1:30 P. M., market reports. 11:30, Crosley Arabian Nights; McKay orch.
WBZ, Springfield, Mass., 337-11:55 A. M., time, weather. 6:30 P. M., Copley-Plaza orch. 7, market report. 7:05, bedtime story. 7:30, Hotel Kimball trio. Jan Geerts, violinist and director; Arnold Janser, cellist; Lloyd Stoneman, pianist. 8:15, program by Weltman Conservatory Jr. orch. 9:15, D. L. Chestnut, trombonist; Alice N. Cook, organist. 9:55, time, weather.

KDKA, E. Pittsburgh, Pa., 326-9:45 A. M., Stockman reports; general market review and agricultural items. 11:55, time. 12 M., weather; Stockman reports. 1:30 P. M., concert by Daugherty's orch. 2:30, Pitt-Syracuse football game from Syracuse. 6:30, concert by the Westinghouse band. 7:15, story for radio children. 7:30, sport review by James J. Long. 7:45, address by the American Red Cross. 8, "Movie Gossip," Sam Comley. 8:15, feature. 8:30, concert, the Westinghouse band; Alice Smith, soprano; F. Robert Coe, baritone; P. Zahner, violinist. 9:55, time, weather.

WJAX, Cleveland, 390-12 Midnight, cruise of the Nite-Caps on Lake Erie; Andy Gump, well-known candidate for President, will start off on his campaign to the music of Austin J. Wylie and his Golden Pheasant orch.; the Forest City Hot Shots; the Kozlik Wallace orch.; the Musical Magpies, and Tom Donahue and Bamboo Village orch.; Harry M. Dunham, tenor; Eddie Connors and Ray Zucker, banjoists; Lotta May Kelly, contralto; Gordon Dewey, guitar; Ethel Rhody, pianologues, and Homer Walters, violinist; the Metro Trio will do their harmony and ukulele act in their own, inimitable way.

WEAF, New York City, 492-2:30 P. M., West Point-Yale football game direct from New Haven, Graham McNamee announcing. 4-5, Bruno Brothers orch. 6-12, music from Hotel Waldorf-Astoria; story for boys by Fred J. Turner; Elsie Kieseewitter, soprano; Ruth Ryan, pianist; Penn Red Cap Harmonic Quartet; Colonel Pattee, fiddler; Florence Poyet, soprano, and John Fobert, baritone; Vincet Lopez and his orch.

KPO, San Francisco, 423-12 M., time; reading of Scripture. 1-2 P. M., orch. 3:30-5:30, band. 8-12, dance orch.

WHN, New York City, 360-2:15 P. M., James A. Kendis, tenor. 2:25, Edward J. Faltermann, jazz pianist. 2:35, Gene Austin, baritone. 2:45, Booker's Memphis Six. 3:45, Ellen Montague Cross presents Ida Allen, soprano; Richard Brown, pianist; Mabel Anderson, soprano, and Vernon Griffith, saxophonist. 4:15, "The Radio Widow," Bella Newmann Zilberman, readings. 4:30, Morris Handel, tenor; G. Abbey, pianist. 4:45, Ruth Sharpe, stories. 5-5:30, B. Reith's Southern Harmonists. 6:30-7, Ray's Alamac quartet. 7-7:30, Ray's Alamac orch. 7:30, Hotel Carlton Terrace orch. 8, "Goodnight Children," by Elizabeth Morrison Jones. 8:05, Jimmy Flynn, dramatic tenor. 8:15, Arthur Stone, world's famous blind pianist. 8:30, Metropolis Trio, King, Butler and Ellis, songs. 8:45, Josephine Michelson, ukulele songs. 9, Frisco Jazz Kings. 9:30, A. V. La Skere, songs. 9:45, Victor Wilbur, baritone. 10, Vic and Jack Lauria, singing and ukulele. 10:15, Fitzpatrick Brothers, old-time medlies. 10:30, Clarence Williams' Radio Trio, assisted by the Blue Five orch. 11, Jimmy Clarke and entertainers. 11:30, Henderson's dance orch.

WQJ, Chicago, 446-11 A. M., to 12 M., home economics program under the direction of Helen Harrington Downing; H. W. West, "Pressure Cookies"; talk by members of First District Illinois Federation of Women's Clubs. 3-4 P. M., "Koffee" Klatsch; special musical features by well-known radio artists. 7-8, concert by Ralph Williams and his Rainbo Garden orch.; Otis Pike Pester, soprano; Mary House, pianist; James J. Whalen, tenor. 10P. M., to 2 A. M., Williams Rainbo Garden orch.; Jerry Sullivan, dramatic tenor. 8:15, Scotch tenor The Melodians; Geo. A. Little and Larry Shay, harmony singers; Dorothe Rae, of "Around the Rainbo" Co.

WJZ, New York City, 455-1:15 P. M., Orlando's Hotel Roosevelt orch.; Herbert Somany, director. 2, Army-Yale football game; play-by-play description by J. Andrew White and Ennis Brown, noted football authority, over direct wire from Yale Bowl, New Haven. 7, Waldorf-Astoria dance orch. 8, talk by the Honest Ballot Association. 8:15, Rinaldo Sidoli, violinist. 8:30, talk by William A. Murphy. 8:45, Rinaldo Sidoli, violinist. 9, Democratic meeting, addresses by John W. Davis and Governor Al Smith. 10:30, Hotel Astor dance orch.

WWJ, Detroit, 517-8 A. M., setting-up exercises. 9:30, a special talk. 9:45, Public Health Service bulletin and talks on subjects of general interest. 10:25, weather. 11:55, time. 12 M., music. 3 P. M., orch. 3:50, weather. 3:55, market reports; football scores. 5, football scores. 7, orch.

WRC, Washington, 469-6 P. M., children's hour, by Peggy Albion. 7:45, Bible talk. 8, song recital by Viola Harper. 8:15, talk. 8:30, song recital by Sue Hess, contralto. 8:45, talk. 9, concert by the Capital male quartet. 9:15, concert by the Lee House trio. 9:55, time. 10:30, dance program.

WOO, Philadelphia, 509-11 A. M., organ. 11:30, weather. 11:55, time. 12 M., luncheon music by the Tea Room orch. 5-15 P. M., grand organ, trumpets, R. C. O. band. 7:30, sports results and police reports. 9:55, time 10:02, weather.

KYW, Chicago, 536-6:30 A. M., calisthenics.



A NEW microphone device eliminates the "one moment please," by flashing "Prepare" and "Broadcast," and artists must obey. (United)

9:30, late news and comment of the financial and commercial markets. 10:30, Farm and Home Service. 11:35, table talk by Mrs. Anna J. Peterson. 6:02-6:18 P. M., news, financial and final markets. 6:35-7, children's bedtime story; concert. 7-7:10, DeBabary's orch.; Coon-Sanders Nighthawks. 7:20, Joska DeBabary's orch. 8-8:58, Thomas B. Stephenson, tenor; Elsie C. Stephenson, accompanist; Calumet Cambrian quartet; Mrs. Joseph Fisher, Mrs. John Bevan, Mrs. Harry Isaac, Mrs. W. E. Jones, Edith Collier. 9:05, Youth's Companion stories, articles, humor.

WDAR, Philadelphia, 395-11:45 A. M., daily almanac. 12 M., organ. 2-3 P. M., Arcadia concert orch. 4:30, dance program by the Cotton Pickers. 5:45, sporting results. 7:30, Dream Daddy.

WGY, Schenectady, N. Y., 380-11:55 A. M., time. 12:30 P. M., stock market report. 12:40, produce market report. 3, running story football game, Army vs. Yale, at New Haven, described by J. Andrew White. 9:30, dance music; popular songs; football results.

WIP, Philadelphia, 509-1 P. M., organ recital by Karl Bonawitz. 1:30, weather. 2:30, play-by-play description of the football game between University of Pennsylvania and Lafayette, broadcast direct from the Franklin Field, University of Pennsylvania. 6, weather. 6:05, music by the Hotel St. James orch. 6:45, U. S. Department of Agriculture livestock and produce market reports. 7, Uncle Wip's bedtime stories. 8, talk by Ernest C. Carpenter. 8:15, artists recital, Lillian A. Mayer, soprano and pianist; Fanny Donnelly, contralto; William J. Mayer, baritone. 9, Tillie B. Shalet, reader. 9:20, piano, Olga Mendhoff. 10:50, dance music by Coogan orch. 11:05, organ, Karl Bonawitz.

WLW, Cincinnati, 423-10:45 A. M., weather forecast and business reports. 1:30 P. M., market reports. 11:30, Crosley Arabian Nights from Castle Farm, featuring the Lange-McKay orch.

KDKA, E. Pittsburgh, Pa., 326-9:45 A. M., Stockman reports; general market review. 11:55, time. 12 M., weather; Stockman reports of the Pittsburgh livestock and wholesale produce markets. 1:30 P. M., Daugherty's orch. 2:30, Pitt-Syracuse football game from Syracuse. 6:30, Westinghouse band, T. J. Vastine, conductor. 7:15, "Wimble the Wanderer," for children. 7:30, sport review by James J. Long. 7:45, address by American Red Cross. 8, "Inside Movie Gossip," Sam Comley. 8:15, feature. 8:30, Westinghouse band, T. J. Vastine, conductor; Alice Smith, soprano; F. Robert Coe, baritone; P. Zahner, violinist. 9:55, time; weather.

KYW, Chicago, 536-6:30 A. M., setting-up exercises; also broadcast at 7 and 8 a. m. 9:30, news; comment of the financial and commercial markets. 10:30, Farm and Home service. 11:35, talk by Mrs. Anna J. Peterson. 6:02 P. M., news, financial and final markets. 6:35, bedtime story by Walter Wilson. 7, DeBabary's orch. 7:10, Coon-Sanders "Original Nighthawks." 7:20, DeBabary's orch. 8-8:58, Thomas B. Stephenson, tenor; Elsie C. Stephenson, accompanist; Calumet Cambrian quartet, Mrs. Joseph Fisher, Mrs. John Bevan, Mrs. Harry Isaac, Mrs. W. E. Jones, Edith Collier, accompanist. 9:05, Youth's Companion, including short stories, articles and humorous sketches.

WBZ, Springfield, Mass., 337-11:55 A. M., time; weather. 6 P. M., Heisman Ensemble. 6:30, Copley-Plaza orch., direction of W. E. Boyle. 7, market report. 7:05, bedtime story. 7:30, Hotel Kimball trio, Jan Geerts, violin; Arnold Janser, cello; Lloyd Stoneman, piano. 8:15, Weltman Conservatory orch. 9:15, D. Lee Chestnut, trom-

bonist; Alice Newhall Cook, organist. 9:55, time; weather.

WOR, Newark, N. J., 405-7 A. M., gym class, under A. E. Bagley. 2:30 P. M., Banks' orch. 3, Lucy Cooper, soprano. 3:15, Grace Humphrey, "Women and Girls of History." 3:30, Lucy Cooper, soprano. 3:45, announced. 6:15, Harold Oxley and Cinderella orch. 7:15, day's sports, "Jolly Bill" Steinke. 8, Cantor Moses Gann, baritone, and Sadye M. Gann, pianist. 8:40, Mary R. Eaton, violinist, and Mary Eaton Demler, soprano. 9, Donn Barbour, architect, on "Better Homes." 9:15, "My Visit to and Around the Regions of Rome," by Burton Holmes. 9:30, Ethel Wagenstein, soprano; Royal Halec, tenor; Gene Schubel, mezzo-soprano; Louis A. Reilly, baritone; Shirley Weisa, soprano. 10:15, Mary R. Eaton, violinist; Mary E. Demler, soprano. 10:30, Allan Glen, baritone, accompanied by Mme. Clara N. Davies. 10:50, Remington Schuyler, artist, on "The Real American." 11, Perry and Russell, 2-man singing orchestra.

WEBH, Chicago, 370-7 P. M., concert, Edgewater Beach Oriole orch.; radio Sunday school lesson, Dr. Herbert W. Virgin; Dean Kemick, pianist; musical bits from Riviera Theatre. 9, dance, Edgewater Beach orch.; Marie Kelly, readings; Langdon Brothers, Hawaiian guitars; William H. Hunt; musical bits from Riviera Theatre. 11, dance, Edgewater Beach orch.; Marie Kelly, readings; Langdon Bros., guitars; Nick Lucas, songs; Edgewater Beach Hotel trio.

Sunday, November 2

WWJ, Detroit, 517-7:30 P. M., services. 5, orch.

WOO Philadelphia, 509-2:30 P. M., musical exercises, Bethany Sunday school. 6, sacred recital, grand organ, Clarence K. Bawden. 7:30, evening services from Bethany Presbyterian Church.

WHO, Des Moines, Ia., 526-7:30-8:30 P. M., sacred concert and sermon. 8:30-9, The Bankers Life radio artists.

WQJ, Chicago, 446-10:30 A. M., Dr. Preston Bradley's sermon. 8-10 P. M., Ralph William and his Rainbo Garden orch.; Maria Dneprova, Russian soprano; Marion Morgana, prima donna, "Around the Rainbo" Co.; Prof. Ira Hamilton, pianist; Apollo quartet.

KPO, San Francisco, 423-11:12 A. M., undenominational and non-sectarian church services. 8:30-10 P. M., concert by Rudy Seiger's Fairmont Hotel orch.

WEEI, Boston, 303-3:45 P. M., men's conference in the Bedford Branch Y. M. C. A., Brooklyn, N. Y. 7:20, music, Mark Strand Theatre, N. Y. C.

Monday, November 3

WDAF, Kansas City, Mo., 411-3:38-4:30 P. M., Star's trio. 5:50-6:30, Boy Scout program. 5:50-6, marketgram, weather, time, road report. 6-7, address, message from Roger W. Fabson; The Story Lady; Hanlein-Knutson Ensemble. 8-9:15, popular program. 11:45 P. M. to 1 A. M., Nighthawk Frolic.

WMC, Memphis, Tenn., 500-12:30 P. M., Skyline Serenaders. 8:30, Georgia Serenaders, Al Benard and Russell Robinson.

WLW, Cincinnati, 423-10:45 A. M., weather; business reports. 1:30 P. M., business reports. 3, market reports. 4, lesson in Ilo; Babson reports. 8, Alvin Roehr's Music Makers; Crosley theatrical review. 8:35, Evangelistic program. 8:45, Cooper orch. and male quartet.

KPO, San Francisco, 423-12 M., time; reading of Scripture. 1-2 P. M., Rudy Seiger's Fairmont Hotel orch. 4:30-5:30, Rudy Seiger's Fairmont Hotel orch. 5:30-6:30, children's hour. 7-7:30, Rudy Seiger's Fairmont Hotel orch. 8-9, organ recital by Theodore J. Irwin. 9-10, program by the Welsh Choir. 10-11, E. Max Bradford's versatile band.

WWJ, Detroit, 517-8 A. M., setting-up exercises. 9:30, "Tonight's dinner," and a special talk by the Woman's Editor. 9:45, Public Health Service bulletin and talks on subjects of general interest. 10:25, weather. 11:55, time. 12 M., music. 3 P. M., Detroit Symphony orch. junior concert. 3:50, weather. 3:55, market reports. 8:30, The Detroit News orch.; F. Eugene Wilson, baritone.

WCBD, Zion, Ill., 345-7 P. M., Hire Trio, Mrs. L. J. Hire, piano; Mr. L. J. Hire, viola, and Mr. Richard Hire, violin, assisted by the following performers: Messrs. Biddle, Hampson, Valkeenaar and Sefton, trombone quartet; Mrs. Mayfield, Miss Farrar, Messrs. Maynard and Paxton, mixed quartet; Misses Peterson and Uhlirk, soprano and contralto; Ida Peterson, soprano.

WHAZ, Troy, N. Y., 340-9 P. M., concert program, soprano, violin, piano and reader, under direction of Mrs. Guy R. Smith. 10:30, Flush's dance orch.

CKAC, Montreal, 425-1:45 P. M., Mount Royal Hotel luncheon concert. 4, weather and stock reports. 4:30, Ilo lessons.

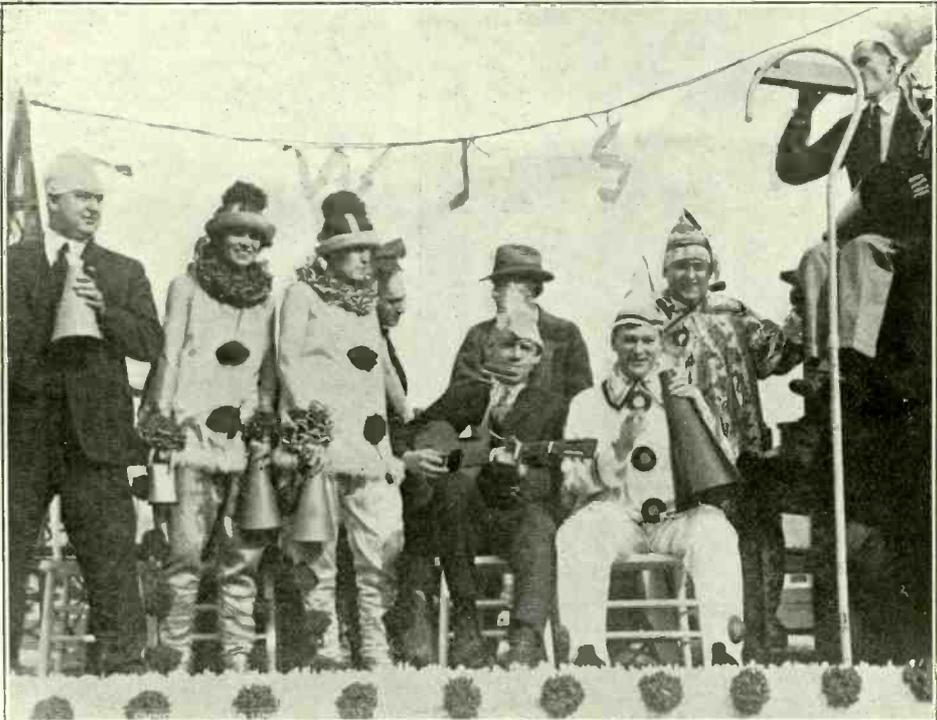
WHO, Des Moines, Ia., 526-7:30-8 P. M., popular song pianist, Miss Sally Myers. 8-9, talent.

WFAA, Dallas, Tex., 476-12:30-1 P. M., address, Dr. J. D. Boon, astronomer, Southern Methodist University, on "Moonlight and You." 8:30-9:30, The Lone Star Five orch.

KGO, Oakland, Calif., 312-1:30 P. M., N. Y. stock reports. 1:40, S. F. stock reports. 1:45, weather. 3, studio musical program. 4-5:30, Henry

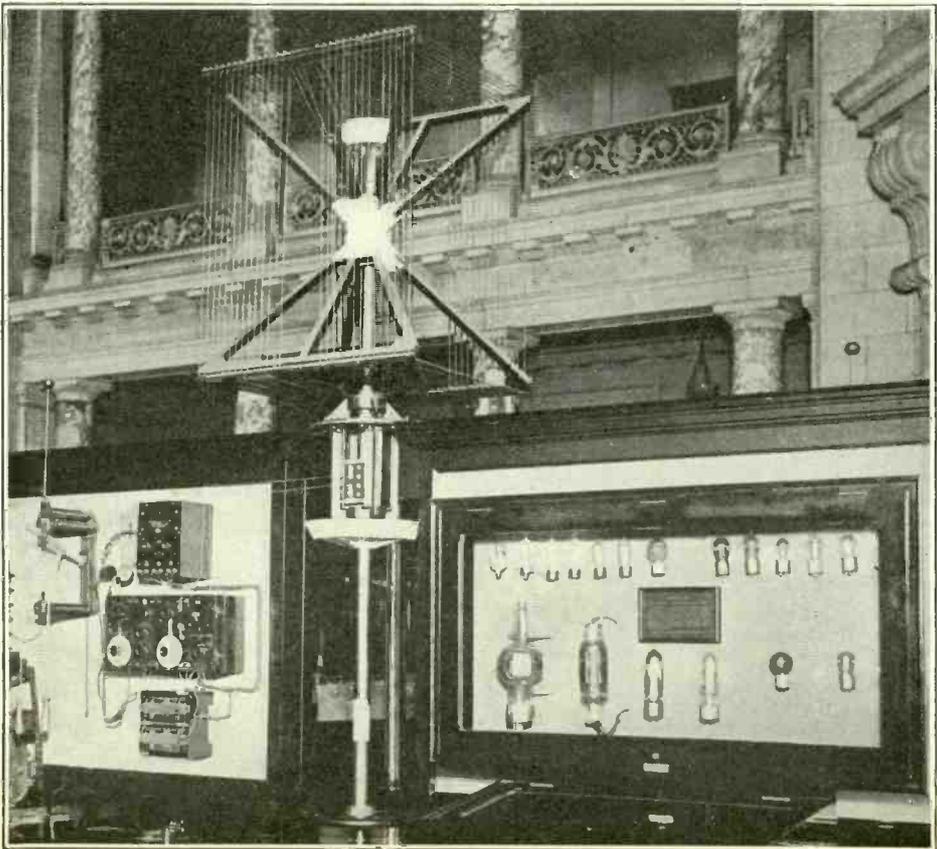
(Concluded on page 20)

WLS Talent at Circus



THE WLS FLOAT made a hit at the first annual radio picnic held at Grant Park, Chicago. Fans were present from all over the middle west, but they were no more enthusiastic to make the party a success than were the station crews and artists. It was the first opportunity for the announcers and listeners to get together. On the WLS float, left to right, are: Thomas Owen; Grace Ingram and Edith Carpenter, "The Harmony Girls"; Walter Peterson; Ford Rush, "Big Ford"; Glenn Powell, "Little Glenn"; and George D. Hay, "Solemn Old Judge." (Underwood & Underwood).

Exhibit of Radio Progress



DOWN THROUGH the "ages" of radio! This exhibit shows the progress of radio from "the earliest times" to the present day. Everything from a crystal detector to a super-fine submarine transmitter is on display. This exhibit is at the National Museum in Washington, D. C. (Harris & Ewing).

Teaches

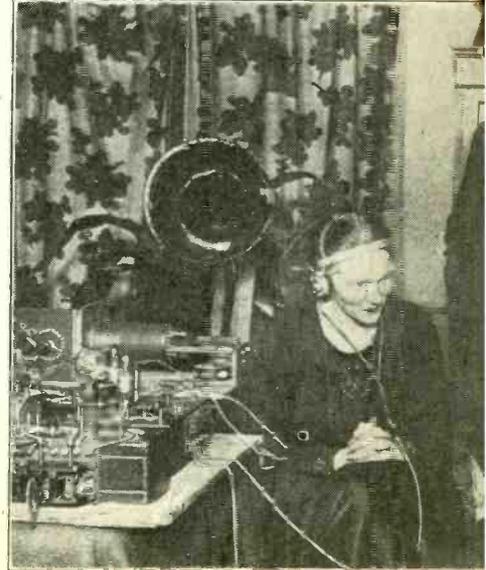


MRS. CLARA E. BREAKLY lectures on "Home Economics" at New York University when she isn't busy conducting the "Air College" courses on Co-operative Economics, under the auspices of her college. She broadcasts from WJZ, New York City. Those who have listened to her have commented that she has an excellent radio voice and knows well how to use the microphone. (Gilliams)

Timepiece

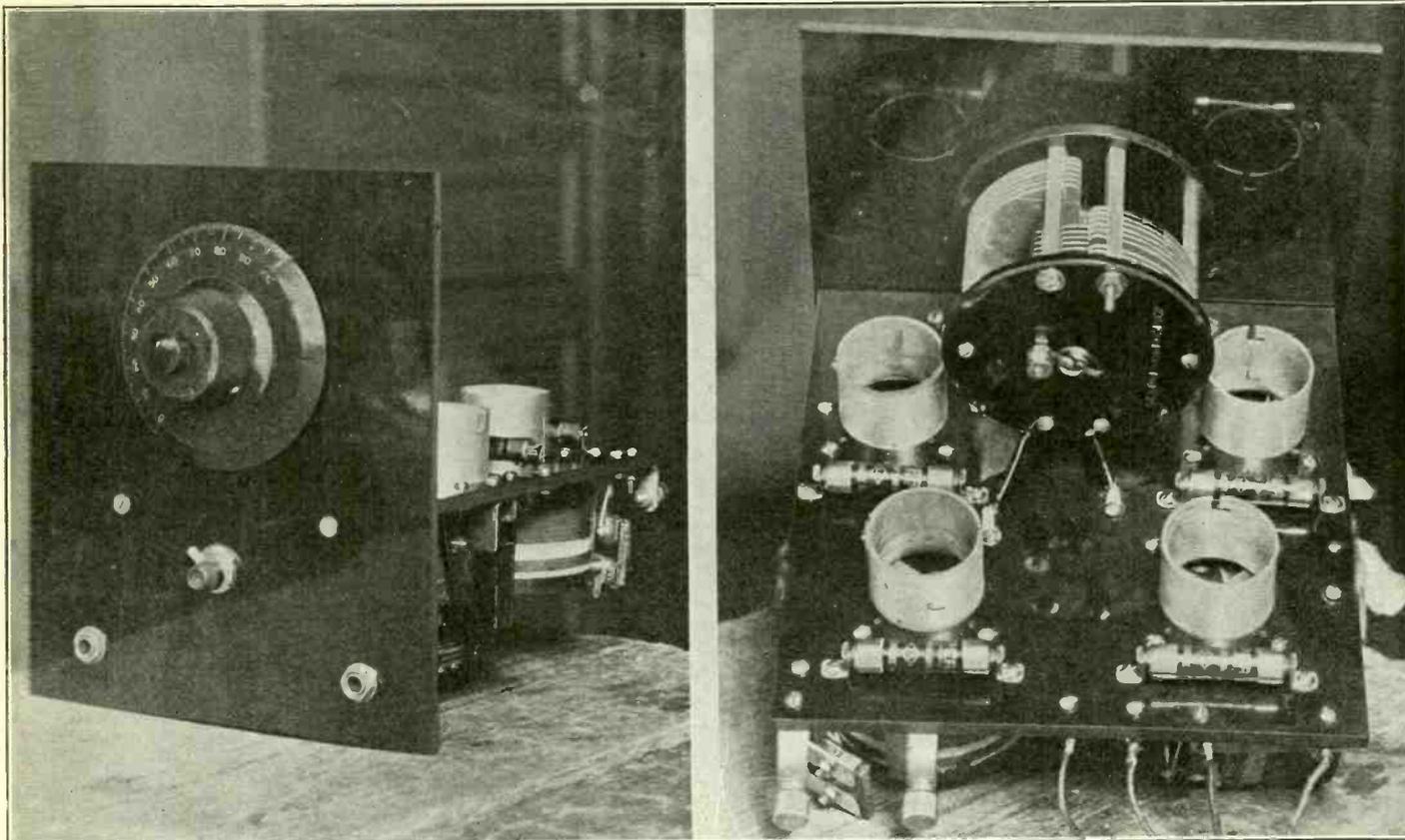


A RADIO TIME CLOCK, being tested by the U. S. Navy at present, is shown in the above picture. The operator is listening, to check results.

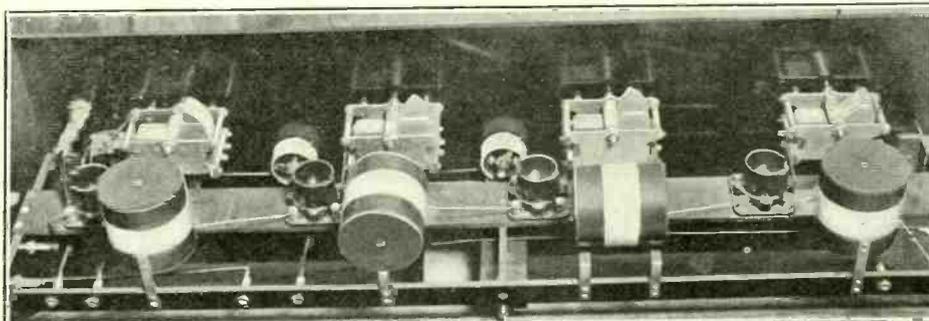


BED-TIME STORY? No, indeed. They're all li of ph

A Compact 1-Dial RF Set



A 4-TUBE, 1-control tuned radio-frequency outfit. It uses a double-rotary plate variable condenser. Self-adjusting rheostats are used to save room and simplify the operation. Note the absence of superfluous wiring, and the short, direct connections. The condenser, if you will notice, has a pig-tail connection to reduce the possibility of a bad, wiping connection. The filament switch could have been eliminated by using filament control jacks, but this in turn would have complicated the wiring. Note that a sub-panel is used, the sockets and balanced rheostats being on top. The variable condenser is panel-mounted. Below are the two coils, the leads to them going through the sub-panel. The outfit may be accommodated on a 10x19" panel. Two jacks are shown on the panel (photo at left), one for the detector stage, the other for the last AF stage. The condenser has a vernier adjustment. (Kadel & Herbert).



RF BUILDERS, take note. Four neutralized air-core transformers, tuned by low-loss condensers, are shown mounted at right angles. Note the distance between coils and the proximity to sockets and condensers. (Kadel & Herbert).



Listening to a lecture on "How to Compute the Internal Resistance of Intercoupling Tubes." Grandma (on picture at left, where she is at right), placed a pair of glasses in series with the loudspeaker to hear better. These two photos typify the salutary effect of radio on the family.

Army vs. Yale Game Saturday

Programs

Monday, November 3, Continued from page 17

Halstead and his dance orch. playing in the Garden Room of the Hotel St. Francis, San Francisco. 5:30-6, Aunt Betty stories. 6:45, N. Y. stock reports. 6:55, S. F. stock reports. 7, weather. 7:05, S. F. produce news. 7:10, baseball scores. 7:15, news items. 8, educational program.

WOO, Philadelphia, 509—11 A. M., organ. 11:30, weather. 11:55, time. 12 M., Tea Room orch. 5:15 P. M., organ and trumpets. 7:30, sports results and police reports; music by A. Candelori and his Hotel Adelphia French Room orch. 8:30, old-time favorites by Aztec quartet; Herman Gatter, Harold Rawley, Edwin Rorke, Charles Long, Mrs. Edwin Grant Rorke, accompanist. 9:25, Fox Theatre orch. 9:55, time. 10:02, weather. 10:03, organ, Mary E. Vogt. 10:30, dance program by Vincent Rizzo and his Hotel Sylvania orch.

WQJ, Chicago, 448—11 A. M. to 12 M., Home Economics program, under the direction of Helen Harrington Downing; Meadows, "Tinens and their Manufacture"; Dr. Fred P. Siebal, "Bakery Products and the Home"; Agnes M. Olsen, dietitian, "Wholesome Foods Easily Prepared." 3-4 P. M., Helen Harrington Downing, director of Home Economics for the Calumet Baking Powder Co., "Ways of Serving Fish"; Reverend Fred Harrison, book review.

WHO, Des Moines, Ia., 526—11:15-12 Midnight, L. Carlos Meier, organ.

KFAE, Pullman, Wash., 330—7 P. M., piano numbers, Thelma Johnson, Palouse; important points in poultry raising, talk I. J. S. Carver; What happens at very low temperatures, J. L. Culbertson, chemist; home treatment of tuberculosis, U. S. Public Health Service; winter rations for hogs, C. M. Hubbard.

Tuesday, November 4

WBZ, Springfield, Mass., 337—11:55 A. M., time, weather, Springfield market report. 6 P. M., Hotel Lenox Ensemble. 6:30, children's program, Amelia Burnham. 7, market. 7:05, bedtime story. 7:15, world market survey. 7:30, Reisman's Hotel Brunswick orch. 8, talk on "Eternal Youth" by Alice Jewel. 8:15, Willena A. Norris, whistler. 8:30, Margaret Caraballo, violinist; Rita Bowers, cellist and Irene Cameron, pianist, from the Hotel Brunswick studio, Boston. 9:15, Sid Reinherz, pianist. 9:30, William Murdock, bass, accompanied by Mrs. R. D. Carter. 9:55, time, weather. 11:30, organ; Presidential election returns throughout the evening.

WDAF, Kansas City, Mo., 411—3:30-4:30 P. M., The Star's trio. 5:50-6, child talent. 5:50-6, marketgram, weather, time, road report. 6-7, Story Lady; radio piano lessons, Maudellen Littlefield; Hanlein-Knutson Ensemble. 11:45, Nighthawk Frolic.

WMC, Memphis, Tenn., 500—12:30 P. M., Sky-line Serenaders. 8:30, election returns and Bernard and Robinson. 11, Midnight Frolic.

WLW, Cincinnati, 423—10:45 A. M., weather and business reports. 1:30 P. M., business reports. 3, market reports. 4, lesson in Ilo; program by Cincinnati Federation of Mother Clubs. 10, Ohio Rubber quartet, Howard Hafford, Erwin Meyer, Edwin Weidinger, John Dodd; feature, Wendell Hall, Waldene Johnston, violin. 11:30, Crosley Arabian Nights orch.

KGO, Oakland, Cal., 492—11:30 A. M., weather. 12:30 P. M., concert. 5, children's program, Jean Adkins. 7:15, markets, weather, news, police reports. 8, election returns.

CKAC, Montreal, 425—4 P. M., weather and stock market reports. 7, kiddies' stories in French and English. 7:30, Rex Battle and his Mount Royal Hotel concert orch. 8:30, Canadian Industrial Coal entertainers. 10:30, Joseph C. Smith and his Mount Royal Hotel dance orch.

WOO, Philadelphia, 509—11 A. M., organ. 11:30, weather. 11:55, time. 12 M., Tea Room orch. 5:15 P. M., organ and trumpets. 7:30, sports results and police reports. 9:55, time. 10:02, weather.

WHAS, Louisville, 400—4-5 P. M., selections by the Alamo Theatre orch.; police bulletins; weather; "Just Among Home Folks"; readings; news. 4:55, local livestock, produce and grain market reports. 5, time. 7:30-9, concert by Carl Zoeller's Melodists; time.

WWJ, Detroit, 517—8 A. M., setting-up exercises by R. J. Horton, physical director of the Detroit Y. M. C. A. 9:30, "Tonight's Dinner" and a special talk by the Woman's Editor. 9:45, Fred Shaw, pianist and popular songster, in an "Ironing Day" special program. 10:25, weather. 11:55, time. 12 M., music. 3 P. M., News orch. 3:50, weather. 3:55, market reports. 8:30, News orch.

KPO, San Francisco, 423—12 M., time; reading of Scripture. 1-2 P. M., Seiger's orch. 4:30-5:30, Seiger's orch. 5:30-6:30, children's hour. 7-7:30, Rudy Seiger's Fairmont Hotel orch. 8-10, election returns. 10-11, Bradfield's band.

WQJ, Chicago, 448—11 A. M. to 12 M., Home Economics program under the directions of Helen Harrington Downing; Miss Estelle Popp, "Brassiers for Stout Women"; Miss Grace Vial Gray,



"THE HIRED HAND," a great favorite of thousands who listen to WBAP, Ft. Worth, Tex. That's the only public identity he owns.

Home Economics, "A Talk on Meat." 3-4 P. M., Miss Cora Beeman, "Planning Your Winter Menu"; Colonel Alexander Damon, Salvation Army talk. 7-8, Ralph Williams and his Rainbo Garden orch.; Excelsior quartet, A. Snavelly, 1st tenor; L. J. Booth, baritone; David Middleton, bass; Rudolph Meyer, 2nd tenor. 10 P. M. to 2 A. M., Ralph Williams and his Rainbo Skylarks; James Mitchell, baritone; Merrie Boyd Mitchell, soprano; Carl Linner, pianist; Harry Geise and his "How Do You Do" song; Nubs Allen, contralto; Viola Graff, soprano; Edna Solomon, contralto; Will Rossiter.

Wednesday, November 5

WBZ, Springfield, Mass., 337—11:55 A. M., time, weather, market. 6 P. M., Westinghouse Philharmonic trio. 7, market. 7:05, bedtime story. 7:15, information on Civil Service Examinations. 7:30, Luigi Fini, tenor; Hubert Hardy, baritone; Rita Equi, soprano; Dorothy B. Mulrone, accompanist, and Westinghouse Philharmonic trio. 8:30, Frances Burr Mitchell, soprano, accompanied by the composer, Leland Clark. 8:45, Walworth band and talk by president, Chamber of Commerce, Boston. 9:30, Bellevue male quartet. 9:55, time, weather. 10, George A. Barker, baritone; Mrs. J. E. Snyder, accompanist. 11, Reisman's Hotel Brunswick orch. 11:30, popular songs. 11:45, Reisman's Hotel Brunswick orch.

WDAF, Kansas City, Mo., 411—3:30-4:30 P. M., Star's trio. 5:50-6, marketgram, weather, time, road report. 6-7, piano tuning-in number; address, on health; The Story Lady; Hanlein-Knutson Ensemble. 8, Con Brio Club of Independence, Mo. 11:45, Nighthawk Frolic.

WMC, Memphis, Tenn., 500—12:30 P. M., Sky-line Serenaders; silent night.

WLW, Cincinnati, 423—10:45 A. M., weather and business. 1:30 P. M., business. 3, market. 4, lesson in Ilo by Fred Smith; program for the "Shut-Ins." 8, Virginia Entertainers; Wendell Hall, 8:55, Formica band and orch.; saxophone solos by Arthur Grafenhan; Coleta Helmig, soprano. 11:30, Crosley Arabian Nights orch.

KGO, Portland, Ore., 492—11:30 A. M., weather. 12:30 P. M., Bill Rarby's orch. 5, children's program. 7:15, markets, weather, news, police reports. 8, concert. 10, Olsen's Metropolitan orch. CKAC, Montreal, 425—12:30 A. M., Midnight Frolics. 1:45 P. M., Mount Royal Hotel concert. 4, weather and stock reports.

WFAA, Dallas, Tex., 476—12:30-1 P. M., address, DeWitt McMurray, "The Salt River Sailors," an after-election medley of humor, pathos and wisdom.

WFAA, Dallas, Tex., 476—12:30-1 P. M., music by the Red-Head Girl. 8:30-9:30, Walter J. Fried, violinist, and assisting artists. 11-12, grand organ recital.

WHAS, Louisville, Ky., 400—4-5 P. M., selections by the Alamo Theatre orch.; police bulletins; weather; "Just Among Home Folks"; readings; late news. 4:55, local livestock, produce and grain market reports. 5, time. 7:30-9, concert by the Tropical Hawaiian Quintet, Frank Plada, Mrs. Frank Plada, Merritt Lamb, Joseph Scabbare, Clarence Young; news; time.

WHO, Des Moines, Ia., 526—7:30-9 P. M., dance program, The Bankers Life radio orch.; Mrs. Edward Sett, soprano soloist; ballroom dancing instructions by Arthur Murray, of the National Institute of Social Dancing.

KPO, San Francisco, 423—12 M., time. 1-2 P. M., Seiger's orch. 2:30-3:30, Gary Fisher's Amphians. 4:30-5:30, Seiger's orch. 5:30-6:30, children's hour. 7-7:30, Seiger's orch. 8-11, Bradfield's band; conversational French lesson, Marie Louise Boutin, instructor; talk by Capt. Smith, Fire Chief.

KFAE, Pullman, Wash., 330—Baritone solos; pointers on dairy farming, talk I. E. V. Ellington; readings, members of speech department; present tendencies in auto design, A. C. Abell; milk for everybody, Miss Mary Sutherland, dietitian.

WWJ, Detroit, 517—8 A. M., setting-up exercises. 9:30, "Tonight's Diner" and a special talk by the Woman's Editor. 9:45, Public Health Service bulletins and talks on subjects of general interest. 10:25, weather. 11:55, time. 12 M., music. 3 P. M., Detroit Symphony orch. junior concert, broadcast from Orchestra Hall. 3:50, weather. 3:55, market reports. 8:30, News orch.; Templeton Moore, tenor.

WOO, Philadelphia, 509—11 A. M., organ. 11:30, weather. 11:55, time. 12 M., Tea Room orch. 5:15 P. M., organ and trumpets. 7:30, sports results and police reports; music by A. Candelori and his Hotel Adelphia orch. 8:15, organ, Mary E. Vogt. 8:45, Eleanor Hamilton and Harriette G. Ridley, piano. 9, WOO orch.; Della M. Keiser, contralto. 9:55, time. 10:02, weather.

Thursday, November 6

WDAF, Kansas City, Mo., 411—3:30-4:30 P. M., The Star's trio. 5:50-6, marketgram, weather, time, road report. 6-7, address, Edgar Allan Linton on world travels; reading, Miss Cecile Burton from popular poems and essays; The Story Lady; Trianon Ensemble. 11:45, Nighthawk Frolic.

WMC, Memphis, Tenn., 500—12:30 P. M., Sky-line Serenaders. 8:30, program by students of Central High School.

WLW, Cincinnati, 423—10:45 A. M., weather, business. 1:30 P. M., business. 3, market. 4, lesson in French by Mme. Ida Teimpidis; piano, Adelaid Apeli; recital, William Kyle pupils. 10, talk by the U. S. Civil Service. 10:03, Doherty Melody Boys. 10:30, Milnor instrumental trio; Wendell Hall, 11:30, Crosley Arabian Nights orch.

KPO, Portland, Ore., 492—11:30 A. M., weather. 12:30 P. M., concert. 5, children's program. 7:15, markets, weather, news, police reports.

WBZ, Springfield, Mass., 337—11:55 A. M., time, weather, market report. 6, Wiggins' ensemble. 6:30, Copley-Plaza orch., W. E. Boyle, dir. 7, market. 7:05, bedtime story. 7:15, letter from New England Homestead; "At the Theatres," with A. L. S. Wood. 7:45, Hector's St. James Theatre orch. 8:15, Betty Gray, soprano, accompanied by Inez Day. 9:15, Josephine Laird, contralto; Charles H. Young, tenor. 9:55, time, weather. 10:01, continuation program.

CKAC, Montreal, Can., 425—4 P. M., weather and stock reports. 8:30, Canadian National Railways program.

WFAA, Dallas, Tex., 476—12:30-1 P. M., address, Charles E. Osborne. 8:30-9:30, Bill Foreman and his banjo sextet. 11-12, Adolphus Hotel orch.

KGO, Oakland, Calif., 312—1:30 P. M., N. Y. stock reports. 1:40, S. F. stock reports. 1:45, weather. 4:50-6, concert orch. of the Hotel St. Francis, San Francisco. 6:45, N. Y. stock reports. 6:55, S. F. stock reports. 7 P. M., weather. 7:05, S. F. produce news. 7:10, baseball scores. 7:15, news items. 8, studio program.

WWJ, Detroit, 517—8 A. M., setting-up exercises. 9:30, "Tonight's Dinner" and a special talk by the Woman's Editor. 9:45, Public Health Service bulletins and talks on subjects of general interest. 10:25, weather. 11:55, time. 12 M., music. 3 P. M., News orch. 3:50, weather. 3:55, market reports. 8:30, News orch.; Graeme Gillies, bass. 10, dance music, Jean Goldkette's Victor recording orch. 11:30, News orch.

WCBD, Zion, Ill., 345—7 P. M., semi-chorus; Messrs. McElroy, saxophone quintet; Mehauffey, Rendall, Sach and McElroy, bells; Messrs. Stewart and Dunn, cornet and euphonium; Wm. C. Dunn, euphonium; Paul Stewart, cornet.

WOO, Philadelphia, 509—11 A. M., organ. 11:30, weather. 11:55, time. 12 M., Tea Room orch. 5:15 P. M., organ and trumpets. 7:30, sports results and police reports. 9:55, time. 10:02, weather.

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Complete, Accurate, Up-to-date

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THE names of readers of RADIO WORLD who desire literature from radio jobbers and dealers, are published in RADIO WORLD, on request of the reader. The blank below may be used, or a post card or letter will do instead.

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Executive Council Show March 2 to 7

PRELIMINARY plans are completed for the Fifth Annual Radio Show and Convention to be given by the Executive Radio Council at the Hotel Pennsylvania, New York City, six days, beginning March, F. K. Doscher of the Show Committee announced.

The management of the show is being conducted from 120 Liberty Street, New York City. Mr. Doscher is general manager; Frank Fimmerman, floor manager; R. Morris, business and advertising manager, and G. Barrows, publicity manager.

New Corporations

- Perfect Radio Equipment Company, N. Y. C., contracting, \$10,000; E. R. Gessling, M. Landrick. (Attorney, J. J. Coyle, 178 W. 85th St.)
- Radio Institute, manufacture, \$300,000; I. N. Walker, Elmer Lueht, M. C. Cronin, Chicago. (A. B. Magee, Dover, Del.)
- Gould Storage Battery Corp., N. Y. C., \$250,000; C. A. and W. S. and C. A. Gould, 2nd. (Attorneys, Greene and Hurd, 43 Exchange Pl.)
- Sport Radio Corp., manufacture sets, \$50,000; T. L. Croteau, Wilmington, Del., Fred P. Winthrop, Philadelphia, Pa., Jennie Sladkin, Wyncote, Pa. (Corp. Trust Co. of America.)
- Rite Wave Manufacturing Corp., Brooklyn, personal property, \$100,000; W. L. Pietsch, G. W. Ryder, E. B. Wright. (Attorney, A. H. Spigel, 215 Montague St., Brooklyn.)
- DeLatt Elec. Corp., N. Y. C., inventions, \$50,000; R. DeLatt, F. C. Ott, M. E. Milles. (Attorney, L. C. Ferguson, 110 William St., N. Y. C.)

Coming Events

- NOV. 3-6—Third Annual National Radio Exposition, Grand Central Palace, New York City, under auspices of American Radio Exposition Co., 322 Fifth Ave., N. Y. C. Annual National Radio Convention in conjunction with show.
- NOV. 11-14—Wisconsin Radio Exposition, Milwaukee.
- NOV. 17-22—Buffalo Radio Show.
- NOV. 18-23—Chicago Radio Fair. They advertise "all space sold."
- NOV. 24 TO 28, INCLUSIVE—International Radio Week.
- DEC. 1-7—Newark Radio Fair.
- DEC. 1 TO 4, INCLUSIVE—Boston Radio Exposition, Mechanics Building, Boston.

3-CIRCUIT TUNER, all circuits tuned; uses coupler and two variometers. Great for DX and volume. Described by Herbert E. Hayden, Radio World, issue of Oct. 11. Send 15 cents or start your subscription with that number. Radio World, 1493 Broadway, New York City.

MR. D. X. HOUND *A Character Created by* HAL SINCLAIR



EMPTY BUBBLES mark this comic strip so that you will have an opportunity to supply funny text and possibly win \$25. Make the characters' conversation brief. Write it in with pencil. Then send your submission to Best Joke Editor, RADIO WORLD, 1493 Broadway, New York City. The answers will be considered as submitted in the Best Joke competition. Turn to page 27 for full explanation. You may send in as many contributions as you desire, using either the above drawing as your basis or submitting any joke, wholly unconnected with the comic strip, that you think is funniest.

The Radio Trade

Exports Increase \$1,000,000

EXPORTS of electrical equipment of all kinds have been very satisfactory, and the totals thus far indicate that for the full year they will be considerably above those of 1923, according to the electrical division of the Department of Commerce. Preliminary figures just available show that the August exports of such goods were larger by 17 per cent. than those for the same month last year, the comparative sales being \$7,188,370 and \$6,108,894.

Generating equipment showed a very considerable increase in both direct and alternating apparatus of all classes, and even farm lighting plants were practically double in value as compared with August, 1923. Motors have not shared the gain shown by generating apparatus, though there was only a slight decrease in motors of one horse power and less. In wiring devices and materials substantial increases were shown.

Exports of radio and wireless apparatus increased largely over August, 1923, the total of shipments during last August being \$541,238, as against \$307,127. Influenced to some extent by the world-wide interest in radio exports of both primary and storage batteries have also held up well and the August exports were well above those of that month in the preceding year.

200-Word-a Minute Telegraph Shown

By Philip E. Kenney

Secretary to U. S. Commercial Attache, The Hague

THE HAGUE, NETHERLANDS.

THE first exhibition of foreign and domestic radio equipment in the Netherlands was held at the International Radio Fair in Amsterdam. Although visitors were assessed one guilder for entrance, 7,000 persons attended. Besides numerous German, English, French and Dutch firms which were represented, a good number of dealers representing American firms were also present.

One American firm has transacted considerably more than half of the American business in radio articles in this market since the beginning of the year, the total importation from the United States during the first seven months amounting to 83,000 guilders or approximately 13% of the total imports from all countries. During the same period of the previous year the total importation from the United States was valued at only 45,000 guilders or about 10% of the total imports which thus shows that a fair increase has taken place.

Among the leading exhibits an important place was occupied by receiving sets, particularly those of simple construction which enable the novice to easily receive radio music from the various stations. These instruments were solidly built and made a good appearance.

The receiving set exhibited by the Ingenieursbureau Hulsewe at Amsterdam, which could be automatically adjusted for the desired station through a practical combination of switches, was particularly interesting.

In regard to real novelties the Shif receiver from Creed C. Ingenieurs Bureau, Hulsewe, which registers telegrams on a ribbon at 200 words per minute was of interest. An invention was shown by W. Peeters who, to economize the necessary paper ribbon, used one upon which the notices were registered with a liquid, and after a few minutes the letters disappeared, thus making it possible to use the ribbon continuously.

Eagle Aerial Towers

RADIO fans will welcome the new adjustable Radio Tower recently put on the market by the J. R. Burrell Company. This tower was worked out by experienced engineers and so constructed as to carry the necessary weight of the most pretentious home aerial with no danger of buckling. It is a nicely finished article, ornamented with a 10-inch golden eagle at the top. The adjustable feature is a patented one. No matter how steep the roof, whether it be a double slant or single slant roof or a flat one, the Eagle Radio Tower fits it without alteration. Adjustable feet and one adjustable leg take care of any style of roof. These towers come knocked down in a package that can go by parcel post and it is a simple matter to assemble them. The manufacturers claim that experiments have shown that carefully constructed outside aerials have many advantages over any other kind in getting distance and more satisfactory reception. Eagle Towers are eight feet high, but can be very easily and inexpensively lengthened by adding a piece of standard pipe to the top member.

(Tested and approved by RADIO WORLD)

A THOUGHT FOR THE WEEK

WHEN mother insists on father buying a radio set for her birthday, that makes it unanimous!

RADIO WORLD

The Rag U.S. Pat. Off.



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RATES—Page, 7 1/2 x 11", \$200.00; half page, 3 1/2 x 5 1/2", \$100.00; quarter page, 4 1/2 x 3 1/2", \$50.00; one col., 2 1/2 x 11", \$66.66. \$7.00 per inch. Per agate line, 50c. Times Discounts: 50 Consecutive Issues, 20%; 26 Times Consecutively, or E. O. W. One Year, 15%; 4 Consecutive Issues, 10%.

CLASSIFIED ADVERTISEMENTS

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NOVEMBER 1, 1924

Credit to the Amateurs

IF it weren't for the amateur, there probably would be no broadcasting today. Major Armstrong, inventor of the regenerative receiver and the Super-Heterodyne, was once a transmitting amateur.

Dr. De Forest, inventor of the third element in the vacuum tube, the grid, once "punched a key."

It is safe to say that 90% of the radio engineers of today were or still are amateurs.

Just before the war, not so long after the discovery that there was such a thing as "wavelength", the government assigned wavelengths of below 200 meters to amateurs, who immediately set to work to make the best of their "hard luck."

Consider the fact that the amateur, of which there are 16,000, must restrict himself to a 50-meter band—150 to 200 meters.

If most of the broadcasting stations today were tuned as sharp, comparatively, as the amateur station, selectivity would be no problem to BCLs.

The New Wave Band A Boon to Radio

THE new wave band, 200 to 545 meters, instead of 222 to 546, will go into effect in a few weeks as the result of the action of the Third National Radio Conference. It is a good thing for radio because it opens more channels and requires not more than two stations to share any given wave. Also, 345 meters range from minimum to maximum is about as far as it is safe to go, for otherwise it would be nearly impossible to cover the band with any untapped combination of coil and variable condenser.

The stations not only will not be so close together as to wavelength, but will be distributed throughout the band more systematically than at present. The Class 1 stations will be allotted waves from 545 to 282.8, Class 2 from 275.5 to 214 and Class 3 from 211 to 205. The new classification also will be more logical, since at present the higher-powered stations are in Class B (henceforth Class 1), whereas one would expect them to be in Class A. It is better, also, to use the figures instead of the letters to designate station classes, as will be done. Thus we will have the bigger, higher-powered stations in Class 1, with the present Class A stations in Class 2, while Class 3 will consist of stations using less than 100 watts, and these will be on the lowest waves.

While these favorable considerations make the changes decidedly valuable, the new range requires that many receiving sets be rearranged so that they will cover the band. If there is to be any sacrifice it should be in favor of the inclusion of the highest waves to the exclusion of the lowest, because the better stations will be on the high waves. Yet there is no good reason for making any sacrifice. Decide that if your set does not now cover the proposed range that you will make it do so. You might as well get started right away, because if your sets responds from 200 to 545 meters it will include the entire present range and the new one, too. Changes will not be necessary in every case, but it is safe to assume that, considering all the home-constructed sets now operating, most sets will have to be converted for general use under the new scheme.

HOW to build a simple current supply unit, by Brainard Foote. You can light your amplifier tubes at a cost of only a few cents a year! Complete construction article and diagrams, with photo of completed unit, in Radio World, issue of Aug. 16. Send 15 cents for a copy or start your subscription with that number. RADIO WORLD, 1493 Broadway, N. Y. C.

WINDING A LOOP ON A PHONOGRAPH RECORD, by Herbert E. Hayden. Sept. 13 issue. Radio World, 15 cents.

FALL BUYERS' NUMBER OF RADIO WORLD dated September 27 sent on receipt of 15c.

"3 O'CLOCK IN THE MORNING"



THE drowsy DX hound can not resist the allurements of programs from foreign lands hence, as Steve says, the setting-up exercises often awaken him to the fact it's time for breakfast.

Steve Says:

The vogue of Neutrodyne gymnastics among the younger set is appalling.

HELLO folks! Did you do your daily doesn't with the 7 a. m. radio today?

U-huh, neither did we.

Goodness, what an hour to pick for arising! Imagine!

Perhaps it is intended to serve as a bedtime story for flappers.

It's tough on Mr. D. X. Hound. When he thinks he's had enough distance the exercise music cheerfully announces he'd better get breakfast and go to work.

My wife's brother left his set operating when he retired so that he wouldn't miss the 7 a. m. exercise. Good idea, only when he woke up they were broadcasting the dinner music from the Ritz-Ginsburg.

Or maybe the purpose of this innovation is to provide exercise in lieu of sleep for the DX fan.

This 7 a. m. stuff don't go so well in the apartment houses that have 4" walls. The bookkeeper in 8-A, who does the calisthenics, rudely jars 8-B out of his sleep and 8-B is a dancer who doesn't have to get up till noon. Mr. 8-A is moving this week.

No fooling, though, this 7 a. m. inhale and exhale proposition is certainly gaining an appalling following.

Take, for instance, my wife's brother. Before broadcasting he usta match nickels for exercise, but now he knows all the drills by heart.

This guy takes it so seriously that he has the parlor rigged up with chest weights, tumbling apparatus, traveling rings and three punching bags. His wife says she's going to sell tickets so the public may see him perform. He even dons full trunks and jersey, and sparring headgear at 6:55 to be ready for his gymnastics.

Our wife's brother's wife says that if he attempts to lay a cinder track in the private hall she will sue for a separation.

I am going to become a devotee also—as soon as they run a second gym class at 11 a. m.
 STEVE POWERS.



Patented in U.S.A. and foreign countries

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A handsomely carved cabinet—a most efficient 5-tube circuit with Unit Tuner—built-in Magnavox Reproducer. The receiver you have been waiting for; study the details.

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Receiving Sets which establish an authoritative standard of excellence for the daily enjoyment of radio.

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Receiving Sets

TRF-50 (as illustrated above)—is a 5-tube tuned radio frequency receiver with carved doors and built-in Magnavox Reproducer \$150.00



TRF-5 is identical with TRF-50 but encased in smaller cabinet without built-in Reproducer \$125.00



Type A and Type D—Six-volt storage battery amplifier and detector tubes with standard base \$5.00

11R

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How to Build ZILTRANDYDE

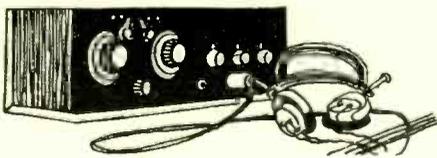
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A Course in Set Building



The RADIO PRIMER

Information and Instruction
for the Beginner

PART I

Construction of Aerial and Ground

YOUR set will respond to no more than the aerial and ground will absorb. That's a little thought, but the aerial and ground system is the balance between 100% efficiency and poor results.

The ideal aerial for receiving is one wire, 50 feet high, clear of all metallic objects, 100 feet long, with a lead-in of not more than 10 feet.

The ideal ground would be a 10-foot square copper plate, sunk five to eight feet in continually moist ground, the ground lead-in not more than 10 feet.

Of course, conditions will not always allow perfect aerial and ground installation, but we can all try to make ours as nearly perfect as location permits.

There are two different situations for aerials, the city aerial and the country aerial. Obviously, the actual aerials are just the same in that they are No. 12 or No. 14 copper wire. Both are well insulated at the ends. Both lead-ins are soldered. However, since the locations differ so radically and the obstacles that confront the prospective listener are so different, we must necessarily consider each separately.

The usual city aerial is situated on the roof of an apartment house. Sometimes there are no other aerials in the house, but the chances are that there are.

Whenever possible, the wire should be strung at approximately right angles to the greatest number of aerials on the roof. If they are already running east and west, north and south, your aerial may be placed at an angle of 45 degrees, the minimum of interference thus resulting. We speak of interference in this case as minute transmissions from other

receivers. This may be eliminated only by proper erection and location of the aerial.

Of course the aerial will be restricted in length to the length of the building. Usually the aerial proper will not be more than 75 feet in length. However, the lead-in is usually longer than it would be if the aerial were strung in the open, between two trees.

The lead-in should be of No. 12 or No.

\$3.75
\$3.75

SPECIAL

On August 13, 1924, the United States Patent Office issued patents for the protection and manufacture of the world's greatest storage "B" battery. The new battery gives an extra long service and lasts much over five years—gives good, clear and loud reception and gets distance very well.

A New Kind of Plate
The battery is absolutely noiseless and gives over 3,000 milli ampere hours of service per charge. The new plate is graphite treated, size 2 1/2 x 1 1/2 inches, and can be recharged in a few hours from any charger lamp socket or farm outfit. Five batteries cost only five cents per charge.

Container is Genuine Hard Rubber
The new battery is built in a one piece, unbreakable, neat, hard rubber container as illustrated, with vent caps large enough for hydrometer readings. Each battery is called a unit of 2 1/2 volts. Add units for higher voltage.

Most for Your Money
This is the largest size battery for your money. Built under patents, thus you get the very best. The battery can be bought assembled or knockdown. Units come with full directions printed very clear. Units can be assembled by any one in a few minutes' time. Don't waste more money on dry batteries—send today for the new patented battery. A set of them will last indefinitely.

Price Assembled .. \$4.50
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If it's a good hydrometer, it's a
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A glance instantly gives condition of your battery.

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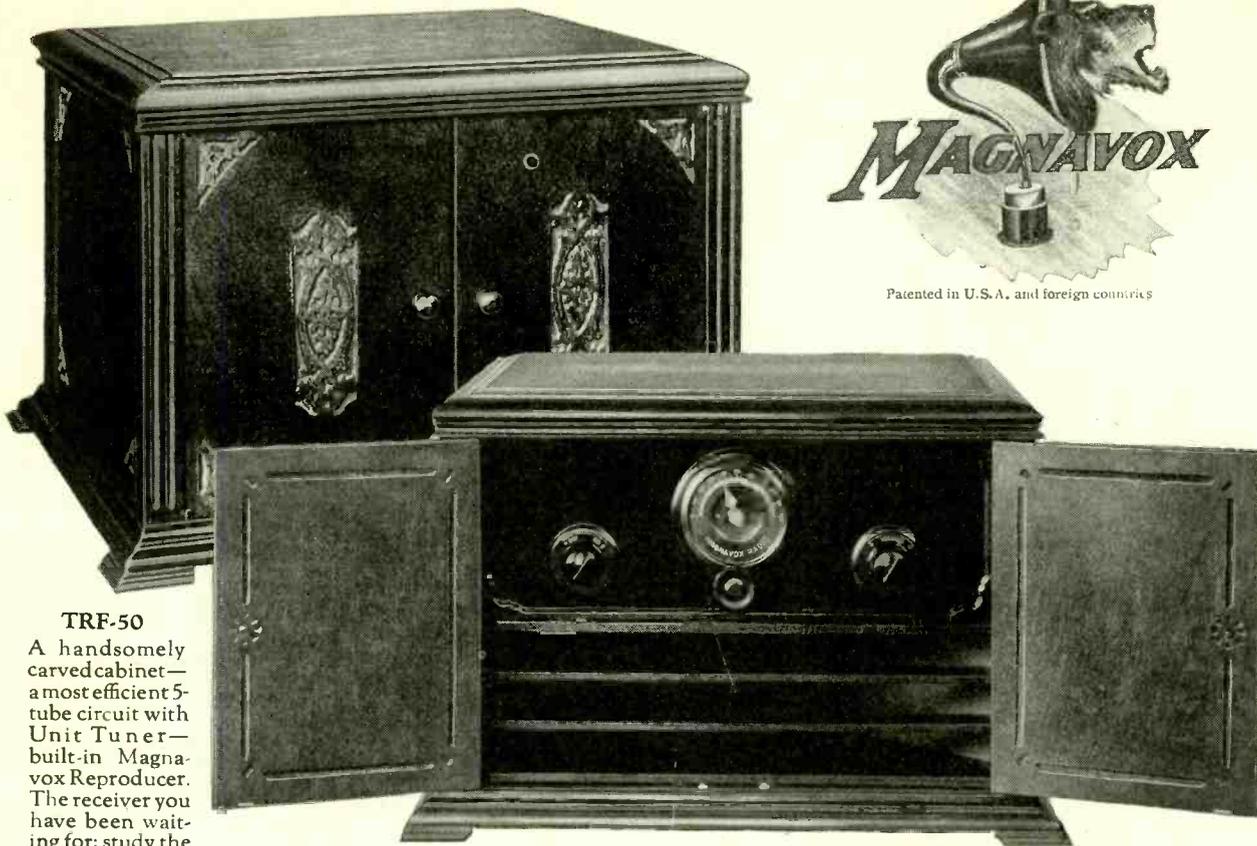
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A handsomely carved cabinet—a most efficient 5-tube circuit with Unit Tuner—built-in Magnavox Reproducer. The receiver you have been waiting for; study the details.

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Receiving Sets which establish an authoritative standard of excellence for the daily enjoyment of radio.

LONG identified with the most efficient radio reproducing and amplifying equipment, Magnavox has developed its new Receiving Sets under conditions insuring superior design, precision of manufacture, and a gratifyingly low cost.

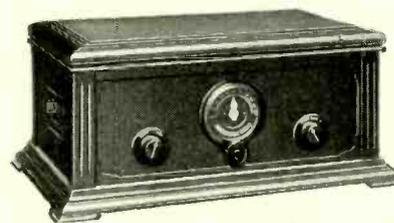
Exacting tests prove that the Magnavox Receiver is not only the simplest to operate but one whose daily performance will satisfy the most discriminating.

Magnavox Radio Receivers, Vacuum Tubes, Reproducers, Power Amplifiers, and Combination Sets are sold by reliable dealers everywhere.

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Receiving Sets

TRF-50 (as illustrated above)—is a 5-tube tuned radio frequency receiver with carved doors and built-in Magnavox Reproducer \$150.00



TRF-5 is identical with TRF-50 but encased in smaller cabinet without built-in Reproducer \$125.00

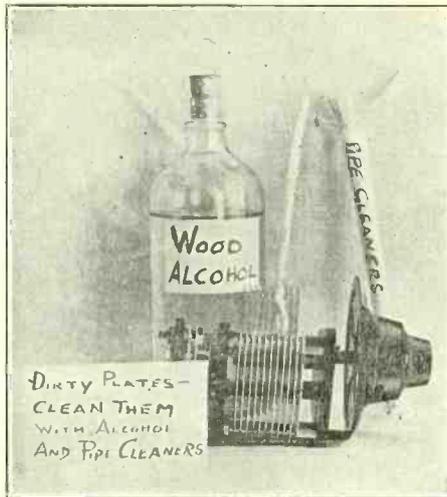


Type A and Type D—Six-volt storage battery amplifier and detector tubes with standard base \$5.00

How to Clean Condensers

IF your condenser has amassed a coating of dust and dirt it is an inefficient instrument. Clean it, using wood alcohol and a bent pipe cleaner. Bend the cleaner V-shaped and insert the point of the V, rubbing the rotor and stator plates. The accumulation of dust causes a path of leakage and some of the feeble radio-frequency currents escape, hence vol-

ume, selectivity and DX results are less. Condensers should be cleaned once a month.



THE BOTTLE, the pipe cleaner and the condenser

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Our Own Coils—guaranteed..... \$6.00
 Kit (Fluewelling Condensers, Coils and Diagram) 19.00
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Keep a permanently bound record of all stations you have received and how you received them. Radio Record 5 1/2" x 14"—600 lines. All broadcasting stations listed, and indexed with space for new stations—\$1.00 Postpaid.

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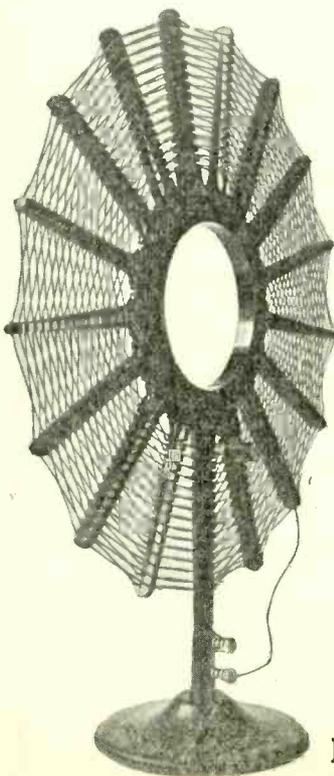
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Coolidge Opposes Air Monopoly

WASHINGTON

*I*N a recent speech President Coolidge said:

In its broad aspects, radio is a new agency brought by science to our people which may, if properly safeguarded, become one of the greatest of our blessings. It should render possible a more complete understanding of our national problems. It should bring to the fireside large contributions toward entertainment and education. With all its great possibilities, it is accompanied by a most intricate technology and a most intricate relationship to the Government.

Wants Popular Control

The Administration, through Secretary Hoover, has from the beginning insisted that no monopoly should be allowed to arise and that to prevent it the control of the channels through the ether should remain as much in the hands of the Government, and therefore of the people, as the control of navigation upon our waters; that while we retain the fundamental rights in the hands of the people to the control of these channels we should maintain the widest degree of freedom in their use.

What is required to meet this situation is an orderly process by which the opportunity for the use of radio communication can be kept open to the highest possible degree. The goal we desire to reach is an opportunity for every one to have access to radio communication without limitation.

Rules Must Be Observed

But in order to secure this result it is necessary that there be rules and regulations. Otherwise, there would be such confusion that there never would be any certainty of service. The Government is undertaking to co-operate in producing this result.

But liberty is not license and in this new instrument of science there is an opportunity for greater license even than in the use of print, for while parents may exclude corrupting literature from the home, radio reaches directly to our children.

Furthermore, there is also a great responsibility on the part of those who transmit material over the radio that there should be no malice or slander through these channels. Entirely aside from the legal liability that may be involved, there is double injury because those who are wronged can have no opportunity of reply.

Opposes Government Operation

In many other countries the Governments, in order to assure these guarantees, have taken over the actual conduct of the programs by radio. We have not believed this was consistent with American institutions, but we believe that freedom in development in these matters would secure wider use of the art and more perfection in its conduct; and above this,

we have been prepared to trust our people to preserve the high standards and ideals which must accompany this great agency of communication.

The rapid development of the art, now involving some 20,000 agencies that are sending communications into the ether, raises the most intricate technical problems with which the Government has had to deal—for, indeed, here is an industry which by unanimity of opinion, must have its traffic rules provided and enforced by some central authority, otherwise there would be confusion and chaos and the total loss of this great medium of communication.

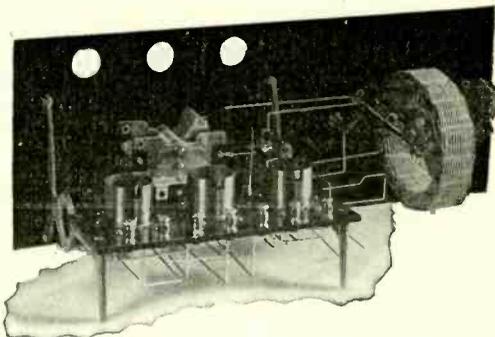
During this period of intensive develop-

ment of the radio art the Administration has had fine co-operation of the industry itself in the creation and maintenance of these rules. That the vast amount of communication which is now in progress over the radio should be handled by a governmental bureau of less than 120 men is evidence not only of the realization of the necessity of traffic control, but of the willingness of the industry to co-operate in its maintenance.

PATENT
 your ideas. Send us a sketch or complete model of your invention. FREE advice. Write for FREE BOOKLET. **MANUFACTURERS PATENT CO., INC.** 70 WALL STREET, NEW YORK

THE NEW "SHACTON" 3-TUBE RECEIVER

A DX Wonder



The lowest note — **\$27.45**
 the sweetest tone AS SHOWN

Beauty, Construction, Performance—A remarkable combination. The "SHACTON" is the long waited for, much demanded achievement in 3-Circuit receivers. It is equipped with the FAMOUS BRUNSWICK LOW LOSS COIL, enabling fine, sharp tuning, with the desired volume, free from distortion or interruption of any kind.

SEND NO MONEY

Kit enables you to build set equal to any factory product. The mounting brackets, a recent improvement, bear our own name. The low-loss condenser and coil work in perfect conjunction. All outside metal parts gold plated. Panel and dial engraved in gold.

STANDARD PARTS

- 1 7x18 Drilled Radion Mahogany Panel, Engraved in gold.
 - 1 Brunswick Low Loss 3-Circuit Tuning Coil.
 - 1 Genuine Brunswick Low Loss Condenser.
 - 1 Brunswick Tripliod Mounting Socket and binding post strip.
 - 2 Brunswick Cast Foundation Brackets.
 - 2 Brunswick Jacks with Gold-Plated Fronts; 1 for phones; 1 for loud speaker.
 - 1 Freshman Mica Grid Condenser.
 - 1 Standard Glass-Enclosed Grid Leak.
 - 2 30-Ohm Shacton Bakelite Rheostats with gold plated indicators.
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 - 1 Special Blue Print for this circuit. Not an ordinary hook-up, but a clear picture form that a child can understand and make.
- ALL ASSEMBLED, READY TO WIRE.

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Everything needed to operate after building is listed here—

- 3 Type 201-A Tested Tubes.....\$10.35
 - 1 60-Ampere Hour Storage Battery..... 11.25
 - 2 45-Volt Extra Large Enco "B" Batteries..... 6.50
 - 1 Pr. 3000-Ohm Head Phones and Cord.. 3.75
 - 1 Antenna Equipment..... 1.50
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- Complete Outfit.....\$34.25

(Parts Also Sold Separately)

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 Please send me the Ambassador outfit I have marked. When it arrives I will pay the postman the amount. If I am not satisfied I will return it in 5 days, and you agree to refund my money instantly. Mark choice in square.

- (A) Complete Building Kit.....\$27.45
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Name.....
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Index to Radio World

Issues from Jan. 5 to Sept. 20, 1924, thoroughly indexed and cross-indexed. Send 15 cents for copy of Oct. 18 issue to Radio World, 1493 Broadway, New York City.

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~ for amplification



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A. B. C. stands for the American Broadcast Club. Join it today. It involves no dues or payment of any kind, and no obligations. It was founded by RADIO WORLD simply to unite the broadcast listeners and radio fans in general in a common

bond to promote their welfare as occasion requires. Send your name and address to A. B. C. Editor, RADIO WORLD, 1493 Broadway, New York City.

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Phenix Radio Corp.
5-9 Beekman Street
New York

50¢

DX or Quality?

This Author Votes for Tone and Says Distance Fever Is Abating

By H. A. Wentworth

THE fad of distance reception is abating, in my opinion, and radio-users are finding more satisfaction in clear reception of good programs from stations nearby than in fair reception of very remote stations whose signals are sought merely because the stations are at a distance. It was natural when radio first came for fans to find the big thrill in getting distance. Loss of sleep and passing up good programs at home stations was nothing compared with bringing in a station 10 miles farther away than your neighbor was able to get. Too much attention has been given to designing sets merely to get distant stations, and tone quality has too often been overlooked.

Many sets give tremendous volume, but with reduced tone quality. I attended a conference of the Bristol, Mercury, Sleeper and Grimes organizations who were recently licensed to manufacture sets under the Inverse Duplex System, and was informed that it has been made the settled policy of these companies to put natural tone at the head of the list of qualities aimed at in their sets.

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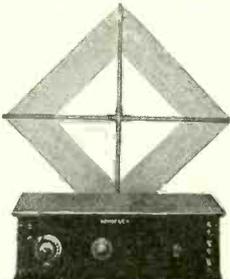
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1000 MILES ON A LOOP!

THE FAMOUS ACME

4-tube REFLEX
Known nationally for its wonderful selectivity, volume—clarity of tone and DX qualities. 4 TUBES REFLEXED GIVE RESULTS OF SIX.
Many of our customers tell us that this set gives them better satisfaction than Super-Heterodynes and other high-powered sets.



We will build this set for you, using a genuine ACME KIT-SET assembled and wired in a beautiful mahogany cabinet ready to operate, with loop.

\$65.00

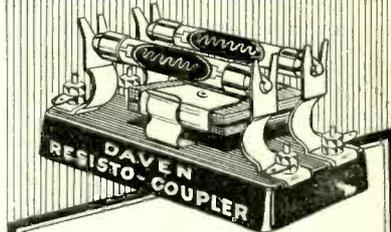
THIS IS WHAT YOU WOULD PAY FOR THE KITSET ALONE
This Set Retail Would Cost \$128
We Absolutely and Unqualifiedly Guarantee Satisfaction
The KITSET is Guaranteed by Us and ACME APPARATUS CO.
5 Days' Trial—Refund if Not Satisfactory

GABE RADIO CO.
1261 Broadway New York City
Mail Orders Given Prompt Attention

Crosley Buys Interest In Canadian De Forest

CINCINNATI.

THE Crosley Radio Corporation of this city has acquired a large interest in The De Forest Radio Corporation, Ltd., of Canada. This transaction means a greater distribution for Crosley products. The De Forest Radio Corporation, Ltd., virtually controls all of the De Forest patents in Canada, including not only radio receiver patents but those relating to transmitters, the new photophone, and many other important inventions of Dr. Lee De Forest. Complete factory, assembly plant, administrative office, and sales division are maintained in Toronto. De Forest-Crosley receiving equipment will be of the same general type as merchandised in the United States, constructed with standard Crosley parts. These radio sets are now being produced in the Canadian factory.



Imitation Is the Sincerest Flattery

—and is inevitable with so fine and worthy a product. But an imitation rarely satisfies.

The discriminating fan will insist upon the original and only RESISTO-COUPLER. Price, \$1.25
Sold everywhere.

Get from your dealer the DAVEN "RESISTOR MANUAL," a practical handbook on Resistance Coupled Amplification. By Zeh Bouck. Price25c

DAVEN RADIO CORP.
"Resistor Specialists"
Newark, N. J.

PRE-AMPLIFIER

Registered



Makes Distant Stations Sound Like Local Ones

THE TWITCHELL PRE-AMPLIFIER is a Powerful Radio Frequency Amplifier attachable to any make of receiving set. It brings in many distant stations which you cannot hear without it. Brings in with tremendous volume those you now hear only faintly. Makes your set selective. Prevents re-radiation.

Price, complete with tube, prepaid
\$25.00

Diagram of circuit, \$1.00
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RADIO WORLD

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Please send me RADIO WORLD for months, for which please find enclosed \$.....

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Six Months	3.00
One Year, 52 Issues.....	6.00

Add \$1.00 a Year to Foreign Postage; 50c for Canadian Postage.

\$25 FOR THE BEST JOKE

WHAT is the best radio joke you ever heard? For the one best joke submitted RADIO WORLD will pay \$25.

The test closes November 15. Your submission must be received at our office by that time. The judges will be S. A. Rothafel, (Roxy), WEA, New York City; Ben Garetson, station director, WGN, Chicago; N. T. Granlund, station director, WHN, New York City; Arthur T. Nelson, Commissioner, State Marketing Bureau, WOS, Jefferson City, Mo., and

George D. Hay, assistant station director, WLS, Chicago.

Send in your jokes NOW! Send in as many as you want. Be sure to write only on one side of the paper and to give your name and address. Send jokes to Best Joke Editor, RADIO WORLD, 1493 Broadway, New York City.

The judges will decide the winner. As it is possible several readers will submit the same joke, the one having his joke published first will be entitled to it as his or her entry. The following jokes have passed the preliminary test and go to the judges:

THE other night I tuned in Italy and got spaghetti all over my tubing.

SOL STRAUS,
1417 Republic St.,
Cincinnati, O.

"I 'VE tuned in every station in the United States."

"How's that?"

"I have a portable set and I'm a traveling salesman."

WILLIAM BRADSHAW,
334 Eighth St.,
Brooklyn, N. Y.

"I GOT 'Frisco on a speaker all over my house last night."

"That's nothing. I got Greece in a restaurant, all over my vest."

WILLIAM BUSCH,
118 South 4th St.,
Mankate, Minn.

Accuratune Dial

AN UNIQUE and good-looking micrometer-adjustable dial is being marketed by the Mydar Radio Company, 9 Campbell St., Newark, N. J., known as the Accuratune. The dials are calibrated either clockwise or anti-clockwise, as desired. The instrument arrived well packed with a replacement guarantee. The vernier effect is very fine and meets the need of any radio set. The device consists of a geared dial, hence need only be mounted on your condenser shaft.

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We guarantee **RADIO**
our new 68-page
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For Maximum Amplification Without Distortion and Tube Noises use the well known
Como Duplex Transformers
Push-Pull
Send for literature.
COMO APPARATUS COMPANY
448 Tremont St. Boston, Mass.

NEW STAR SOCKET 75¢
STAR COIL 3 CIRCUIT 600
STAR RADIO PRODUCTS CO.
711 S. DEARBORN ST. CHICAGO, ILL.

The "Goode" Two - o - One



Le Ton d'argent

Guaranteed



BY MAIL ONLY

\$2.39

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QUARTER AMPERE AMPLIFIER-DETECTOR RADIO TUBE

GUARANTEED SATISFACTORY

All "GOODE" Tubes Sold Direct to the Consumer—No Dealer Profits.

ONE—"Goode" Detector-Amplifier \$2.39

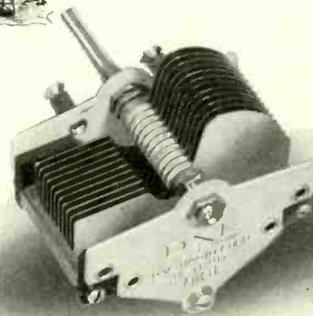
THREE—"Goode" Detector-Amplifiers \$6.42

(All Postage Prepaid)

The "Goode" Two-o-One A Tube amplifies or detects. It is a quarter ampere, five volts, standard base silvered tube.

Send express or postal money order or New York draft to—

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Incorporated
OWENSBORO KENTUCKY



PRICES	
11 PLATE	\$5.00
17 PLATE	5.25
23 PLATE	5.50
43 PLATE	6.00

"The Choice of the Critical"

Opinions do not answer, facts do. That is why you cannot afford to borrow the jaundiced ideas of your neighbor when choosing your condenser.

Buy a D. X. L. and save being disappointed. This condenser is a straight-line-low-loss type designed especially for super Heterodyne and all super sensitive sets. With grounded rotor plates of brass construction and aluminum end plates. Body capacity entirely eliminated. Approved by the University of Michigan and found absolutely accurate with the U. S. Bureau of Standards.

Write for folder giving complete description.

If your dealer cannot supply you we will furnish direct. Send money order.

Manufactured by

D. X. L. Radio Corporation
5769 Stanton Ave. Detroit, Michigan



A Coil That Aids Sharp Tuning

(Concluded from page 13)
metal near a coil I examined an old-style loose-coupler, with its multi-tapped coils, long brass rods extending through the coils and the nicely-shellaced windings. I

was astounded to find that the resistance was as high as 23 ohms! The resistance of the present-day well-engineered tuner is approximately 4 ohms. Audio-frequency transformers must be

kept as far away as possible from the tuning coils. If this is not done poor tone and loss of signal strength will result.

To make the coil I find best, use No. 20 enameled DSC wire, to be wound on a glass preserving jar 3" in diameter. Lay the five 1/4" wide strips of adhesive tape the length of the bottle, equi-distant, with the gummed side up. Measure 13 feet of wire and cut it at this point. Lay this aside. Take the 1/4 lb. spool and start winding the secondary. Leave 6" for later connections. Lay on 27 turns. Now pick up the 13-foot wire, leave 6" free and wind this wire (the primary) alongside of the continued secondary. Do this with one motion, by holding both wires between the fingers. When within 6" of the end of the primary continue on with the secondary alone. Turn back the excess tape so it sticks to the outside of the coil for 2". Cut away the rest of the tape. Slide the coil off the bottle.

I am using this type of coil in my Neutrodyne with great success. The tuning is sharp, there are no bolts or screws to cause a loss due to metal objects, and neutralization is perfect. If readers will try this form of inductance, in connection with the alternate winding method, where an RF transformer is called for, they will be pleasantly surprised with the results.

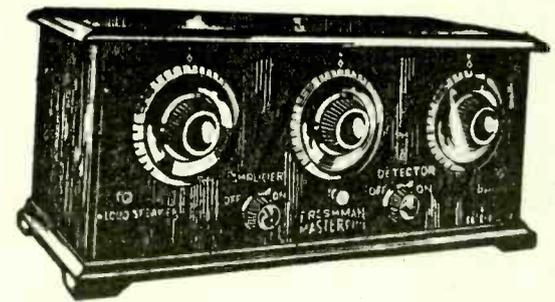
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Packed under your own label if desired.
Dealers and Jobbers—Write us for lowest prices on Quality Crystals.
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Representatives, Jobbers, dealers in every City, County, State and Country (correspondence confidential), to handle our new line of radio receiving sets—The Ultra Synchronyne VII and The Staraco VIII. Something worth your while. Stanley's Perpetual Radio Bulb Fuse.
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RADIO EXPERTS MAKE \$3,000 to \$10,000

NEUTRODYNE KIT \$19.75
Complete kit of licensed Neutrodyne parts including panel, tube sockets, rheostats, jack, screw condensers and grid leak. Neutroformers complete with variable condensers and neutrodans. Every part insulated even to screws and wire. Easy read plans.
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RADIO SURPLUS STORES
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FRESHMAN MASTERPIECE
YOU CAN USE DRY BATTERY TUBES
equally as well as storage battery tubes because the **FRESHMAN MASTERPIECE** is balanced within itself and **Does Not Require Neutralizing or Balancing Condensers**
We have made the great discovery that U. V. 100 and other dry battery tubes give practically the same marvelous results as are obtained with storage battery tubes.



No Distortion—No Squealing
Real enjoyable radio with plenty of volume and great distance.

The Greatest Value Ever Offered

60

A 5-tube tuned radio frequency set, costing only sixty dollars, that is the equal, if not the superior, to any 5-tube set in existence, regardless of price. Not only the simplest set in the world to operate, but so selective that stations once logged can be brought in night after night at the same dial settings.

All genuine Freshman Masterpiece Sets have a serial number and trademark riveted on the sub-panel. The Receiver is not guaranteed if number has been removed or tampered with.

CHAS. FRESHMAN CO., INC., 106 Seventh Ave., New York

NEW BROADCASTERS
SEVEN more broadcasting stations were licensed by the Department of Commerce; six of them A stations and one, in Los Angeles, Class B.

CLASS A

Call	Station	Keys.	M. W.
WBBS	First Baptist Church, New Orleans, La.	1190	252 50
WEBX	John E. Cain, Jr., Nashville, Tenn.	1140	263 50
WEBY	Hobart Radio Co., Roslindale, Mass.	1330	226 10
WHA	University of Wisconsin, Madison, Wisconsin	1090	275 500
WJJD	Supreme Lodge, Loyal Order of Moose, Mooseheart, Ill.	1080	278 500
WWAE	The Alamo Ball Room, Joliet, Ill.	1240	242 500

CLASS B

KNX	Los Angeles Evening Express, Los Angeles, Calif.	890	337 500
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Dartmouth College, in Hanover, N. H., has applied for a broadcasting license, for educational and entertainment programs.

BROADCASTERS DECREASE
STATISTICS compiled by the Department of Commerce indicated the existence of 577 broadcasting stations on May 1, compared to 591 on May 1, 1923. These were divided as follows: Class A, 371; Class B, 52; Class C, 152, and Class D, 2.

TUBES REPAIRING REBUILDING

SAVE ON TUBES!
Buy Direct From Manufacturers!

All Tubes Repaired (Detectors or Amplifiers) Guaranteed Like New **\$2.25**

1 Amp. 6 Volt Tubes Changed to 1/2 Amp. Tubes. Send for Circular on New and Rebuilt Tubes.

AMERICAN RADIO TUBE WORKS
23 Central Avenue Newark, N. J.
Big Money for Agents Everywhere

CATALOG OF RADIO & ELECTRICAL BOOKS sent free on receipt of post card. The Columbia Print, 1433 Broadway, N. Y.

WNYC to Tell Food Bargains

A SUGGESTION adopted by the Board of Estimate, it is asserted, will benefit bargain-hunting women who own radios. The suggestion is to have Commissioner

of Markets Edwin J. O'Malley utilize the city radio Station WNYC to broadcast occasions when one particular food commodity threatens to glut the New York market.

Murray Hulbert, President of the Board of Aldermen, who made the suggestion, pointed out that often occasion arises when one particular food arrives in such quantity as to glut the market and, being unable to reship carloads to points of origin, the material goes to waste. Hereafter, if the Commissioner of Markets is agreeable, a condition such as described will be broadcast over WNYC and women "listening in" will be invited to ask the "corner vegetable man" for potatoes, cabbage or apples, or whatever happens at the moment to threaten the market to such an extent as to be allowed to spoil because of oversupply.

A CALL for aid coming thinly through the ether to L. B. Joyce of Bronxville, N. Y., amateur radio fan, and relayed by him to the Mitchel Field air station saved one of nine giant Martin bombers which winged their way from Langley Field, Va., to the Long Island army post from possible disaster and, probably, grave injury to its crew of four.

GEORGE L. RECORD, New Jersey independent progressive candidate for the United States Senate, charged in Newark that through its ownership of patents "the telephone trust now controls the radio and Wall Street censors broadcasting." Mr. Record said that when he applied to WEA, the American Telephone and Telegraph Company's New York

broadcasting station, he was told that two speeches broadcast by Senator La Follette were enough for the Third Party and that he was advised to apply to some other broadcasting station.

Loud Speaker FREE

with Every Complete Original
NATH. BALDWIN HEADSET
Purchased at \$7.50
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436 Highland Ave. Newark, N. J.

Soldered Connections Insure Clearer Reception

Our Electric Soldering Outfit, consisting of an Electric Iron, Cord, Plug, Solder and Flux, will assure positive connections. All for \$1.98
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MONEY BACK IF NOT SATISFIED.
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Prepare For Election Returns

- \$17.50 Freshman Kit.....\$17.50
- \$80.00 Freshman "Masterpiece" Receiver, 5 tube.....\$85.00
- \$12.50 Come Push and Pull Transformers, 2000.....\$ 9.90
- Amplex Grid-Densets Rectifier.....\$ 1.25
- Benjamin Clearatone Sockets.....\$.85
- 23 Plate Vernier Amoco Condensers.....\$ 3.85
- 23 Plate Vernier U. S. L. Condensers.....\$ 3.50
- \$ 5.50 Accuratune Dials.....\$ 2.95
- \$18.50 Homecharger Gold Seal, A. C. Current.....\$14.95
- \$18.00 Westinghouse Rectifier, Charger, A. C.....\$14.63
- 48 V. B Batteries, large, \$2.90; medium...\$ 2.25
- \$ 7.00 Westinghouse Storage B Batteries...\$ 6.39
- \$ 5.00 Aemo Audle and Radle Freq. Transformers, each.....\$ 3.90
- \$ 4.50 Globe Audio Freq. Transformers...\$ 3.40
- Pioneer Moulded Bakelite Variometers...\$ 4.85

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Two volumes by the noted radio authority, M. B. Sleeper. 50 cents each, or both mailed postpaid on receipt of one dollar. A very valuable addition to your technical library. The Columbia Print, Room 323, 1463 Broadway, New York City.

BRAINARD FOOTE—noted radio authority, describes his favorite receiver in Radio World, issue of October 16. One stage of impedance RF, one transformer RF stage, crystal detector and two audio stages. Four tubes. Great quality set. Send 15 cents for copy of issue or start your subscription with that number. Radio World, 1463 Broadway, N. Y. C.

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EVERY MAKE OF LOUD SPEAKER IN STOCK. AT LOWEST PRICES.
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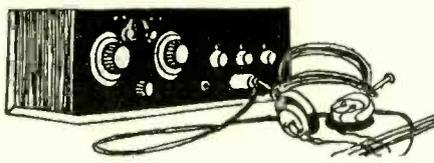
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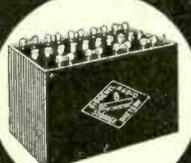
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BIG CATALOG ON REQUEST

PART I Construction of Aerial and Ground

YOUR set will respond to no more than the aerial and ground will absorb. That's a little thought, but the aerial and ground system is the balance between 100% efficiency and poor results.

The ideal aerial for receiving is one wire, 50 feet high, clear of all metallic objects, 100 feet long, with a lead-in of not more than 10 feet.

The ideal ground would be a 10-foot square copper plate, sunk five to eight feet in continually moist ground, the ground lead-in not more than 10 feet.

Of course, conditions will not always allow perfect aerial and ground installation, but we can all try to make ours as nearly perfect as location permits.

There are two different situations for aerials, the city aerial and the country aerial. Obviously, the actual aerials are just the same in that they are No. 12 or No. 14 copper wire. Both are well insulated at the ends. Both lead-ins are soldered. However, since the locations differ so radically and the obstacles that confront the prospective listener are so different, we must necessarily consider each separately.

The usual city aerial is situated on the roof of an apartment house. Sometimes there are no other aerials in the house, but the chances are that there are.

Whenever possible, the wire should be strung at approximately right angles to the greatest number of aerials on the roof. If they are already running east and west, north and south, your aerial may be placed at an angle of 45 degrees, the minimum of interference thus resulting. We speak of interference in this case as minute transmissions from other

receivers. This may be eliminated only by proper erection and location of the aerial.

Of course the aerial will be restricted in length to the length of the building. Usually the aerial proper will not be more than 75 feet in length. However, the lead-in is usually longer than it would be if the aerial were strung in the open, between two trees.

The lead-in should be of No. 12 or No.

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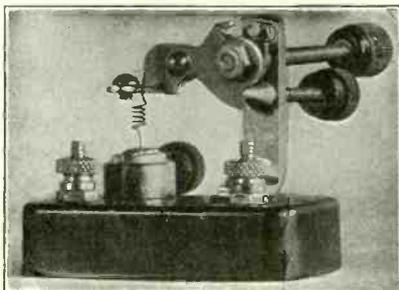
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Construction for Beginners

The Aerial and Ground System

14 rubber insulated wire, and insulated with porcelain cleats, so that it does not touch any part of the building. This is necessary not only because of a possible loss of energy, but to comply with the

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inconvenient, the next best step is to tin-foil the joint, after which tape should be used so that all air is kept out.

There are many different kinds of wire that may be used for the aerial. Examples are braided, twisted and solid copper. As far as results for receiving are con-

(Concluded on next page)

Dictionary

GROUND CLAMP—The common type of ground clamp usually consists of a strip of copper or zinc about one inch wide by seven inches long, perforated with holes to accommodate a small bolt. The holes are made at different points along the strip so as to enable it to be fastened to any standard size pipe. The bolt is passed through one end of the strip and through the most convenient hole along the strip after it has been tightly wound around the pipe. Some types of ground clamps are made of a coil of spring wire, supplied with a binding post and means of fastening both ends together, keeping a spring tension on the pipe.

fire underwriters' specifications. A hole may be drilled in the sash of the window and a porcelain tube insulator inserted, the lead-in coming through the insulator.

In the case of the country aerial, we have a different situation, not quite so complicated. It is usually strung between two trees, between a tree and the house or over the rooftop. There is seldom trouble from radiation interference, because of the distance between aereals. However, there is one precaution to take in the erection of an aerial from a tree, and that is to keep the branches or leaves from touching the aerial. This may be accomplished by placing the insulator out of reach of the leaves. The tree will absorb a great deal of the energy unless this is done. Select as clear a space as possible, so that there will be a minimum of trees around the aerial. The lead-in is brought into the house the same as for the city aerial.

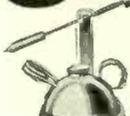
Every aerial lead-in must be soldered at the joint on the aerial. If this is not done weather will severely corrode it, causing a partial insulation and a subsequent loss of energy. If soldering is very

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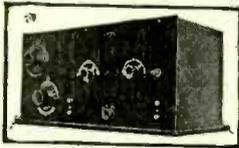
NEWARK, N. J.

Solving Antenna Problems

(Concluded from preceding page)
 cerned, they are about equal. But the braided and twisted are by far stronger than the solid copper. Experience proves that it pays to put up a permanent aerial the first time. It is advisable to use twisted copper. Braided is more expensive, but perhaps better, because of the greater conductivity.
 Fire laws require a protection against

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The Aerial Problem

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lightning. There are on the market a number of very good approved lightning arresters that are automatic in their action. A 100-ampere, 600-volt single-pole, double-throw switch may be used, but it is more expensive than the automatic device and requires personal attention.

The ground may be connected to a water pipe. It is advisable to use a cold water pipe wherever possible. Heated pipes have a higher resistance, thus lowering efficiency. Always scrape the pipe well. A firm mechanical as well as a good electrical connection is very necessary.

Before considering your set for improvement, consider the aerial and ground.

—A. J. G.

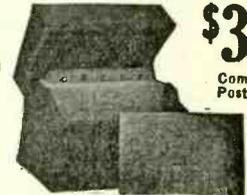
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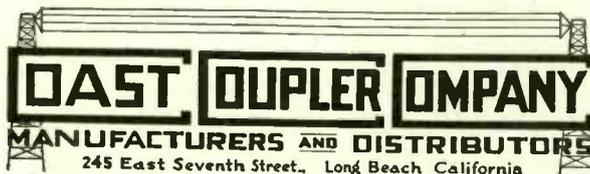
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Radio Aids in Thrift Week

THE Savings and Loan Association Thrift Week Committee is preparing for a vigorous program for the observance of Thrift Week, beginning Jan. 17. Edwin F. Howell of 195 Broadway, New York City, Secretary-Treasurer of the Serial Building Loan and Savings Institution, and Vice-President of the New York State League, said: "Extensive work will be done in New York City, where radio lectures will be held.

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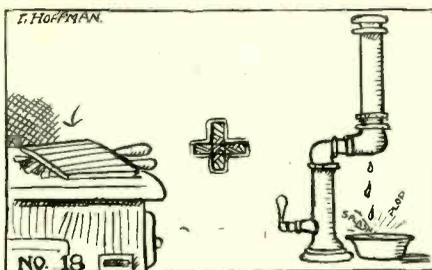
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Radiograms

NEW YORK CITY plans adding 1,000 more policemen to its force. Commissioner Enright wants them. Mayor Hylan approves. Acting Capt. J. H. Ayers presented the request to the Board of Estimate, with a list of possible new

sources of revenue to defray the \$2,433,500 extra cost. One item is a tax on aerials. Now there is no tax. No amount was specified.

JUNE MULLIN, singer, closing a recital at WNYC, New York City's municipal station, 526 meters, said: "Now, good night, and don't forget to vote for Davis." She was instantly reprimanded and the call-down broadcast. She apologized days later, promised she'd never do it again, and was forgiven.

SECRETARY OF WAR WEEKS was the principal speaker at a radio campaign stunt of the Republican National Committee. WAGH, Richmond Hill, N. Y., and WBKF, Providence, R. I., did the broadcasting. The next night Weeks spoke from WJZ, New York City.

THE 13,000 miles of space between London and New Zealand was bridged for the first time when two British amateurs exchanged radio messages with low-powered home-made apparatus, says a dispatch from London.

THOMAS A. EDISON made his annual pilgrimage to the electrical show at the Grand Central Palace, New York City, and visited all of the booths where devices made possible through his original discoveries and inventions with electricity are on display. Electric light and power transmission by wireless, he said, was surely coming in the future, but "there is no cause to believe that it is immediately at hand."

UNABLE to get a speech of his broadcast by WHO while he was in Des Moines Senator La Follette charged the existence of a broadcasting monopoly. Secretary Hoover denied the charge.

THOUSANDS of people stood in Trafalgar Square, in front of "loud speakers" at the new offices of the Dominion of Canada, and listened to former Premier Stanley Baldwin make a twenty-minute speech over the radio, says a London dispatch. Millions heard the speech by radio.

AN extended series of observations over a period of six years into the habits of static is yielding remarkable results in weather prediction by radio. The research in this particular case has been conducted at the British laboratories at Aldershot, where highly sensitive receiving apparatus has been employed with recording devices. Similar equipment has

now been installed in an American station to supplement these observations.

OFFICIALS of South Dakota State College, Brookings, S. D., announce a weekly radio program of music, educational talks and news will be broadcast from the College Station KFDY every Thursday evening at 8 p. m., beginning Thursday.

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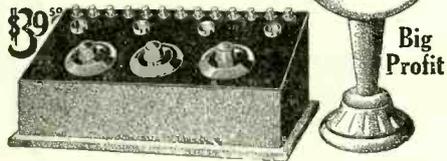
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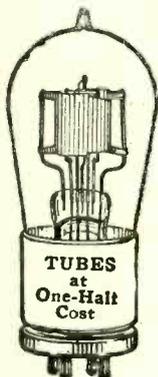
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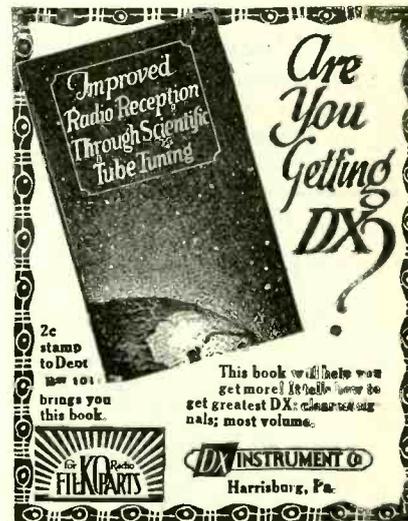
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ALTHOUGH the price of RADIO BROADCAST has just gone up to 35c a copy, you can still order the magazine for one, two, or five years at the old prices.

RADIO BROADCAST has been doing valuable pioneer work for its readers and for radio in general. Long before broadcasting had been thought of, and before anyone dreamed of a radio magazine, RADIO BROADCAST'S editors were earning their livelihood through their knowledge of radio. Thus the staff are not only trained writers, but also profes-

sional radio men. Arthur H. Lynch, editor-in-chief, has for many years been one of the really big men in radio. Under his able leadership RADIO BROADCAST has become generally recognized as the standard monthly radio magazine. It is on his initiative that RADIO BROADCAST instituted and conducted the first successful trans-Atlantic broadcasting tests last fall. Some of the best reception from England came in on an eight-tube set installed in Mr. Lynch's Long Island home. This set had been especially built in our Designing Laboratory. The American end of this year's International Radio Week, November 24th to 30th, will be conducted under RADIO BROADCAST'S auspices.

How the Testing and Designing Laboratory Helps Our Readers

Soon after RADIO BROADCAST was established, we made up our minds that we must identify the magazine above everything with a policy of absolute reliability. How best to do this? Check every bit of information ourselves, we decided. So to do this we organized a special Laboratory Staff and built and equipped our new Laboratory. We have our own ideas about receivers for the use of the public, and these ideas we are constantly publishing. Several receivers developed in our Laboratory, notably the Knock-Out series, have attained nation-wide popularity. Not only amateurs, but even manufacturers now come to our Laboratory for

advice on construction problems. The Laboratory also enables us to test material advertised in our pages so as to determine its true worth. In answering the questions of readers, the Laboratory affords practical facilities for verifying all our replies before we print them. The Laboratory functions on a definite progressive plan designed to aid radio listeners and operators. By reading Laboratory reports month by month, the reader receives what is in effect a course in radio.

Some Distinctive Features

The March of Radio, conducted by J. H. Morecroft, Professor of Electricity at Columbia University, President of the Institute of Radio Engineers, and author of perhaps the best radio text book that has ever been published, is a regular feature where, in a dozen pages, you may review the passing panorama of radio. Every issue contains a number of practical constructive articles by foremost men in the radio field. Thousands of receivers have been built all over the country, based on the instructions given in these articles. "The Listeners' Point of View," by Jennie Irene Mix, one of the nation's leading musical critics, is a unique department in which you will find entertaining criticisms of radio programs and broadcasting stations all over the country. There are large, clear photos of new material, together with detailed descriptions; stories of big men in radio; authentic accounts of radio adventures, and many other distinctive articles.

How can we afford these low prices so far as you are concerned? We shall tell you: a subscription in advance saves us the cost of newsstand distribution, the expense of the return of unsold newsstand copies, and the selling cost of a new subscription. You can have RADIO BROADCAST for a dollar less a year, or if you order for two years, it will cost you only a dollar more than the new price for a single year. At the five-year rate, RADIO BROADCAST will cost you just one-half what it will cost other purchasers after the price goes up. Why not send in the convenient order form while it is before you.

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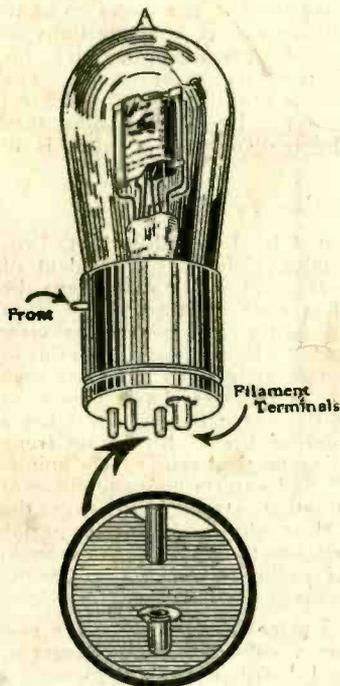
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