

March 14
1925
15c

Hookups

FULL
Programs

RADIO WORLD

Title Reg. U.S. Pat. Off.

Vol. 6
No. 25
155-155

Illustrated
Every Week



WHERE IGNORANCE IS BLISS 'TIS FOLLY TO PLUG IN

The Aladdin Combination!

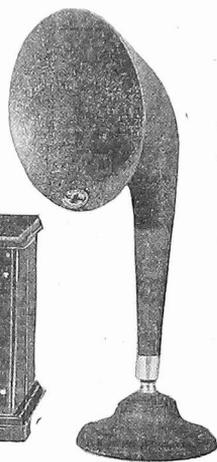
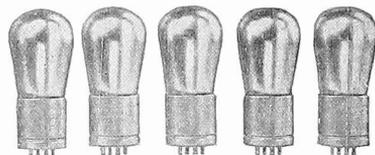
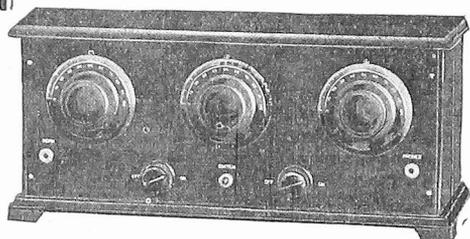
"BACKED BY A \$200,000 CORPORATION"

"Absolutely the Greatest Radio Value on the Market Today"

A 5-Tube Balanced Radio Frequency Receiver
COMPLETE WITH ALL ACCESSORIES

\$60.00

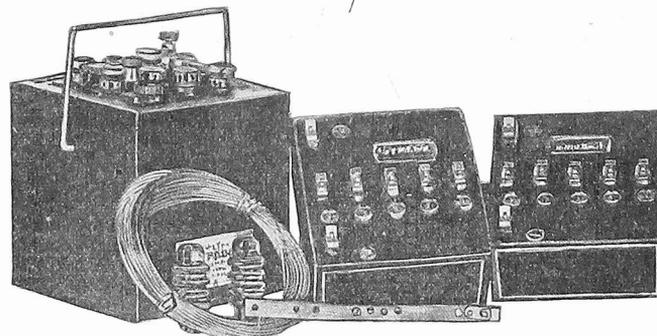
COMPLETE
 NOTHING ELSE TO
 BUY



INCLUDES
 The Aladdin Receiver
 Five Aladdin Vacuum
 Tubes—6 Volts—Type
 401A
 Loudspeaker
 Storage Battery
 2-45 Volt "B" Batteries
 Aerial Equipment
 Ground Equipment

\$60.00

COMPLETE
 NOTHING ELSE TO
 BUY



UNBEATABLE VALUE

5 MATCHED AND
 TESTED ALADDIN
 TUBES—Type 401A.

SOLID MAHOGANY
 CABINET — Lustrous
 Piano Finish.

STANDARD LOW
 LOSS PARTS
 THROUGHOUT.

SKILLFULLY CON-
 STRUCTED — SCIENTI-
 FICALLY TESTED.

FROM BUS BAR TO
 CABINET—THE FIN-
 EST QUALITY PRO-
 CURABLE.

The ALADDIN employs the most efficient principle known to RADIO science today—TUNED RADIO FREQUENCY! With this recently perfected circuit, sharp and selective tuning, long distance reception and remarkable ease of control are actual realities. The usual stray-capacities inherent with the ordinary radio frequency circuits are entirely eliminated, insuring remarkably clear undistorted reception, volume, and mellow tonal qualities.

The ALADDIN is conscientiously built — under the personal supervision of skilled radio engineers. An inspection of this receiver will immediately convince you that only the finest and most efficient LOW LOSS parts have been incorporated in its construction.

The position of the radio frequency transformers and condensers has been scientifically and minutely adjusted for the permanent and exact capacity balance of the receiver. This circuit is self-neutralizing—troublesome neutralizing condensers are entirely eliminated!

The ALADDIN is FOOL-PROOF!—exceptional results are obtained by the non-technical users.

SATISFACTION INSURANCE

Each and every one of these receivers is carefully and conscientiously tested under actual conditions. Therefore, we have no hesitancy in issuing our iron-bound guarantee of uniformly high quality results.

The ALADDIN Vacuum Tube — Bake- lite Base—Tipless

An improved, accurate instrument, built to precision and minute scientifically gauged specifications. Can be used in any set, from the smallest one-tube receiver to the finest and most intricate multi-tube set. Economical in current consumption. Impregnated thorium filaments (not thorium-coated).

List Price \$3.00

Every tube furnished with the ALADDIN RECEIVER has been individually matched and bears an identification mark for easy insertion in their proper sockets.

The Aladdin Radio Co.

Originators of Radio Apparatus

156 FULTON STREET
 NEW YORK CITY

MAIL ORDER DIVISION

ALADDIN RADIO CO.,
 156 Fulton Street, New York City

Gentlemen:
 Kindly ship the items checked below for which I am enclosingdollars;

- The ALADDIN Combination.
- The ALADDIN Tube.

Name

AddressCity

W.R.

Radio's Greatest Development

"THE MARVEL FIVE"

Specifications—

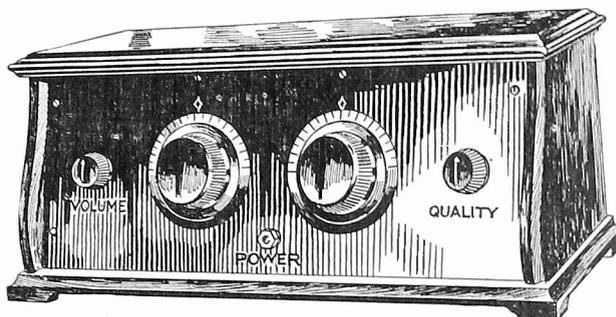
Solid Mahogany Cabinet,
Piano Finish

5-Tube Tuned Radio Frequency
Simple Two-Dial Control.

Distance, Volume, Selectivity, Clarity

Low-Loss Construction Throughout

Absolutely Guaranteed For One Year



THE MARVEL FIVE

Each set is assembled by experts—is three times tested before it leaves our factory. Yet— if you decide within *3 days* that you are not satisfied, we will cheerfully return your money.

SEND NO MONEY

PAY THE POSTMAN

3 DAYS' FREE TRIAL

DEALERS and AGENTS WANTED

\$55.00

AN EXTREMELY BEAUTIFUL and Powerfully Efficient 5-Tube Radio Receiver with only 2 Dials to Control, for...

\$55.00

FREE!

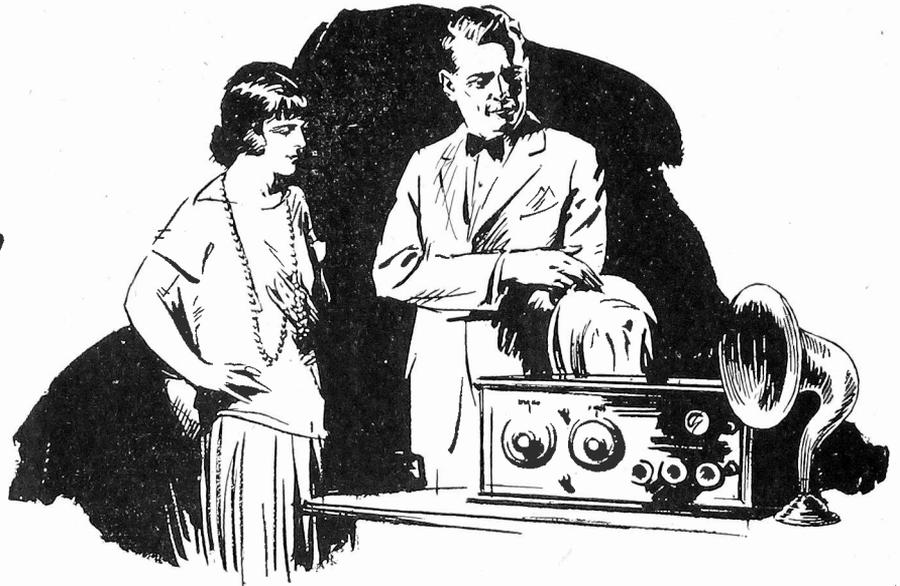
Five perfectly balanced, laboratory built, tested and guaranteed tubes, regularly selling for \$15.00. These tubes are given free with each set purchased in order to introduce this wonder set to the great masses of people who want something besides a lot of noise and who do not desire studying the technique of Radio Engineering in order to be competent operators of their instrument.

THE RADIO SYNDICATE OF NEW YORK

240 BROADWAY

NEW YORK CITY

100%
Tone!



Magic Radio Clearness

with this new principle horn—

The Kellogg Symphony Reproducer

THIS offers a new conception of radio clearness—a recent scientific advance in radio reproduction. It brings to your home the marvels of the air exactly as they were broadcast. With an absolute fidelity of tone that will amaze you.

This new way is the Kellogg Symphony Reproducer—that is now made in quantity production to sell at a price within the reach of practically every radio-owner.

WHAT IT IS

The Kellogg Symphony is made by the Kellogg Switchboard & Supply Company, for 28 years leading specialists in the reproduction of sound. The acoustical engineers of this company worked for years on the problem of clarifying radio reproduction before they finally succeeded.

The shape and contour—the composition of the horn itself, is one of the principal features. But the theory and design of this “unit” is the secret of its wonderful success.

This “unit” is unlike anything ever offered before for radio.

The magnetic feature gives it watchlike precision. The improved results are noticeable instantly to any who hear it.

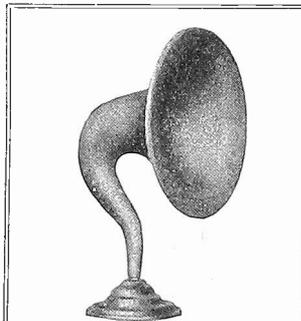
WHAT IT DOES

It brings in the human voice with a clearness that is remarkable. Songs take on new beauty. Music has greater charm. The exquisite chords of the violin seem to be in the very room with you.

The greatest test of all is the reception of piano-music. The notes come through full, clear—with all their original beauty. No thumping, glassy sounds—but real, pure *tone*!

HEAR IT TODAY

Today, hear the Kellogg Symphony. Do not buy any lesser horn until you have heard it. It will increase the value of your set 100% in musical quality—in pleasure to your family and yourself. Any dealer will gladly demonstrate the Symphony for you. Hear it—*today!*



The Kellogg Symphony
Reproducer
Not a “Loud Speaker”

Based on a new telephonic principle for the first time applied to radio. Perfected after years of research by the Kellogg Switchboard & Supply Co., for 28 years makers of the world's finest telephone receiving and sending devices.

KELLOGG SWITCHBOARD & SUPPLY CO. : CHICAGO, ILLINOIS

KELLOGG Symphony Reproducer

RADIO WORLD

[Entered as second-class matter, March 23, 1922, at the Post Office at New York, N. Y., under the Act of March 3, 1879]

A Weekly Paper Published by Hennessy Radio Publications Corporation from Publication Office, 1493 Broadway, New York, N. Y. Phones: Lackawanna 6976 and 2063

Vol. VI. No. 25. Whole No. 155.

March 14, 1925

15c per copy, \$6.00 a year

Reflexing the 3-Circuit Tuner That You Can Log

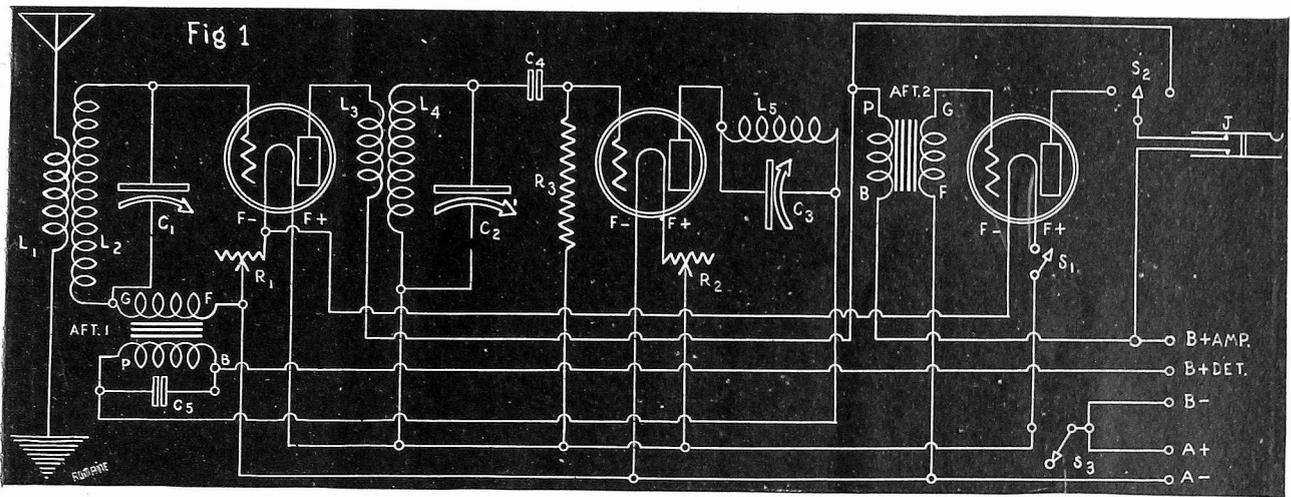


FIG 1. wiring diagram of the Reflexed 3-Circuit Tuner You Can Log. A single-circuit jack is used for the output of both the first and second audio stages. There are three controls, all of them .0005 mfd. variable condensers.

By Herman Bernard

A SET of considerable power and range is the Reflexed 3-Circuit Tuner You Can Log. It embodies a stage of tuned radio-frequency amplification ahead of a regenerative detector, two transformer-coupled audio stages being employed. The first of these two audio stages is reflexed in the radio-frequency tube.



Herman Bernard

The 3-Circuit Tuner You Can Log is in itself a great distance - getting set.

Several who built this set, described in the November 8 issue of RADIO WORLD, reported hearing Europe during the international tests. With the radio-frequency stage added, and reflexing being resorted to so that the total number of tubes still will be three, the DX powers should be increased, the volume be somewhat greater and the tonal quality equally good.

One RF Stage Enough

One stage of radio-frequency is about all the RF that can be added to a regenerative detector. Two stages will not be successful, unless neutralized, and some losses are necessarily sustained by the neutralization process. The reason for this condition is found in the tubes themselves. One stage of tuned RF ahead of a regenerative detector is theoretically at

least the equal of two stages preceding a non-regenerative detector, since regeneration is the most effective form of radio-frequency amplification known. Another RF stage in the regenerative set would set up too much free oscillation or otherwise reduce tube efficiency, while more than one regenerative stage is out of the question when one desires a set possessing some stability. The only way of gaining greater effective amplification is by the heterodyne system.

Excellent Results Possible

No reflex set is simple to build. One ever-present problem is to shorten the leads as much as possible. There is no way of avoiding the long lead from the detector output to the first audio primary. But by careful construction and wiring excellent results may be obtained.

Choice of Coils

One has a rather wide choice of coils for use in this circuit. As the three variable condensers C1, C2, C3 are .0005 mfd. each, normally 23 plates, the coils, if wound on cylinders, may be as described by J. E. Anderson in his important article on the most desirable coils, begun in the March 7 issue and concluded in this issue. No. 20 double silk covered wire is used for the radio-frequency transformers, L1L2 and L3L4. On a 3½" diameter tubing 4" high wind, near the top, ten turns of this wire to constitute the primary L1. Terminate. As close as possible to the primary start the secondary, L2, which will consist of 41 turns of the same kind of wire wound in the same direction. The other RFT should be made the same way, except that the secondary L4 should have

40 turns instead of 41. This is on account of the capacity of the plate of the RF tube being added to the capacity of the condenser C2, thereby requiring slightly less inductance on the secondary. The two condensers therefore may be tuned approximately in step. The impedance coil L5, tuned by variable condenser C3, is wound on a 3" diameter tubing 3" high and comprises 43 turns of No. 24 double cotton covered wire. These directions take into account the formulas for best inductance value, the proportion of the axial length of the secondary (the number of inches from terminal to terminal) to the diameter of the tubing being scientifically observed.

Spider-web fans may use a 5½" diameter form, winding 45 feet of No. 20 SCC wire for L2 and 44 feet for L4. The primaries consist of six feet each of the same wire, wound with the secondary, about in the center thereof. The plate coil would have 43 feet of the same kind of wire.

Those who prefer basketweave coils may use a 3½" diameter, placing fifteen dowel sticks equi-distant about the circumference, and wind 46 turns of No. 18 double cotton covered wire for the secondary L2, the primary consisting of ten turns, wound simultaneously with the secondary, in approximately the center of the winding. The secondary L4 would have one less turn. The plate coil L5 would consist of 44 turns.

If commercial type coils are desired, the Globe or Wallace RF transformer may be used for L1L2 and L3L4, these being of the Lorenz type (basketweave). The Eastern nickel base

Assembly of the DX Reflex

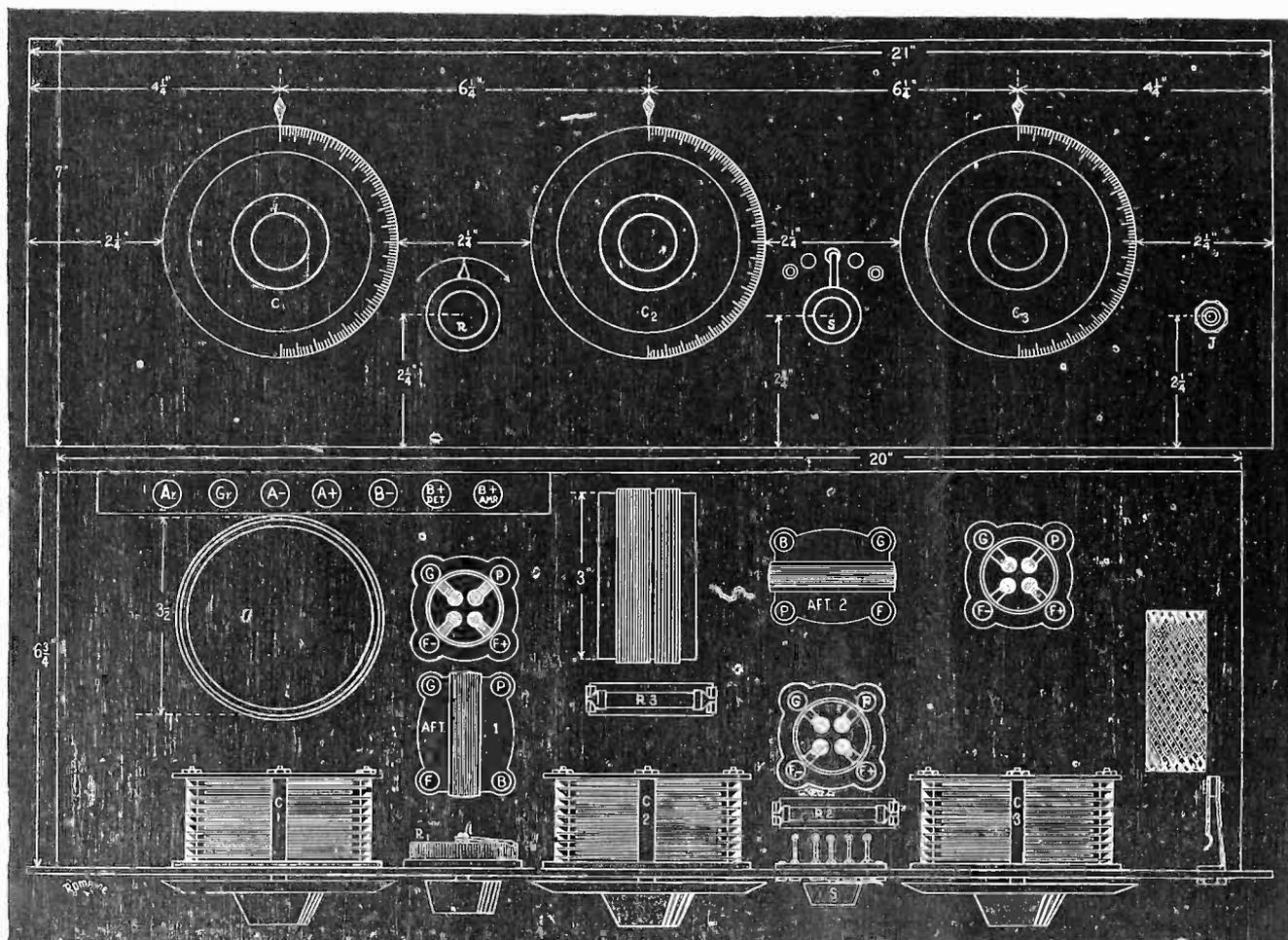


FIG. 2, the panel layout, and Fig. 3 the assembly plan of the set. Instead of the plate coils described in the article a honeycomb coil may be used. It may be a 75-turn coil from which four 14 turns have been removed.

radio-frequency transformers also are good. Any one having three RFT may use only the secondary of one of them as the plate coil L5, omitting the primary altogether.

Keeping Dials in Step

If after the set is built the dials are found not to read in step they can be made to do so approximately by removing turns, one at a time, for the coils whose condensers give the higher readings. However, be sure that the dials are correctly affixed. When the plates are totally in mesh (parallel) the reading should be 100 or 180, depending on the type of dial used. For much of the range the dials may be kept fairly close together as to readings if they are set at an identical reading for a given station on a rather high wavelength (as for instance 67, 67, 67 for WEA, 492 meters).

Achieving Regeneration

The plate coil is tuned by a variable condenser to put the plate of the detector tube in resonance with the grid of that tube, thereby occasioning regeneration through the capacity between the plate and grid elements within the tubes themselves. The leads of the plate, usually a shovel shaped element, and of the grid, a sort of grillwork, are brought through the vacuum of the glass envelope to seals near the base. Usually some red substance distinguishes these seals. The red composition tends to keep the temperature of the seals about the same as that of the glass. Each seal is like a plate of a two-

plate condenser, hence here the radio-frequency energy is passed from plate to grid. Indeed, even when there is no tuned plate there is a trivial transfer of energy in this direction, but not enough to constitute regeneration which is a controlled condition of oscillation. It is the free or uncontrolled oscillation that makes a set unstable.

Aid of Bypass Condenser

A bypass condenser C5 will be seen across the primary of the first audio-transformer. This condenser is usually important in this particular circuit. Some tubes more readily regenerate by the tuned plate method than others. Occasionally a tuned plate set does not respond as successfully as desired, due to "lethargy" in the elements, and this condenser often cures the defects. A tube on the verge of an outlived usefulness will not do in this detector socket, although it might show up fairly well if the tickler method of regeneration were used. The tickler method consists of returning the plate current of the tube to the grid by means of a rotatable coil placed in the plate circuit and in inductive relationship to the grid coil (secondary).

Tubes for the Circuit

This circuit works very well with dry-cell tubes. WD11, C11, WD12 or C12 may be used throughout, or interchangeably. These tubes are splendid detectors, good radio and audio-amplifiers. The 199 and 299 tubes also may be used, but they require 4½-volt A battery, whereas the

others require 1½. The 199 and 299 tubes are at least as good as the others mentioned in the radio and audio stages, but it is not so easy to get a good one for the detector circuit, due perhaps to difficulty in manufacture, as this product runs very unevenly as a detector. However, if you can buy one that is tested for its detecting power you will have a fine combination with 199 or 299 tubes throughout.

Better than the dry-cell tubes, although somewhat more expensive in the long run, are the UV201A and C301A tubes. These may be used throughout, or interchangeably. They require a 6-volt storage battery. When it comes to choosing a detector tube the UV200 or C300 will be found considerably more sensitive. This type of tube draws one whole ampere, while the 201A and equal draw only .25 ampere. A detector tube as good as the 200 or 300 is the D21 Sodian, which also draws only .25 ampere. Those desiring to use the Sodian should change the grid return in the detector stage (end of L4). The grid return is that connection of a coil whose other terminal goes to the grid of a tube. Fig. 1 shows the grid return of L4 going to positive A. For the Sodian tube, and even for the 200 and 300, this should be to negative A. The Sodian, like the 200 and 300, is to be used only as a detector.

A novelty in Fig. 1 is the method of plugging in the first and second audio stages. Instead of two jacks, one a double-circuit, the other a single-circuit jack, only one is employed, and it is of

(Concluded on page 22)

Coil Problems Solved for You

Turns per Inch of Winding

TABLE I

Turns per inch of different sizes of wire with various kinds of insulation:

Wire No.	En.	SCC	DCC	SSC	DSC	CEn.	SEn.
18	23	21	19	23	22	20	22
20	29	26	23	29	27	25	27
22	37	33	29	36	33	31	34
24	46	40	34	44	41	38	42
26	57	48	41	54	50	46	51

Look in the left-hand vertical column for the size of the wire you're using. Then look at the italic line on top where the kind of wire is specified (enamel, single cotton covered, double cotton covered, etc.) Then see where these two lines intersect and you will have the number of turns per inch of axial length of winding for that size and kind of wire. This is important in determining the "shape factor" (as explained in last week's issue, dated March 7). But the solutions were worked out for you by J. E. Anderson and embodied in his conclusions and winding directions. Different samples of the same size and kind of wire may vary slightly from the figures in the above table. One may always wind 1" of the wire on hand to determine the number of turns per inch.

[This is the concluding instalment of a two-part article.]

By J. E. Anderson

Consulting Engineer

PART II.

EVEN with a large antenna the impedance circuit may be selective, but signals will not be so loud as in the previous case. If an outside antenna of average proportions is available this circuit should not be used because of its limited tuning range. If a very small indoor, open-circuit antenna only as available, this type of circuit may be used to advantage. The signals will be fairly loud, the circuit will be selective, and it is possible with a 23-plate condenser to cover the entire broadcast range without resorting to taps and switches.

The Tuned Primary

In Fig. 3 is shown an arrangement which now may be considered obsolescent, as the present trend is toward making the primary aperiodic. But now and then the question is raised whether the tuned primary arrangement is not better than the other. Undoubtedly greater selectivity may be obtained if the primary as well as the secondary is carefully tuned, and the volume obtainable may also be a little greater. But to obtain these advantages it is required that the coupling between the primary and the secondary coils be very loose, especially when the resistance in the antenna circuit is low. The tuning must be very carefully done. The gain, however, is not enough to offset the greater difficulty of tuning and the impracticability of calibrating the circuit. Therefore Fig. 3 was disregarded in the coil tests.

The Aperiodic Primary

In nearly all modern receivers the primary is aperiodic or untuned. No condenser is then used in the antenna circuit

and the inductance is reduced to a very few turns of wire, usually on the same form as the secondary. The coupling is fixed, making calibration practical. The number of turns on the primary may vary from one to fifteen or twenty, depending on the number of turns on the secondary. A good way is to make the primary turns one-fifth as many as the secondary. This is equivalent to loose coupling, even if the two windings are close together, and the inductance of the secondary is not greatly affected, but whatever the effect, it is constant and is not a continual annoyance. This inductance effect of the primary on the secondary may be disregarded.

Tuned Impedance Coupling

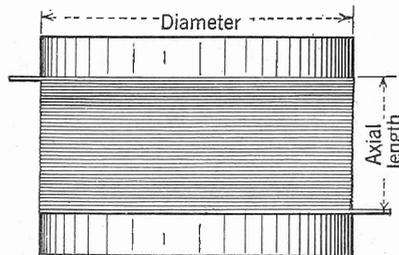
In the case of tuned impedance coupling between two vacuum tubes (Fig. 4), the required tuning constants L and C are not greatly affected by the associated parts. The minimum capacity is increased a little because both the plate capacity of the first tube and the grid capacity of the second are added to the capacity of the tuning condenser. But the only new capacity added is that of the plate since that of the grid was considered in previously deriving the value of the inductance of 160 microhenries (43 turns No. 24 DCC wire on 3" diameter for L). Although the coupling is close, being unity, the arrangement is selective because of the high impedances of the plate and grid circuits of the tubes. This type of circuit is not widely used now because there is no step-up of voltage and the reaction of the tuned circuit on the first tube gives rise to oscillation in that tube unless means are employed to prevent it. For the broadcast range and with a .0005 microfarad condenser, the inductance should be between 160 and 170 microhenries.

Transformer-Coupling

The most satisfactory form of coupling between two high-frequency tubes is a tuned radio-frequency transformer, and this is the form most often used. The question as to what ratio of turns is best often arises. If the ratio of turns is unity there is no step-up of voltage and there is no advantage of having two windings over the tuned impedance method of coupling, except that the transformer method is better for keeping the plate potential off the grid than to use a blocking condenser which must be used in the case of impedance. The tendency of the preceding tube to oscillate on account of reaction is equally great in the two cases. If only a very few turns are used on the primary the transformer is not so efficient because the plate of the preceding tube is working into a very low impedance, but this is partly offset by the step-up of voltage effected. As to the effect of the associated parts on the tuning constants of the tuned circuit there is very little difference, because the impedances of the tubes between which the transformer works are very great, little current flowing in the primary. The values of inductance previously calculated may be used.

Effect on Tuning

Experience has shown that when the same values of inductance are used in the secondary of the interstage coupling transformer and the secondary of the first input transformer, that is, the one connected to the antenna, with the same size tuning condenser, the interstage transformer requires slightly less capacity than for the other. The condensers tuning the stage or stages after the input, and that includes the detector, may therefore require a dial setting a degree or so less than for the



$$\text{Diameter} = 2.3 \times \text{AL}$$

THE DIAMETER of the tubing may be used in computations as the diameter of the coil wound thereon. What is meant by the axial length is clearly shown in the diagram.

aerial side of the set. This may be partly compensated for by affixing the dials on the condensers so that all dials read alike for a given high wavelength station (above 450 meters), for those finicky about having dial readings as nearly in step as possible. Readings of 50-50-50 for WJZ on a Neutrodyne would be "in step," but 50-49-49 would be the readings otherwise. The logging advantage exists in either case.

What Ratio to Choose

When it comes to choosing the ratio of turns for a radio-frequency transformer a rather wide latitude is allowable. Some writers specify a certain ratio and give the impression that if this is not strictly followed the set will not work properly. If that is the case in fact, the circuit is not worth trying out at all; but most likely it would not make much difference whether the primary turns were multiplied or divided by two. However, the ratio must be greater than two to one or there will be no appreciable gain in the voltage over the directly-coupled circuit. This applies even though the secondary is tuned. Some of the best receivers have ratios of three to one, four to one, five to one. There is a certain gain in selectivity if a high ratio is used. I prefer a ratio of about four to one. The actual number of turns on the primary depends on the size of the primary turns in relation to the size of the secondary turns and also on the position of the primary winding. Fewer turns will be needed if the primary is wound directly over the secondary near the middle of that winding than if it is placed on a small tube concentric within the secondary, or than if it is placed on the same tube with the secondary but to one side of the secondary.

Application of Formula

For those interested in following the technique on which preceding findings were based, I may say in respect to formulas for the calculation of the inductance of any given solenoid type coil, that the simplest and most convenient formula is, indeed, the one developed by Nagaoka. His formula, too, may be given in many forms, but the following is probably the most convenient:

$$L = .02507d^2NnK(nd/N), \dots (\text{No. 1})$$

L is the inductance in microhenries when d is the diameter of the tubing in inches, N is the total number of turns on the coil, n is the number of turns per inch, and K is a parameter called the shape factor which depends for its value on the ratio of the diameter to the length of the winding. The shape factor K is Nagaoka's contribution to this formula and it may be obtained from a Table VI. The formula is only approximate, as it does not take into account the finite size of the wire nor the appreciable thickness of the in-

Tables for Inductance Values

Inductance Values of Windings on 2 1/2 Inch Tubing

TABLE II

Inductance of 2 1/2" tubing with various turns and sizes of wire. The inductance (the larger numbers) is in microhenries. The smaller number under the inductance is the diameter expressed in the number to be multiplied by the length of winding:

Turns	No. 24 wire		No. 24 wire		No. 26 wire	
	DCC	DSC	DCC	DSC	DCC	DSC
45						157.5
						2.78
46						162.8
						2.72
47				158.0		168.0
				2.34		2.66
48		157.0	155.0	163.0	157.0	173.6
		2.14	2.08	2.29	2.14	2.60
49	146.0	161.7	160.0	169.1	161.7	179.0
	1.74	2.09	2.04	2.24	2.09	2.55
50	150.3	166.3	164.5	173.0	166.3	184.8
	1.70	2.05	2.00	2.20	2.05	2.50
51	154.7	171.5	169.4	178.1	171.5	
	1.67	2.01	1.96	2.16	2.01	
52	159.0	176.7	174.3		176.7	
	1.64	1.97	1.92		1.97	
53	163.0					
	1.60					
54	167.7					
	1.57					
55	172.0					
	1.54					

Inductance Values On a Tubing of 3 1-2 inch Diameter

TABLE IV.

Inductance of 3 1/2" tubing with various turns and sizes of wire. See headnotes to tables II. and III.

Turns	No. 24 wire		No. 22 wire		No. 20 wire	
	DCC	DSC	DCC	DSC	DCC	DSC
35	146.5	159.0		144.7		
	3.40	4.10		3.30		
36	153.3	166.6		154.5		
	3.30	3.98		3.21		
37	159.8	173.8	148.3	157.4		143.4
	3.22	3.88	2.74	3.12		2.54
38	166.7	181.0	154.5	164.3		149.2
	3.13	3.78	2.67	3.04		2.49
39	173.3		160.7	171.0	142.7	155.3
	3.05		2.60	2.96	2.06	2.42
40	180.0		167.0	177.5	148.0	161.7
	2.98		2.54	2.89	2.01	2.36
41			173.4	184.0	153.3	167.4
			2.47	2.82	1.96	2.30
42			179.7		159.1	173.3
			2.42		1.92	2.25
43			186.5		164.5	179.0
			2.36		1.87	2.20
44					1.83	

From this table the radio-frequency transformer was selected to be tuned with a .0005 mfd. variable condenser. On a 3 1/2" tubing 4" high 10 turns of No. 20 double silk covered wire were wound for the primary. Leaving 1/4" space the secondary was wound of the same kind of wire, in the same direction, and consisted of 41 turns. The inductance was 167.4 and the shape factor 2.3, both just right to satisfy the requirements of the formula, as explained last week (issue of March 7).

Inductances For 3-inch Diameter

TABLE III.

Inductance of 3" tubing with various turns and sizes of wire. The inductance, in microhenries, is the larger number. Under it is the number to be multiplied with the length of the winding to obtain the 3" diameter.

Turns	No. 24 wire		No. 22 wire		No. 20 wire	
	DCC	DSC	DCC	DSC	DCC	DSC
40		156.3		2.3		
41		3.075				
42	154.3	168.7				
	2.43	2.93				
43	160.1	175.0		157.2		
	2.37	2.86				
44	165.2	181.2	152.0	162.7		
	2.32	2.80	1.98	2.25		
45	171.0		157.0	168.0	137.8	151.0
	2.26		1.93	2.20	1.53	1.80
46	176.7		162.2	173.8	142.0	151.0
	2.22		1.89	2.15	1.50	1.76
47			167.3	179.8	142.0	156.0
			1.85	2.10	1.47	1.72
48			172.3	185.0	150.7	166.0
			1.81	2.06	1.44	1.67
49			177.5		155.0	170.7
			1.78		1.41	1.65
50			182.7		159.3	175.4
			1.74		1.38	1.62

From this table the most acceptable tuned impedance coil was selected. For tuning with a .0005 mfd. variable condenser it consisted of 43 turns of No. 24 double cotton covered wire on a 3" diameter tubing 3" high. The shape factor was 2.37, the inductance 160.1, the nearest approach to full satisfaction of the formula, which called for 2.3 and 160.

Inductance Values For Coils On 4-Inch Diameter

TABLE V.

Inductance of 4" diameter tubing with various turns and sizes of wire.

Turns	No. 24 wire		No. 22 wire		No. 20 wire	
	DCC	DSC	DCC	DSC	DCC	DSC
31	146.3	157.7		145.7		
	4.38	5.29		4.26		
32	153.7	165.9	144.0	152.0		
	4.25	5.12	3.62	4.12		
33	161.9	175.0	151.1	159.6	139.0	146.5
	4.12	4.97	3.52	4.00	2.79	3.27
34	168.0	183.0	158.7	167.4	142.1	153.1
	4.00	4.82	3.41	3.88	2.70	3.18
35	177.5		165.6	175.3	148.8	160.5
	3.88		3.31	3.77	2.62	3.08
36	185.5		173.0	183.0	155.0	167.5
	3.78		3.22	3.66	2.55	3.00
37			180.3		161.5	174.5
			3.14		2.48	2.92
38					168.3	182.0
					2.42	2.84
					175.2	
					2.36	

A personal of J. E. Anderson's article will disclose why the 4" diameter tubing was not used for the most acceptable coil. The 2 1/2" diameter tubing likewise was rejected. See table II.

sulation. However, it is sufficiently accurate. The diameter d should be taken from center to center of the wire on opposite sides of the coil rather than the diameter of the tube upon which the coil is wound. But if this is done the calculated inductance will usually be slightly greater than the measured inductance due to the fact that skin effect at high frequencies, as well as certain other factors, reduces the inductance. Hence, if the

diameter of the tubing is used in the formula, a fair approximation to the inductance is obtained.

As an illustration of the use of formula No. 1, suppose it is desired to find what is the inductance of a coil of 50 turns of No. 22 DCC wire wound on a tubing 3" in diameter. Table I shows that the number of turns per inch of this size wire is 29, hence n in the formula is equal to 29. The factor K is to be found from Table

VI. This is given as a function of the ratio of the diameter to the length of the winding, or as a function of nd/N. Since the diameter of the tubing is 3", n is 29, and N is 50, this ratio is equal to 1.74, for which the value of K is equal to .5593. Hence,

$$L = .02507 \times 3'' \times 3'' \times 50 \times 29 \times .5593$$

$$= 183 \text{ microhenries}$$

[This concludes the article on coil construction. Part I was published March 7.]

N. Y. C. Has Its First 1925 Show

Some Notables at the Big Event

THE fifth annual radio show and convention of radio amateur operators was held at the Hotel Pennsylvania, New York City, the first one to be held there in 1925. The grand ballroom is divided up into booths, in which fifty-five radio manufacturers and dealers have receivers of the latest designs on exhibit. The show was held under the auspices of the Executive Radio Council of the New York district.

It is essentially an educational exhibit. The general style of equipment is similar to the sets displayed at the Radio World's Fair and National Exposition given in New York last fall, but this exhibit reveals a tendency of manufacturers to use instruments of low-loss design. The coils and condensers are built to prevent losses of energy, which can be utilized to give greater signal strength, long-distance range and more selectivity in tuning.

The low-loss era was started by the amateurs early last Summer in their experiments with transoceanic and coast-to-coast transmission on short wave lengths. The short waves and long distance reception of small power sets used by the amateurs developed the necessity for apparatus of low-loss design, and they produced the needed equipment. Much of it was made by boys working in the attics of their homes, as was the case with many of the early wireless telegraph instruments. It is recalled that Edwin H. Armstrong, a youth experimenting with the audion circuit in 1912, discovered the principle of regeneration and patented it in 1913.

Commercial Sets Seen

There are numerous commercial sets on exhibit at the show, equipped with low-loss tuners and condensers. Several engineers attending the show expressed the opinion that by the time the Radio World's Fair and National Exposition are held in New York next September more manufacturers will have incorporated low-loss parts in their outfits.

Lectures have been arranged and motion pictures will be shown to enable broadcast listeners to better understand their receivers and to give them an idea of what to expect from certain types of circuits. On several occasions during the week broadcasting will be done direct from the ballroom balcony through station WJY, so that visitors at the show will have an opportunity to see artists perform before the microphone.

Amateurs Meet

Radio amateur delegations from clubs and districts throughout the East and Middle West are expected to attend the fifth annual convention of the Hudson Division of the American Radio Relay League, arranged in conjunction with the show at the Pennsylvania, the four days commencing Wednesday and closing with the annual amateur banquet Saturday



night. Preparations are being made for 600 to attend the banquet.

One of the features of the convention will be the annual code speed contests for amateurs and professionals, the winners of which will be recognized as the world's champions in their respective fields. The professional contest, open to everybody, will be held Wednesday at 8:30 P. M. A. E. Gerhard of the Radio Corporation won the contest last year when he transcribed sixty words a minute. The amateur in-

ternational speed contest will be held Thursday at 8 P. M. It will be open to both men and women. Men who qualify for this contest must be capable of transcribing thirty-five words a minute and women twenty-five words a minute.

A radio traffic program, featuring talks and discussions, led by E. M. Glaser, traffic manager of the Hudson Division of the American Radio Relay League, will be conducted Saturday afternoon in the lecture hall.

Marconi's Long Efforts

MARCONI began his experiments with the two-element vacuum tube, or valve, twenty years ago, according to Dr. J. A. Fleming, British scientist, who sent a few samples of the valves to the Italian inventor to test the radio stations.

Some Coils Save Space

TUNING coils for radio receivers may be wound on tubing or in spiral form, like the pancake or spiderweb type of coil. An advantage of the latter lies in its smaller size, allowing the use of a smaller cabinet for the tuner.

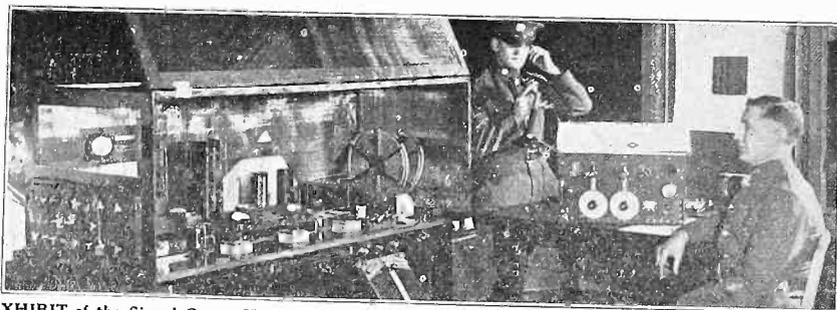


EXHIBIT of the Signal Corps, U. S. A., at the Fifth Annual Amateur Show at the Hotel Pennsylvania, New York City. (Foto Topics).

The Right Way to Put Coils and Condensers in a Set

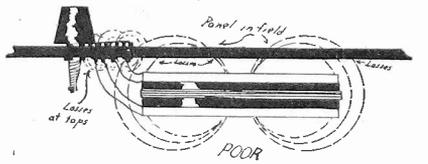


FIG. 1, how eddy currents from a tap-switch play havoc with the fields of a coil.

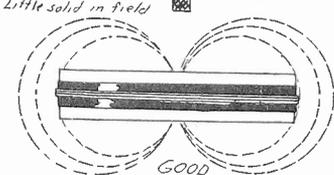
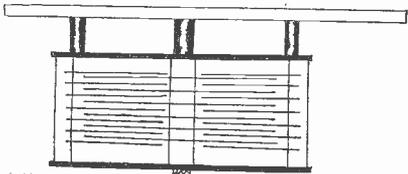
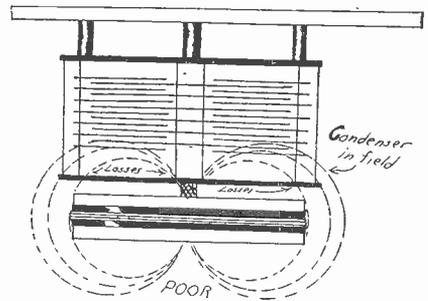


FIG. 2 (top), the electromagnetic field of a coil interacting with the electrostatic field of a condenser and causing severe losses. FIG. 3 (bottom) shows how this is avoided by proper spacing between parts.

By Byrt C. Caldwell

MOST receivers being made by fans are made with low-loss condensers and inductances. The average builder believes that the use of low-loss parts is all that is required to make his set perfect as to efficiency. But this is not so. The very

Use of Low-Loss Parts Alone Is not Enough, Says Expert, Explaining Results of Tests He Made—Tips on How to Conserve Gain that Low-Loss Parts Make Possible.

best low-loss parts may be used to no avail if they are not used properly.

I have experimented a great deal with low-loss condensers and coils and have tried practically every one of the many new high-efficiency condensers on the market, in conjunction with all kinds of inductances—low-loss, high-loss, no-loss and all-loss. Tests of receivers using the different combinations of condensers and coils were made both on actual broadcast reception and with a standard oscillator.

Much has been said about the kinds of condensers and coils to use. This article treats of the placing of the coils for highest efficiency. On first thought one might think that the placing of the coils has nothing to do with the results. But tests show that the proper placing is one of the largest factors in the successful use of low-loss parts.

What Are Best Condensers

The best condensers have soldered plates, pig-tail connector to rotor, very little insulation (and this insulation is hard rubber) and, outside of the plates themselves, very little metal. The very best low-loss coils are

When using low-loss condensers you must use those which are basket wound, which have no insulation outside of the covering of the wire itself, and which are made with fairly large wire (No. 22 or larger). Tests show that spider-web coils, although they might not have any insulating support, are not high in efficiency and cannot be included in the list of low-loss apparatus. This, I insist, is a fact, despite all that has been said in favor of these coils.

When using low-loss condensers you must use low-loss inductances also, or the benefits of the condenser will be lost. Do not use taps with low-loss inductances. Fig. 1 shows the losses which are sustained when taps are used. A tapped low-loss coil is no

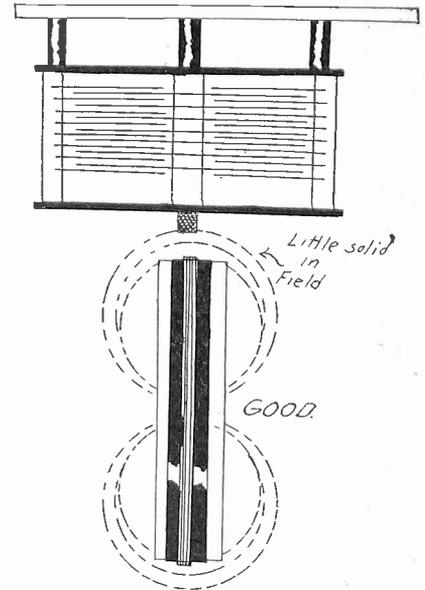


FIG. 4, the coil at right angles to the condenser makes for good results.

longer a low-loss coil. Taps are not necessary. Good low-loss condensers, with a basket-weave coil of the proper size, will cover the broadcast wavelength band without taps. The writer uses 3-inch diameter coils made of 65 turns of No. 22 D. C. C. wire and .00025 mfd. condensers. This combination exactly covers the present wavelength band. The entire condenser is used, which gives maximum efficiency and ease of control.

What the Tests Showed

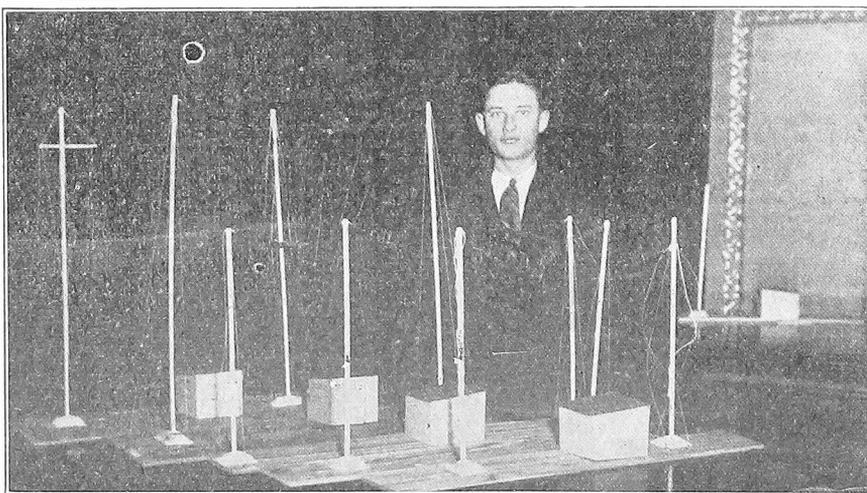
A test was made with ordinary coils, wound on bakelite tubes, with condensers of this capacity. The combination covered only the wavelengths between 300 and 475 meters. The substitution of the basket-weave coils widened the range until it was from 250 to 550 meters. In addition the selectivity of the receiver used was improved 100 per cent. and the sensitiveness was increased several times.

Another test was made with a coil placed so that the plane of the coil was parallel to the condenser plates, as in Figs. 2 and 3. It was first placed about 1/4 inch from the metal end plate of the condenser. It was then moved to about 1 1/2 inches from the condenser. It was found that when the coil was moved away from the condenser selectivity and sensitivity were very greatly improved. Figs. 2 and 3 show the reason for this. The field about the coil must be kept as far as possible from any solid substance, especially metal.

Fig. 4 shows the coil placed at right angles to the condenser plates. The results obtained with the coils in this position were almost the same as when the coil was placed at a good distance from the condenser.

The results of these simple tests show that it is not enough to have low-loss parts in your receiver. They must be properly placed.

1. Keep inductances at a reasonable distance from the condensers, transformers and other solids, such as the panel, base, etc.
2. Do not use taps.
3. Solder all connections very thoroughly.
4. Keep the variable condensers themselves at a reasonable distance (at least 2 inches) from each other.



THIS DISPLAY of miniature radio aerials was made by members of the Staten Island Radio Club. From left to right are the vertical cage, fan, 5-wire flat-top cage with single wire lead-in, and the same with a cage lead-in. (Underwood & Underwood.)

BROADCAST PROGRAMS

(Wavelength in Meters; Eastern, Central, Mountain and Pacific Standard Time specified.)

Thursday, March 12

WHAS, Louisville, Ky., 400 (C. S. T.)—4 P. M., selections from the Louisville Conservatory of Music; police bulletins; weather; readings; late news. 4:55, local livestock, produce and grain market reports. 5, time. 7:30, concert under the auspices of Mrs. J. E. Harmon, Jr.; four-minute digest of International Sunday school lesson; four-minute welfare talk; late news; time.

WWJ, Detroit, Mich., 353 (C. S. T.)—8 A. M., Setting-up exercises. 9:30, "Tonight's Dinner" and a special talk. 9:45, Public Health Service bulletins. 10:25, weather. 11:55, time. 12:05 P. M., Jules Klein's Hotel Statler orch. 3, News orch. 3:50, weather. 3:55, market reports. 6, dinner concert. 8, concert from New York.

WPG, Atlantic City, N. J., 296 (E. S. T.)—10 P. M., studio concert, Edna Irene Beach, mezzo contralto; Evan Prosser, tenor; Hannah Shaeffer, pianist; Minnie Shaeffer, violinist; Alice Warren Sachse and Joseph Lilly, pianists.

KGW, Portland, Ore., 492 (P. S. T.)—11:30 A. M., weather. 12:30 P. M., concert by Rose City Trio. 5, children's program. 7:15, market, weather, news bulletins and police reports. 8, The Oregonian Concert orch. 10, Multnomah Hotel Strollers.

WREO, Lansing, Mich., 286 (C. S. T.)—8:15 P. M., musical program; Reo Broadcasting orch.; Reo Male Quartet; soloist. 10, weather.

KTHS, Hot Springs, Ark., 375 (C. S. T.)—8:30 P. M., organ concert by Lawson Reid. 12 midnight, Owl concert and dance frolic by the Meyer Davis orch.

WKAQ, Porto Rico, 341 (E. S. T.)—8:30 P. M., musical concert from restaurant "La Cafetera." **KFDY, Brookings, S. D., 273 (C. S. T.)**—9 P. M., clarinet and saxophone solos by R. M. Endresen. 8:10, "Increased Returns Through Seed Treatment," by A. T. Evans. 8:20, vocal solos by Mrs. James Meine, soprano. 8:30, news and farm facts. 8:35, "Spring Care of Orchard" by G. T. Gilbertson. 8:45, Clarinet and saxophone solos. 8:50, soprano solos with guitar accompaniment.

KOA, Denver, Colo., 323 (M. S. T.)—12:20 P. M., Rialto organ recital. 1, N. Y. stock reports; live stock; fruit and vegetable report and weather. 3, half hour matinee for housewives. 6, final reading, N. Y. stock reports; live stock; vegetables and late news.

WLW, Cincinnati, O., 423 (C. S. T.)—10:45 A. M., weather and business reports. 11:55, time. 12, physical exercises; William Stradtman, instructor. 12:15 P. M., noonday concert. 1:30, business reports. 3, market reports. 4, French lesson; piano recital by Adelaide Apfel. 6 P. M., Selinsky Instrumental Quintet. 10, three-minute message. 10:03, Cooper Corporation; Cooper Concert orch. and Male Quartet; Larry Grueter, piano accordion solos; Doherty Melody Boys.

WGN, Chicago, 370 (C. S. T.)—9:31 A. M., time. 9:35, stock and farm quotations. 10, wheat. 10:30, wheat and cable reports. 11, wheat, weather, dairy reports. 11:30, wheat, grain and livestock receipts. 11:56, time. 12, wheat, board of trade. 12:10 P. M., board of trade quotations; hog sales. 12:35, Tea Room orch. 1, wheat. 1:05, Tea Room orch. 1:35, readings. 1:40, Drake concert ensemble and Blackstone string quintet. 2:30, musical recital. 3, miscellaneous entertainment. 5, stock exchange and market. 5:30, Skeezix time for children. 5:57, time.

WMAQ, Chicago, 448 (C. S. T.)—4 P. M., household hour. 4:30, Illinois Federation. 6, organ recital. 6:25, Hotel LaSalle orch. 6:50, "Daddy," 8, garden talk, James H. Burdett. 8:15, Western Railways Commission. 8:30, Jane Fitch, soprano. 8:45, income tax. 8:50, University of Chicago lecture. 9:15, Edgewater Glee club.

WGR, Buffalo, N. Y., 319 (E. S. T.)—6 P. M., Hallpryd string trio. 8, joint variety program. 9, Victor hour. 10, Goodrich Silvertown orch.

WEEL, Boston, 303 (E. S. T.)—2 P. M., Eleanor Baldwin Cass, "The Picture Houses; Their Management and the Patrons." 3:15, Noah's Arkadians, Joe W. Rines, director. 6:30, Big Brother club. 7:25, program by the Boston Churches. 7:55, Pathe News flashes. 8, musicale. 8:30, musicale. 9, Victor concert. 10, Goodrich Cord orch.

WQJ, Chicago, 448 (C. S. T.)—11 A. M., to 12 M. economics program; Helen H. Downing; Erna Bertrams, "Packing the Lunch Box"; Eleanor Chalmers, "New York Style Talk"; Mrs. Geo. M. Shirle, "Preservation of Food." 3 to 4 B. M., Helen H. Downing, "Questions and Answers"; L. B. Pierson, "Planning Ahead for Lighting"; L. L. Jones, "Ice Cream Gossip." 7 to 8, concert, Williams orch; Mrs. Lydia Lochner, contralto; Edith Buckmaster, accompanist; Blanche E. Robinson, pianist; Mildred Perlin, reader. 10 P. M. to 1 A. M., Williams and Skylarks. Lew Butler; Ned and Ches, songs; Marie Wright, soprano; James J. Whalen, tenor; other artists to be announced. 1 to 2, Hotsy Totsy hour; Williams and Skylarks.

CKAC, Montreal, Can., 411 (E. S. T.)—4 P. M., weather and stock reports. 4:45, dance, Leon-

14 Stations to Send Victor Program Thursday

FOURTEEN stations will be linked together to broadcast a popular program under the auspices of the Victor Talking Machine Company on March 12 from 9 to 10 P. M., Eastern Standard Time. The entertainers scheduled to appear before the microphone in WEAF's studio at 195 Broadway, New York City, are Billy Murray, comedian; Rudy Wiedoeft, saxophone; Henry Burr, tenor; Peerless Male Quartet and International Novelty Orchestra. The program will be sent into the air by WEAF, WMAQ, WJAR, WEEL, WFI, WCAE, WGR, WDBH, WTIC, WEAR, WSAI, WWJ, WOC and WCCO. The programs presented heretofore on alternate Thursday evenings since the first of the year by the Victor Company have been made up of noted opera singers.

ard's red jackets. 8:30, Canadian National program, call letters CNRM.

KHJ, Los Angeles, 405.2 (P. S. T.)—12:30 to 1:30 P. M., news and music. 2:30 to 3:30, electric program. 6 to 6:30, Hickman's orch., Edward Fitzpatrick, director. 6:30 to 7:30, children's program, Prof. Walter Hertzog; Joyce Coad; Dickie Brandon; Mrs. Max Paul Keppel. 7:30, "Art Talk," Harold Swartz. 7:45, "Care of the Body" Dr. Philip M. Lovell. 8 to 9:30, DeLano Hawaiian Guitar Club. 9:30 to 10, Piggly Wigly Girls. 10 to 11, Hickman's orch., Earl Burnett, director.

WGY, Schenectady, N. Y., 379.5 (E. S. T.)—2 P. M., one-act play, "The Courier," WGY Student Players. 2:30, organ recital by Stephen E. Boisclair. 6:30, dinner music by Ten Eyck Trio. 7:30, Review of New Books, L. L. Hopkins. 7:45, organ by Ollie G. Yettru, from Unitarian Church. 8, "Childhood Training," by Dr. A. A. Brill, N. Y. University. 11:30, organ by Stephen E. Boisclair from Albany.

WGBS, New York City, 316 (E. S. T.)—10 A. M., Terese. 10:10, Mary Pasquale, pianist. 10:20, Sally Knickerbocker's Radio Grads and Fashion Fads. 10:30, Mary Pasquale. 10:40, Lillian Eichler, etiquette. 10:50, Mary Pasquale. 1:30-1:35 P. M., scripture. 1:35-2:30, Ada Radin, songs, and Edna Josephs, concert pianist. 3, interview with Kathleen MacDonnell, star of "Episode," by Betty Ross and Terese Rose Nagel. 3:10, Genevieve Williams, soprano. 3:20, F. D. Armory, "Home Architecture." 3:30, Genevieve Williams, soprano. 3:40, Louise Rice, "Graphology." 3:50, Genevieve Williams, soprano. 6-6:30, Uncle Geebee. 6:30-7:30, Dave Harmon and his Cinderella orch. 7:7-10, What the World is Doing, by the Independent Magazine. 7:10-7:30, Dave Harmon and his Cinderella orch. 8:30-9, Oliver Saylor in "Footlight and Lamplight," Book and Play Review. 9-9:30, Medupe Parishii, Native African program. 9:30-11:30, program direct from Piccadilly Theatre. 11:30 P. M.-1 A. M., Russian Eagle orch.

WAOA, Omaha, Neb., 526 (C. S. T.)—12:30 P. M., horticultural. 5:15, Malie & Stept. 5:45, news. 6, child's story. 6:20, Malie & Stept. 6:45, Willard Robison orch. 9, Omaha Tech. Band. 10:15, Malie & Stept. 10:30, Hodek Nightingale orch.

WCCO, Minneapolis, Minn., 417 (C. S. T.)—10:45 A. M., Home Service Talk, Betty Crocker, "A St. Patrick's Day Party." 2 P. M., woman's hour, "The popular Concert," Mrs. Agnes Fryberger, assisted by Mrs. Lillian Lewis, pianist. 4, magazine hour. 5:30, children's hour. 7-10, national program by Remote Control from New York.

KDKA, Pittsburgh, 326 (E. S. T.)—9:45 A. M., stockman reports, general market review and agricultural items. 11:55, time, weather. 12 M., stockman reports, produce. 12:20 P. M., Lenten services from the Trinity Church, Rev. Hugh E. Fosbroke, General Theological Seminary, N. Y. C. 3:30, closing quotations on hay, grain and feed. 6:15, Broudy's orch., from the Hotel Schenley. 7:15, market reports of primary livestock and wholesale produce. 7:30, Uncle Ed. 8, "Common Poultry Diseases," Dr. C. J. Millen, inspector of U. S. Bureau of Animal Industry; "Brooding," a poultry talk, J. C. Taylor, Penn. State College. 8:30, Glenn McClintock and Scalzo's String quartet; Chauncey Parsons, tenor, and Fred Rogers, bass; Bert Musing, announcements. 9:55, time, weather. 11, concert.

KFOA, Seattle, Wash., 455 (P. S. T.)—12:30 to 1:30 P. M., Young Men's Business Club luncheon program from the Olympic Hotel. 4 to 5:15, The Times, Wm. F. Hoffman's Olympic Hotel Concert orch. 6 to 7, studio program by the Moran School for Boys; evening silent.

WBZ, Springfield, Mass., 333 (E. S. T.)—11:55 A. M., time, weather and market reports. 6

P. M., Westinghouse Philharmonic trio. 7, market report. 7:05, bedtime story. 7:15, Federal Income Tax by Thomas McNarry. 7:30, "Why We Do, What We Do," by Glenn Newton Merry. 8, "Original Three Musketeers." 8:30, Leslie Stearns, tenor, accompanied by Benjamin Buxton. 8:45, Miss Murray, soprano. 9:15, Stanley Cross, bass. 9:45, Westinghouse Philharmonic trio. 9:55, time, weather. 11, Hotel Brunswick orch. 11:30, Don Ramsay's radio four. 11:45, Hotel Brunswick orch.

WOR, Newark, N. J., 405 (E. S. T.)—7 A. M., gym class. 2:30 P. M., Constance Clements Carr, soprano; Florence Carson, accompanist. 2:45, A. McGregor Brown, Scotch baritone. 3, Helen Bolton, "Songs and Stories." 3:15, Constance Clements Carr, soprano; Florence Carson, accompanist. 3:30, A. McGregor Brown. 3:45, Edna Eckert, reader, "William Wordsworth." 6:15, Cooper's Country Club orch.

WNYC, New York City, 529 (E. S. T.)—7:20 P. M., sports analysis by Thornton Fisher. 7:30, police alarms. 7:35, M. O. quartet. 8, "Time-ly Topics," by Francis P. Best, director of investigations, Board of Estimate. 8:15, concert by the College Point zither and Mandolin club. 9, Municipal instrumental trio, Herman Neuman, pianist and director; William Holzberg, violinist; Alfiero Pierro, flutist. 9:30, The St. James Players—minstrel show. 10:30, police alarms and official weather forecasts.

WIP, Gimbel Bros., Philadelphia, Pa., 509 (E. S. T.)—10 A. M., the daily menu and intimate talk to housewives by Mrs. Anna B. Scott, food economist of the Philadelphia North American, through the courtesy of the Gimbel Pure Food Store. 1 P. M., luncheon music by the Gimbel Tea Room orch., Ray Steen, director. 1, weather. 3, recital by the Zeckwer-Hahn Philadelphia Musical Academy. 6, official weather forecast. 6:05, dinner music by the Benjamin Franklin Concert orch., under the direction of W. Irving Oppenheim. 7, Uncle Wip's roll call and birthday list, assisted by Maryanna Louise Tevis, six year old songster. 8, "The Scout and His Vocation," a talk by Dr. Edwin G. Broome, supt. of public schools. 8:15, concert. 10:05, "The Conservation of Human Vision," talk by Dr. J. F. Neill, Jr., former president of the State Board of Examiners of Pennsylvania. 10:15, Art Coogan and his orch. from the Dance Box, 10, other interesting features. 11, dance music by Harvey Marburger and his vaudeville orch., broadcast direct from the Cafe L'Aiglon.

WRC, Washington, D. C., 469 (E. S. T.)—6:45 P. M., children's hour by Peggy Albion. 7, dinner music by the Shoreham Hotel orch., from the Shoreham Hotel. 8, Mexican Night, under the auspices of the Pan-American Union, broadcast jointly with stations WJZ and WGY. 10, dance music by Vincent Lopez and his Hotel Mayflower orch. from the Italian Garden of Hotel Mayflower.

WGR, Buffalo, N. Y., 319 (E. S. T.)—6 P. M., Hallpryd String Trio dinner music. 8, joint variety program with WEAF, New York City. 9, Victor hour. 10, Goodrich Silvertown Cord orch.

WJY, New York City, 405 (E. S. T.)—7:30 P. M., Ralph DeStefani and his Penatiquit Point Inn orch. 8:15, "American Fishes," Barton A. Bean of Smithsonian Institute, from WRC, Washington. 8:30, Wanamaker organ recital; Godfrey Ludlow, violinist; Alexander Russell, organist. 9:30, field and stream talk. 9:45, American Pen Women program; Gola Branscombe, original compositions; May Gelwell Hoisington, poetic readings; Mrs. Lois Pierce Hughes, talk.

WJZ, New York City, 455 (E. S. T.)—10 A. M., housewives league daily menu; Mrs. Julian Heath. 10:20, Review of Reviews. 10:30, Ethel Peysor's household equipment talk. 10:40, needle art talk. 12, Lenten service direct from Trinity Church. 1 P. M., Abas' orch. 4, Edith Marion, soprano; Mildred Meehan, accompanist. 4:15, Ralph Thomas, tenor; Keith McLeod, accompanist. 4:30, Levitow's Hotel Commodore Tea orch. 5:30, State and Federal agricultural reports; farm and home market reports; closing quotations of the New York Stock Exchange; foreign exchange quotations; Evening Post news. 7, Bernhard Levitow's Hotel Commodore dinner concert. 7:55, "New Brains for Old," John B. Kennedy of Collier's. 8, Wall Street Journal review. 8:10, NYU Air College; "Economic Geography," Prof. J. E. Woodman. 8:30, Pan-American program with U. S. Army band; from WRC, Washington. 10:30, Josephine Evans, contralto. 10:45, Jacques Green and his club Deauville orch., with Clark's Hawaiians. 11:45, Olga Steck, sons.

WCAL, Northfield, Minn., 336.9 (C. S. T.)—9 P. M., music.

Friday, March 13

WHAS, Louisville, Ky., 400 (C. S. T.)—4 P. M., selections from the Louisville Conservatory of Music; selections played on the Alamo Theatre organ; police bulletins; weather; readings; late news. 4:55, local livestock, produce and grain market reports. 5, time. 7:30, concert under the auspices of Kingswood Holiness College.

WEMC, Berrien Springs, Mich., 286 (C. S. T.)—9 P. M., Radio Lighthouse Choir. 9:20, program of negro spirituals by Mrs. Sidney A. Smith.

WWJ, Detroit, Mich., 353 (C. S. T.)—8 A. M., setting-up exercises. 9:30, "Tonight's Dinner" and a special talk. 9:45, Public Health Service bulletin. 10:25, weather. 11:55, time. 12:05 P. M., Hotel Statler orch. 3, News orch. 3:50, weather. 3:55, market reports. 6, dinner concert. 8, concert from New York.

WPG, Atlantic City, N. J., 296 (E. S. T.)—7 P. M., Hotel Traymore Dinner music. 9, Am-

(Friday, March 13, continued)
bassador Hotel concert orch. 10:45, Tau Epsilon Chi Sorority dance.

KGW, Portland, Ore., 492 (P. S. T.)—11:40 A. M., weather. 12:30 P. M., Rose City Trio. 5, children's program. 7:15, market, weather, news bulletins, and police reports. 8, lecture by University of Oregon. 10:30, Hoot Owls.

WREO, Lansing, Mich., 288 (C. S. T.)—1 P. M., special orch. 10, weather.

KTHS, Hot Springs, 375 (C. S. T.)—8:30 P. M., specialty selections, violin and yodeling. 9, Meyer Davis-New Arlington orch.

KOAA, Denver, Colo., 323 (M. S. T.)—12:20 P. M., Rialto organ recital. 1, N. Y. stock reports; live stock; fruit and vegetable report; weather. 3, half hour matinee for housewives. 6, N. Y. stock reports; live stock; vegetables and news bulletins. 6:40, Book of Knowledge program. 8, Fred Schmitt and his orch. 8:10, studio program.

WGN, Chicago, 370 (C. S. T.)—9:31 A. M., time. 9:35, stock and farm quotations. 10, wheat. 10:30, wheat and cable reports. 11, wheat, weather, dairy reports. 11:30, wheat, grain and livestock receipts. 11:56, time. 12, wheat, board of trade. 12:10 P. M., board of trade quotations; hog sales. 12:35, Tea Room orch. 1, wheat. 1:05, Tea Room orch. 1:35, readings. 1:40, Drake concert ensemble and Blackstone string quartet. 2:30, musical recital. 3, miscellaneous entertainment. 5, stock exchange and market. 5:30, Skeezix time for children. 5:57, time.

CKAC, Montreal, Can., 411 (E. S. T.)—1:45 P. M., concert. 4, weather and stock reports. 4:30, no lessons.

WQJ, Chicago, 448 (C. S. T.)—11 A. M. to 12 M., Ted Wilmus, Sunday dinner menu. 3 to 4 P. M., Josephine Naylor, "The Lucky Party." Wynne Ferguson, on "Bridge Lessons." Mrs. Harry T. Sanger, "Estes Rocky Mountain National Park." 7 to 8, concert by Williams orch.; Henrietta Nolan, violinist; Dorothy Davie Dillow, soprano; special numbers also. 10 P. M. to 1 A. M., Williams' Skylarks; Rogers Boys, Larry and Billy; The West Brothers, Steel Guitar Duets; Zeigler Sisters, Pauline and Sarah; Nate Caldwell, pianologues; other artists to be announced. 1 to 2, Hotsy Totsy Hour with Ralph Williams and the Little Skylarks.

WGY, Schenectady, N. Y., 379.5 (E. S. T.)—2 P. M., music, health talk by Dr. C. W. Woodall. 6:30, International Sunday School lesson. 7, Albany Strand Theatre orch., Julius Boxhorn, conductor. 7:30, health talk. 7:40, program by WGY orch. 8:15, drama, "Just Suppose," by A. E. Thomas; WGY Players. 10:30, Schubert compositions by WGY orch. and Caryl Marshall, mezzo-soprano.

WAHG, Richmond Hill, N. Y., 316 (E. S. T.)—12 M. to 1 P. M., special program, Brooklyn Federation of Churches; 8 to 8:15 P. M., Edna Fields, contralto. 8:15 to 8:30, Maude Mason, pianist. 8:30 to 9, Davison Sisters, songs and duets; 9 to 9:45, Michael Lamberti, cellist. 9:45 to 10, Edna Fields, contralto. 10 to 10:15, Wm. F. Diehl, Radio Question Box. 10:15 to 10:30, Ted Snyder & Bill Heins, piano and songs. 10:30 to 11:30, dance.

KHJ, Los Angeles, 405.2 (P. S. T.)—12:30 to 1:30 P. M., news and music. 2:30 to 3:30, Electric Co. program; Gladys Terrel and the Immanuel Male Quartet. 6 to 6:30, Hickman's orch., from Biltmore Hotel, Edward Fitzpatrick, director. 6:30 to 7:30, children's program, Prof. Walter S. Hertzog; Richard Headrick; Vyola Von, screen juvenile; Huntington Park Union High School Band. 7:30, Gladys DeWitt, through the courtesy of the Santa Fe Railway, will give the next talk in her series on "The Romance of the Santa Fe Trail." 8 to 10, Henley & Scott, program. 10 to 11, Hickman's dance orch. from Biltmore Hotel, Earl Burnett, director.

WGBS, New York City, 316 (E. S. T.)—10 A. M., timely talks with Terese. 10:10, Eugene West, composer, and Babette Guth, singer. 10:20, Mrs. Maybelle A. Burbridge, beauty talk. 10:30, Eugene West, composer, and Babette Guth, singer. 10:40, Lillian Regan, fashion talk. 10:50, Eugene West, composer, and Babette Guth, singer. 1:30-1:35 P. M., scripture reading. 1:35-2:30, Wheaton's orch. 3, interview with Florence Smith Vincent. 3:10, Luz Gonzalez, soprano. 3:20, interview with Inez Haynes Irwin, by Terese Rose Nagel. 3:30, Lu Gonzalez, soprano. 3:40, Dr. Alfred G. Robyn, theory lessons. 3:50, Luz Gonzalez, soprano. 6:16:30, Uncle Geebee. 6:30-6:40, Herman Bernard, managing editor of RADIO WORLD. "Radio Hookups and Problems"; Mr. Bernard is on the air at this station every Friday at 6:30 P. M. 6:40-7:30 P. M., Larry Funk and his orchestra.

WOAW, Omaha, Neb., 526 (C. S. T.)—4 P. M., remote control studio program, Shenandoah, Ia. 5:45, news by Eugene M. Konecky. 6, story hour, Doris Secord. 6:20, Malie and Stept. 6:30, Pat's Melody Boys. 7:15, sport events, Ivan L. Gaddis. 9, program Union Pacific R. R. Co. 10:30, Willard Robison and orch.

WLW, Cincinnati, O., 423 (C. S. T.)—10:45 A. M., weather and business reports. 11:55, time. 12 M., physical exercises from the Central Y. M. C. A., William Stradtman, instructor. 12:15 P. M., dance program by the Ahaus Brunswick Shop orch. 1:30, business reports and stock quotations.

KDKA, Pittsburgh, Pa., 326 (E. S. T.)—7 A. M., exercises conducted by O. Shannon of McKeesport Y. M. C. A. 8, exercises conducted by O. Shannon. 9:45, livestock markets; general market review and agricultural items. 11:55, time. 12 M., weather; livestock and wholesale produce markets. 12:20 P. M., Sunday school lesson for March 15, James C. Mace from Y. M. C. A., Pittsburgh. 3:30, closing quotations on bay

grain and feed. 6:15, concert by Gaylord's orch., from Fort Pitt Hotel. 7:15, primary livestock and wholesale produce markets. 7:30, Daddy Winkun, rhymster. 7:45, economics, by the Pittsburgh Personnel Association. 8:15, Pitt Players of the University of Pittsburgh. 8:30, concert by the Pittsburgh Mandolin orch. 9:00, concert. 9:55, time, weather.

WCCO, Minneapolis, Minn., 417 (C. S. T.)—10:45 A. M., Gold Medal Home Service Talk, Betty Crocker, "Some Tempting Lenten Dishes." 2 P. M., woman's hour. 4, magazine hour. 5:30, Court of Gold Medal. 6, sport talk. 6:30, dinner concert, Biley's concert orch. 7:30, "American Farmers' European Competition," Wells Levens, International Harvester Co. 8, Minneapolis and St. Paul Real Estate Board program. 9, "The F. & R. Family." 10-11, silent hour. 11, dance, Frank's St. Paul Hotel orch.

KFOA, Seattle, Wash., 455 (P. S. T.)—12:30 to 1:30 P. M., Seattle Chamber of Commerce program from their new C. of C. Bldg. 4 to 5:15, The Times, Wm. F. Hoffman's Olympic Hotel concert orch. 6:45 to 8:15, Sherman, Clay & Co. program. 8:15, weather report. 8:30 to 10, The Times program sponsored by Mrs. A. S. Kircaid. 10 to 11, Eddie Harkness and his orch. playing from the Marine Room of the Olympic Hotel.

WBAP, Fort Worth, Texas, 476 (C. S. T.)—1 P. M., Bradstreet's financial reviews and R. G. Dun's business report. 7, review of the interdenominational Sunday school lesson by Mrs. W. F. Barnum.

WAAM, Newark, N. J., 263 (E. S. T.)—11 A. M., Radio Cooking School lesson No. 82 by Miss Ada Bessie Swan, director of Bureau Home Economics, Public Service. 11:30, address by Rev. Sidney W. Powell of Mt. Pleasant Baptist church. 7 P. M., Jolly Bill Steinke's Italian Night. 8, home and heart problems by the Ledger Lady. 8:15, Crystal Society orch. 8:45, Hilda White Kiernan, a radio trick. 9, memories, the Voice of the Music Box. 9:15, Original Egyptian Six orch. 10, Victor Wilbur, tenor. 10:15, Richard B. Gilbert & Ruth Wimp. 10:30, Elizabeth Town Players Club (A Forty Minute Radio Play).

WIP, Gimbel Bros., Philadelphia, Pa., 509 (E. S. T.)—10 A. M., the daily menu and intimate talk to housewives by Mrs. Ann B. Scott, food economist of the Philadelphia North American, through the courtesy of the Gimbel Pure Food Store. 1 P. M., luncheon music by the Gimbel Tea Room orch., Ray Steen, director. 1:30, official weather forecast. 3, "Suggestions for Special Holiday Luncheons," by Mrs. Anna B. Scott, food expert of the North American. 3:15, recital by Anna M. Hoffman, pianist; L. Vida Hoffman, soprano; Pearl Edith Haws, contralto. 4, "Influence of Epicurianism," a lecture by Dr. George Dupue Hadzits, professor of Latin, broadcast direct from Houston Hall, University of Pennsylvania. 6, weather. 6:05, popular numbers by Archie Fletcher. 6:15, dinner music by Harvey Marburger and his vaudeville orchestra, broadcast direct from the Cafe L'Aiglon. 6:45, U. S. Department of Agriculture, livestock and produce market report. 7, Uncle Wip's bedtime story, roll call and birthday list for the children of Uncle Wip's Kiddie Klub, assisted by Joan Marie Kelly, six year old pianist.

WRC, Washington, D. C., 469 (E. S. T.)—4 P. M., fashion developments of the moment by Eleanor Gunn. 4:10, piano recital by Eleanor Glynn. 4:20, "Beauty and Personality" by Elsie Pierce. 4:30, tea music by Meyer Davis' New Willard Hotel trio broadcast from the Palm Room of the New Willard Hotel. 6, children's hour by Peggy Albon.

WJY, New York City, 405 (E. S. T.)—7:30 P. M., Billy Wynne's Greenwich Village Inn orch. 8:15, "Work of the New York Assembly," Julius S. Berg. 8:30, "Just Suppose," comedy by WGY Players; A. E. Thomas, author; from WGY, Schenectady. 10:30, Monte Carlo Virginians.

WGR, Buffalo, N. Y., 319 (E. S. T.)—10:45 A. M., Gold Medal Home Service Talk by Betty Crocker. 6:30-7:30 P. M., Buffalo Trust hour. 8:8:55, recital by Doris Wetmore and Marjorie Freeman. 9-10, B. Fischer and Company's Astor Coffee Dance orch. 10-11, Larkin string orch.

WOS, Jefferson City, Mo., 409.9 (C. S. T.)—8 P. M., addresses: "A Farmer's Problems as a Farmer Sees Them," by R. A. Ellis, Barry Co.; "Immediate Finance for Farmers," by H. Paul Bestor, St. Louis; G. O. Reed, Greene Co.; "The Mule in Missouri and the World," by John Ashton of the State Board of Agriculture; original poems by LeRoy H. Kelsey, secretary to Governor Sam A. Baker, called the "Edgar A. Guest of Missouri"; varied musical program by Triple R Club.

WJZ, New York City, 455 (E. S. T.)—10 A. M., housewives League daily menu; Mrs. Julian Heath. 10:20, "Books," Grace Isobel Colbron. 10:30, Good Housekeeping Magazine talk. 10:40, arts and decorations. 10:50, Eleanor Gunn's fashion talk. 12:15 P. M., Friday noon hour of music, direct from Brick church. 1, Hotel Ambassador Trio; Henry Van Der Zanden, director. 4, Doris Makstein, soprano. 4:15, Myro Glass, baritone; Modern Classic Songs in Hebrew. 4:30, Hollander's Hotel Ambassador Tea Music. 5:30, State and Federal agricultural reports; farm and home market reports; closing quotations of the New York Stock Exchange; foreign exchange quotations; Evening Post news. 7, Bernhard Levitov's Hotel Commodore orch. 8, Wall Street Journal review. 8:10, NYU Air College; "Phycology," Dean James E. Lough. 8:40, Virginia Richards, soprano; Vere Richards, tenor; Keith McLeod, accompanist. 9, "Animals," Dr. W. Reid Blair of N. Y. colonial Park. 9:15, U. S.

Army Night; speaker, Maj. Gen. Harry Taylor, chief of engineers, U. S. Army; U. S. Army band. 10:30, Leo Duran, French songs. 10:45, Beaux Arts orch., direct from Studio Art Club.

WCAL, Northfield, Minn., 336.9, (C. S. T.)—8:30 P. M., book talk, Dr. Geo. W. Spohn.

WNYC, New York City, 529 (E. S. T.)—7:30 P. M., police alarms. 7:35, resume of meeting of the Board of Estimé by Peter J. McGowan, secretary. 8, novelty program under the direction of John Daly. 9, hour of German music: Margarete Gans, soprano; Rose Richards, coloratura soprano; Herma Herold, contralto, and Richard Singer, piano. 10:10, Disraeli's "Coningsby" will be reviewed by Professor Carter Troop. 10:30, police alarms and official weather forecasts. 10:35, Joseph M. White, tenor.

KSAC, Manhattan, Kan., 341 (C. S. T.)—9 A. M., opening exercises for rural schools. 9, housewives' half hour. 12:35 P. M., readings, weather, grain ration or pasture, radio question box, spring application of fertilizer. 7:20, College quartet. 7:30, old age poisoning 7:40, College quartet. 7:50, second claimant.

WBZ, Springfield, Mass., 333 (E. S. T.)—11:55 A. M., time, weather, market report. 7 P. M., market report. 7:05, bedtime story.

WOR, Newark, N. J., 405 (E. S. T.)—7 A. M., gym class. 2:30 P. M., Annette Simpson, soprano. 2:45, Herbert Maytin, violinist. 3, Annette Simpson, soprano. 3:15, Herbert Maytin, violinist. 3:30, Glassner's Colonial Inn orch. 6:15, Hotel Lorraine orch. 6:30, "Man in Moon" stories for the children by Josephine Lawrence and William F. B. McNary. 7, Hotel Lorraine orch.

Saturday, March 14

CKAC, Montreal, Can., 411 (E. S. T.)—7 P. M., kiddies stories. 7:30, Windsor Hotel dinner concert. 8:30, La Presse studio concert. 10:30, Windsor Hotel Grill dance orch.

WCCO, Minneapolis, Minn., 417 (C. S. T.)—10:45 P. M., talk, Betty Crocker. 2:30 P. M., Musicale, Soo Line Brotherhood of Railway and Steamship Clerks. 7-8, silent hour. 8, "Fireside Philosophies," Rev. Roy L. Smith. 8:30, concert. 10, dance, Joe Peyer's St. Paul A. C. orch.; quartet.

WAHG, Richmond Hill, N. Y., 316 (E. S. T.)—12 P. M., Saturday, to 2 A. M., Sunday, midnight program, Smith's Paramount orch.

WGY, Schenectady, N. Y., 379.5 (E. S. T.)—9:30 P. M., dance by Romano's orch., New Kenmore Hotel, Albany; popular songs.

PWX, Havana, Cuba, 400 (E. S. T.)—Concert at studio by Cesar Simone; Augusta Carunchu; Emma Roldan; Prof. Julian del Campo, others.

KHJ, Los Angeles, 405.2 (P. S. T.)—10 to 12 P. M., class in broadcasting. 12:30 to 1:30, news and music. 2:30, Electric Company program; Charlie Wellman and Sat. Afternoon Frolic. 6 to 6:30, Hickman's concert orch., from Biltmore Hotel, Ed. Fitzpatrick, director. 6:30 to 7:30, children's program, Prof. Walter S. Hertzog; Helene Pirie; Henrietta Poland; Elma Roberts. 8 to 10, program of William H. Hyatt, Inc., arranged by J. Howard Johnson. 10 to 11, Hickman's dance orch., from Biltmore Hotel, Earl Burnett, director. 11 P. M. to 2 A. M., The Lost Angels and Los Angeles.

WGBS, New York City, 316 (E. S. T.)—10 A. M., timely talks with Terese. 10:10-10:40, Eleanor Schorer and her Kiddie Klub program. 10:40-11, Miriam Mandel, pianist. 1:30-1:35 P. M., scripture reading. 1:35-2:30, Blue Horse Instrumental Quartet. 3, interview with Charles Mayer, game hunter, on Travels in Sumaka, Siam, and other countries, by Terese Rose Nagel. 3:10, Nelson Van Horn, pianist. 3:20, Lady Edeson, inventor, talk. 3:30, Nelson Van Horn, pianist. 3:40, Wells Hawkes, talk on "Children in the Circus." 3:50, Nelson Van Horn, pianist. 6-6:30, Uncle Geebee. 6:30-7:30, Harwood's Musical Aces. 7:30-8:30, Armand Vecsey and his concert orch., direct from the Ritz-Carlton hotel. 9-9:30, to be announced. 9:30-9:45, Sam Comly, "Inside Movie Chats." 9:45-10, San Souci Ladies Trio. 10-10:30, Kenneth Burdick, original songs. 10:30-11, Newman Levy and Frank Sullivan, "The World's Best Humorists." 11-12, music.

WOAW, Omaha, Neb., 526 (C. S. T.)—12:30 P. M., horticultural program. 5:45, public news period, conducted by Eugene M. Konecky. 6, dramatic hour, readings by Ellen Elise, J. Simmons Davis and Betty Lenzen. 6:30, Malie Stept. 6:45, Willard Robison and orch. 7:30, address, Omaha Chamber of Commerce. 9, concert by the Skeen Trio. 10, Albert Sand, pianist. 11, Hodek and Nightingale orch. at Roseland Gardens. 11:30, organ from World Theatre, Arthur Hays.

KDKA, Pittsburgh, Pa., 326 (E. S. T.)—9:45 A. M., livestock markets; general market review and agricultural items. 11:55, time. 12 M., weather, stockman reports of the Pittsburgh livestock and wholesale produce markets. 12:20 P. M., Lenten services from the Trinity Church, Pittsburgh, Rev. Tage Teisen, Ph.D., St. Paul's Church, Kittanning, Pa. 1:30, concert by Daugherty's orch. 6, concert by the Westinghouse Band, T. J. Vastine, conductor. 7:30, Richard the Ridder. 7:45, helps to Bible school teachers, Carman Cover Johnson. 8, Richard, the Ridder, for the "grown-ups." 8:30, Westinghouse Band, direction of T. J. Vastine; Mrs. Jessie Santmyer, soprano, and Herbert Dugan, baritone. 9:55, time; weather.

KNX, Los Angeles, Cal., 337 (P. S. T.)—6:15-7:30 P. M., dinner hour program. 8:10, KNX feature program. 10-11, Lyman's orch. 11 P. M.-1 A. M., Constance Talmadge Night.

WLW, Cincinnati, O., 423 (C. S. T.)—10:45 A. M., weather, business reports. 11, correct time. 1:30 P. M., stock quotations and business reports. 2:30 to 3, WLW program from the Music Hall in

Saturday, March 14—Continued

connection with the Radio Show. 6, dinner hour concert featuring the Selinsky Instrumental quartet; Lafafone by E. D. Leonard.

KFOA, Seattle, Wash., 455 (P. S. T.)—4 to 5:15 P. M., Hoffman's Olympic Hotel concert orch. 6:45 to 8:15, studio program by the Moran school for boys. 8:30 to 10, The Times program. 10 to 11, Eddie Harkness and his orch.; dance program; Olympic Hotel.

WBAP, Fort Worth, Texas, 476 (C. S. T.)—11 A. M., complete services of St. Paul's M. E. church, Rev. C. D. Meade, pastor; Mrs. F. L. Jaccard, organist. 4 P. M., concert from the Rialto theatre. 11, midnight frolic by Kerner's Crazy Hotel orch., broadcast from the lobby of the Crazy Wells Hotel, Mineral Wells, Texas, by remote control. (C. B. L.)

WAAM, Newark, N. J., 263 (E. S. T.)—11 A. M., special happy hour program for the children home from school; conducted by S. W. Powell, pastor of Mt. Pleasant Baptist church.

WIP, Gimbel Bros., Philadelphia, Pa., 509 (E. S. T.)—10 A. M., the daily menu and intimate talk to housewives by Mrs. Anna B. Scott, food economist of the Philadelphia North American, through the courtesy of the Gimbel Pure Food Store. 1 P. M., organ recital by Karl Konawitz, broadcast direct from the Germantown theatre. 1:30, official weather forecast. 3, Dal Ruch and his Arcadians; program: 1, Down Moonlight Lane; 2, My Dream Girl; 3, The End of the Road; 4, My Best Girl; 5, Hungaria; 6, Do-Waka-Do; 7, The Love That I Loved; 8, Meanest Kind of Blues; 9, Sunset; 10, Southern Rose; 11, All Alone; 12, Me and the Boy Friend. 4:15, "The Emotions and Nervousness," a talk by Dr. J. H. W. Rhein, of the Mental Hygiene Department of the Pennsylvania University. 6, weather. 6:05, popular numbers by Charles Higgins. 6:15, dinner music by the Hotel St. James orch., broadcast direct from the Hotel St. James. 6:45, U. S. Department of Agriculture, livestock and produce market reports. 7, Uncle Wip's bedtime story and roll call for the children of Uncle Wip's Kiddie Klub, assisted by Francis Wilson, ten-year-old songster. 8, "Lenten Meditations," E. A. E. Palmquist, broadcast under the auspices of the Philadelphia Federation of Churches. 8:15, concert by the Penn-Charter Musical Clubs; Mr. Richard L. Weaver, musical director; Clinton A. Strong, Ph.D., managing director; Charles T. Maclary, O. P. C., accompanist; Charles Rupp, Jr., manager of clubs; William Tuttle, Jr., leader of Glee Club; Robert L. Zullinger, leader of Mandolin club. 10:05, Benjamin Franklin dance orch. directors Howard Lanin. 11:05, organ recital Karl Bonawitz.

WRC, Washington, D. C., 469 (E. S. T.)—6:45 P. M., children's hour by Madge Tucker. 7, dinner music by the Hotel Washington-Irving Boernstein orch., from the Hotel Washington. 8, to be announced. 9, talk on psychology by Mable Dill. 10, dance music by Vincent Lopez and his Hotel Mayflower orch., from the Italian Garden of Hotel Mayflower. 11:15, organ recital by Otto F. Beck from Crandall's Tivoli theatre.

WJZ, New York City, 455 (E. S. T.)—1 P. M., Erdoy's Hotel Park Lane orch. 4:30, Sherry's Tea orch. 5:30, State and Federal agricultural reports; farm and home market reports; closing quotations of the New York Stock Exchange; foreign exchange quotations. 7, Freddie Rich and Hotel Astor dance orch. 8, "Art for Laymen," Walter M. Grant. 8:15, "The Texans," Sanchez and Milstead, popular songs. 8:30, Liederkranz Society concert.

WGR, Buffalo, N. Y., 319 (E. S. T.)—6:7:30 P. M., Hallpry String Trio dinner music.

WCAL, Northfield, Minn., 336.9 (C. S. T.)—9:45 A. M., St. Paul College chapel services. 12, midnight meals.

WGN, Chicago, 370 (C. S. T.)—9:31 A. M., time. 9:35, stock and farm quotations. 10, wheat. 10:30, wheat and cable reports. 11, wheat, weather, dairy reports. 11:30, wheat, grain and livestock receipts. 11:56, time. 12, wheat, board of trade. 12:10 P. M., board of trade quotations; hog sales. 12:35, Tea Room orch. 1, wheat. 1:05, Tea Room orch. 1:35, readings. 1:40, Drake concert ensemble and Blackstone string quintet. 2:30, musical recital. 3, miscellaneous entertainment. 5, stock exchange and market. 5:30, Skeezix time for children. 5:57, time.

WNYC, New York City, 529 (E. S. T.)—6:30 P. M., Sam Wooding's Club Alabama orch. 7:30, police alarms. 7:35, The Chateau four. 8, "Duties of the City Clerk," by Michael J. Cruise. 8:10, Chateau four resumed. 8:45, The Police quartet. 9:15, piano recital. 9:30, dinner to Murray Hulbert by the Canarsie Board of Trade, Hotel Bossert, Brooklyn. Speakers, Murray Hulbert, Edward T. O'Loughlin, Joseph A. Guider, Major John F. Hylan, Maurice E. Connolly, Col. John R. Slattery, U. S. A. 10:30, police alarms and weather.

KSCA, Manhattan, Kansas, 341 (C. S. T.)—12:35 P. M., radio fan's question box.

WBZ, Springfield, Mass., 333 (E. S. T.)—11:55 P. M., time, weather, market reports. 6, Leo Reisman Hotel Lenox ensemble. 7, market report. 7:15, sketches from the U. S. naval history by Lt.-Comdr. F. S. R. Brandt, U. S. N. 7:30, Nora Gladden Winton, contralto, accompanied by Mrs. Munvan Thomson. 7:45, Hotel Kimball trio, direction of Jan Geerts. 8:15, Mrs. Richard F. Donovan, soprano, accompanied by Prof. Wilson T. Moog. 8:30, Nora Gladden Winton, contralto. 8:45, concert. 9:45, talk. 10:05, Mrs. Alberta barve, reader.

WOR, Newark, N. J., 405 (E. S. T.)—7 A. M., gym class. 2:30 P. M., Dorothy McKeon, soprano; Helen Terry, accompanist. 2:45, George Watson Little, D. V. M., "How to Know When a Dog is Sick." 3, Dorothy McKeon, soprano; Helen

Terry, accompanist. 3:15, Cole's orch. 6:15, Adams Arcadians orch. 7:30, "The Commanders," 8, Lynette Gottlieb, pianist. 8:15, Dr. Ernest C. Stanback, "Common Sense Foot Care." 8:30, Lynette Gottlieb, pianist. 8:45, Bessie Hockberger, soprano, and Mme. Florence Wessell, pianist. 9, William J. Burns, the detective, "Crime and its Causes." 9:15, Bessie Hockberger, soprano, and Mme. Florence Wessell, pianist. 9:30, Gene Carr, cartoonist. 9:45 to 10:30, State of Kansas program, Mrs. David Burr Luckey, pres. 10:30, Jasha Gurewich, saxophone ensemble. 11, Circo orch., with Dave Bernie.

Sunday, March 15

CKAC, Montreal, Can., 411 (E. S. T.)—4:30 P. M., Band of the City of Grandby, P. Q., talk by Mayor Boivin.

KOA, Denver, 323 (M. S. T.)—11 A. M., Service of Unity Church (First Unitarian society), Denver; Dr. George Gilmour, pastor. 4 P. M., music hour; organ from Unity Church, Denver. 7:45, service of Unity Church; Dr. George Gilmour, pastor.

WGN, Chicago, 370 (C. S. T.)—11 A. M., Uncle Walt reads the funnies to the children. 11:45, concert from theatre. 2 P. M., Edwin S. Seder, organ. 2:30, artists concert. 3:30, recital Musical College. 9, concert directed by Charles H. Gabriel, Jr., with WGN singers and by Drake concert ensemble.

KCW, Portland, Ore., 491.5 (P. S. T.)—10:30 A. M., service from First Presbyterian Church, Dr. Harold Leonard Bowman, pastor. 3 P. M., municipal concert by wire telephony from auditorium. 6, church services provided by the Portland Council of Churches. 7, dinner concert by Colburn concert orch. of Hotel Portland; intermission solos.

KPO, San Francisco, 423 (P. S. T.)—10:30 A. M., "What is playing at the Local Theatres." 11 to 12 M., time; denominational and non-sectarian church services; A. E. Kelley of the Ingleside Community Church; soloists, Mrs. Byron McDonald, contralto, and Mrs. Ashley Faull, soprano; organ by Theodore J. Irwin. 6:30 P. M., "What is playing at the Local Theatres." 8:30 to 10, concert by Seiger's orch., by wire telephony.

WOAW, Omaha, Neb., 526 (C. S. T.)—9 A. M., chapel service by Rev. R. R. Brown. 1:30 P. M., program, remote control studio, Shenandoah, Ia. 2:30, Omaha String Club, Frank Buckingham, director. 6, Bible study period, under the personal direction of Mrs. Carl R. Gray. 9, Lenten chapel service, Zion English Lutheran church, Rev. Nels Lundgren, pastor; Bernard E. Johnston, choir director; Eva Nelson, organist; Roland Rudeen, Mildred Peterson, Christian Larsen; Lillie Anderson; F. A. E. Hanson; Bernard Johnston; Geraldine Olson Fowell.

KTHS, Hot Springs, Ark., 374.8 (C. S. T.)—11 A. M., services of the First Presbyterian Church, Rev. Chauncey Hickok, pastor. 3:30 to 10 P. M., gems of popular operas; Jacques Renard, director Meyer Davis-New Arlington orch. 10 to 11:15, dance by Phil Baxter and his singing orch.

WLW, Cincinnati, O., 422.3 (C. S. T.)—9:30 A. M., school conducted by the editorial staff of Sunday School Publications of the Methodist Book Concern. 11, services from the Church of the Covenant; Dr. Frank Stevenson, minister; J. Warren Ritchey; Charlotte Sandman Angert; Louise Koetter; Erwin Meyer; Edwin Weidinger. 7:30 P. M., service from the First Presbyterian Church of Walnut Hills; Dr. Frederick McMillan, minister. 8:30, concert by the Western and Southern orchestra; William Kopp, director; Carl Wunderle, zither.

WEMC, Berrien Springs, Mich., 286 (C. S. T.)—11 A. M., sacred music by the Radio Lighthouse choir; Mrs. Mabel Butterfield, soprano; Miss Ruth Nelson, violinist. 11:40, sermon, Pastor W. R. French. 8:15 P. M., sacred music by the Radio Lighthouse choir; Mr. Prescott Fairchild, violinist. 8:50, sermon, Pastor John Knox.

KNX, Los Angeles, Cal., 237 (P. S. T.)—5 P. M., Radio Sunset Service, Rev. Charles F. Asked, and Rev. Frank Dyer. 7, International Bible Students' Association hour of music. 8, Ambassador Concert orch, Josef Rosenfeld, leader. 9, Globe music.

WIP, Gimbel Bros., Philadelphia, Pa., 509 (E. S. T.)—10 A. M., the daily menu and intimate talk to housewives by Mrs. Ann B. Scott, food economist of the Philadelphia North American, through the courtesy of the Gimbel Pure Food Store. 3:15 P. M., Civic Junior Symphony orch., consisting of one hundred and twelve members ranging from seven to twenty-four years, under the direction of Mr. Albert N. Hoxie, broadcast direct from the reception room of His Honor, the Mayor, at City Hall. 4, services under the auspices of the Germantown Y. M. C. A., broadcast direct from the Germantown theatre, "Save the Surface and You Lose All," a lecture by Wm. H. Crown, secretary of the Germantown Y. M. C. A.; music by the Y. M. C. A. Glee Club. 7:15, evening service, broadcast direct from Holy Trinity Church, Rittenhouse Square, Philadelphia; Rev. Floyd W. Tomkins, D. D., rector. 9:30, Germantown Theatre orch., Karl Bonawitz at organ.

KGO, Oakland, Cal., 361 (P. S. T.)—11 A. M., service of the First Presbyterian Church, San Francisco, Rev. William Kirk Guthrie, D. D., minister. 3:30 P. M., concert by the KGO Little Symphony orch., Carl Rhodehamel, conductor; Arthur S. Garbett, musical interpretative writer; guest artists. 7:30, service of the First Presbyterian church, San Francisco, Rev. William Kirk Guthrie, D. D., minister.

WEAR, Cleveland, Ohio, 396 (E. S. T.)—1 to 2 P. M., symphony concert by Allen Theat

orch., Phillip Spitalny, conducting, direct from Loew's Allen theatre. 3:30 to 5, twilight concert by Ivan Francis and his Hotel Cleveland orch., broadcast from the studio.

WOS, Jefferson City, Mo., 440.9 (C. S. T.)—7:30 P. M., religious service of the First Christian church, Rev. Robert M. Talbert, pastor.

WCAL, Northfield, Minn., 336.9 (C. S. T.)—8:30 P. M., sacred program: "To the Sea," Macdowell, Louise Stenseth, pianist; "Hark, Hark My Soul," "Bow Down Thine Ear," Marión Llandahl, mezzo-soprano; scripture reading, the Reverend Nils Kleven, pastor of St. John's Lutheran Church of Northfield; "God Calling Yet," "O Bread of Life," Loyal Tallakson, tenor; sermon, Reverend Kleven; "I Do Not Ask, O Lord," Miss Llandahl; "Wait Thou Still," "My Task," Mr. Tallakson; "Romance in F," "Dedication," Miss Stenseth.

WGR, Buffalo, N. Y., 319 (E. S. T.)—3 P. M., Vesper services by the Rev. F. L. Ganeway, assistant minister at Westminster Presbyterian Church. 4, organ recital, John F. Gunderman, Jr., organist. 7:15, pre-season organ recital, direct from Central Presbyterian Church, Wm. Wall Whiddit, organist. 7:30, evening service, R. J. MacAlpine, D.D., minister.

WGY, Schenectady, N. Y., 379.5 (E. S. T.)—11 A. M., service of First Presbyterian Church, sermon by the Rev. Robert W. Anthony. 3:35 P. M., WGY symphony orch., Leo Kliwen, conductor; soloist, Kolin Hager, baritone. 7:30, service of First Presbyterian Church, Schenectady. 8:45, Waldorf-Astoria orch., Joseph Knecht, conductor; also broadcast by WJZ. 10, selections by the Tuskegee Institute quartet.

Monday, March 16

CKAC, Montreal, Can., 411 (E. S. T.)—1:45 P. M., Windsor Hotel Trio. 4, weather and stock reports. 4:30, no lessons.

KOA, Denver, 323 (M. S. T.)—12:20, organ. 1 P. M., stock market reports; livestock; fruit and vegetable report and weather. 6, N. Y. stock market reports; livestock; vegetables and late news bulletins. 8, music by Fred Schmitt and Rialto theatre orch. 8:10, studio program: Irish numbers; educational description of Irish songs by the Rev. William O'Ryan; one-act Irish skit, "The Courting of the Widow Malone"; quartet and duet selections; baritone, tenor, contralto, soprano and piano solos.

WEEL, Boston, 303 (E. S. T.)—12:15 P. M., Lenten service direct from B. F. Keith's theatre under the auspices of the Greater Boston Federation of Churches; Vesper Quartet, Morgan Memorial. 2, Harry Lowes orch. 3, talk on Lynn English High School Bank by Joseph Swaska. 3:15, Eliot Daniel, pianist. 6:30, Big Brother Club. 7:15, Pathe News flashes. 7:30, Dok-Eisenbourg and his Sinfonians. 8, Bailey's Whispering Jazz Orchestra. 9, from New York, A. & P. Gypsies. 10, concert by May Delaney Beal and assisting artists.

WJL, Detroit, 352.7 (E. S. T.)—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 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. 12:05 P. M., Jules Klein's Hotel Statler orchestra. 3, The Detroit News orch. 3:50, weather. 3:55, market reports. 6, dinner concert. 8, Detroit News orch.

KFAE, Pullman, Wash., 348.6 (P. S. T.)—2 P. M., Marimbaphone duets, and readings, Cooper Sisters, Pullman (Clelah, Regina, Zora Cooper); soprano solos, Velma Olson, Husum; the good old fashioned songs; Opportunities in Civil Engineering, Prof. M. K. Snyder; Can We Legislate Morals? Rev. Clay E. Palmer, Pullman; Opportunities with "Bummer" Lambs, C. M. Hubbard; Diseases Affecting Animals and Men, Dean E. E. Wegner.

KGW, Portland, Ore., 491.5 (P. S. T.)—11:30 A. M., weather. 12:30 P. M., Rose City Trio. 5, children's program. 6, organ, William Boone. 7:15, markets, weather, news, police reports. 8, silent.

WFAA, Dallas, Tex., 472 (C. S. T.)—12:30-1 P. M., address, Frank Reedy. 6:30-7:30, Buddy's Blue Melody Boys orch. in vesper recital. 8:30-9:30, Wednesday Morning Choral Club recital.

KPO, San Francisco, 423 (P. S. T.)—10:30 A. M., news. 10:40, "What is playing at the Local Theatres." 11:50, market report on eggs, butter, cheese and poultry. 12 M., time, scripture. 1 to 2 P. M., Seiger's orch. 4:30 to 5:30, Seiger's orch. 5:30 to 6:30, children's hour stories by Big Brothers of KPO, from the Book of Knowledge; recitation by Lela Malech. 7 to 7:30, Seiger's orch. 8 to 9, program of Irish folk lore, F. J. Kelleher; talk by Redfern Mason. 9 to 10, program under the management of Emile Lichtig, baritone.

KTHS, Hot Springs, Ark., 374.8 (C. S. T.)—8:30 to 10 P. M., All-Star Quartet directed by Louis Davis and Charles McGill, Little Rock and the Peter Pan jazz orchestra of that city. 10 to 11, dance concert by the Charles L. Fischer orch. from the Eastman Hotel. 12:15 P. M. to 1:15 A. M., midnight dance lark by the Fischer orch. from KTHS studio.

WLW, Cincinnati, O., 422.3 (C. S. T.)—10:45 A. M., weather, business reports. 11:55, time. 12 M., physical exercises from the Central Y. M. C. A.; William Stradman, instructor. 12:15 P. M., noonday Lenten services conducted by Rev. G. H. Kase. 1:30, business reports. 3, market reports. 4, Babson reports. 6, dinner concert. 8, American Legion air night. 9, Times Star program; Karl Kirksmith, cellist of Cincinnati Symphony orch.; 1st movement from Grieg Sonata and other selections; accompanist: Thomic

(Monday, March 16, continued)

Prewitt Williams; Howard Hafford, tenor; Senator Schultz, "My Experiences in the Court Room" Times-Star orch; directed by William Kopp.

WEMC, Berrien Springs, Mich., 286 (C. S. T.)—8:15 P. M., orch.

KNX, Los Angeles, Cal., 337 (P. S. T.)—6:15-7 P. M., silent. 7-8, West Coast Theatres by remote control. 8-16, program of music. 10-11, Silvertown orch and Lillian May Challenger, soloist. 11-12, Lyman's orch.

WBAP, Fort Worth, Texas, 476 (C. S. T.)—12:05 to 12:30 P. M., musical program. 7:30 to 8:30, "Camp Fire Girls" program under the direction of Miss Lucia Walker. (C. B. L.) 9:30 to 10:45, Ward's "Trail Blazers," playing popular music; broadcast from the Montgomery Ward studio. (The Hired Hand.)

KGO, Oakland, Cal., 361 (P. S. T.)—9 A. M., music and lectures by the California State Department of Education. 10:40, classroom instruction by Oakland public schools. 11:30 to 1 P. M., luncheon concert, courtesy Pacific States Electric Company. 1:30, N. Y. and S. F. stock reports and weather. 3, studio musical program and speaker. 4 to 5:30, Henry Halstead's dance orch., Hotel St. Francis, San Francisco. 5:30 to 6, Aunt Betty stories and KGO Kiddies' Klub. 6:45, final reading, stock reports, weather, S. F. produce news, and news items. 8, educational program; music by Arion trio; address on agricultural subject by a professor of the College of Agriculture, University of California; "A Lesson in English," Wilda Wilson Church; "How to Improve Your Memory," Albertine Richards Nash, consulting psychologist; address "On being a good hostess, and on being a good guest," Edith Stevens Giles; "Chats About New Books," Joseph Henry Jackson. 10 P. M. to 1 A. M., dance music program by Henry Halstead's orch. and soloists, Hotel St. Francis, San Francisco.

WCAL, Northfield, Minn., 336.9 (C. S. T.)—9:45 A. M., St. Olaf College chapel services. 11 P. M., organ recital by Elnor Overland from Grand theatre. Tuesday, March 17, 9:45 A. M., St. Olaf College chapel services.

WOS, Jefferson City, Mo., 440.9 (C. S. T.)—8 P. M., addresses: Homer F. Williams, Bollinger Co.; Lon S. Hayes, Greene Co.; Earl E. Roberts, Crawford Co.; "Relation of Physical Education to Racial Survival," by Dr. Henry S. Curtis, State Director Hygiene and Physical Education; piano recital by Professor F. J. Zeisberg, Jefferson City.

WEAR, Cleveland, Ohio, 390 (E. S. T.)—7 to 8 P. M., musical program direct from Loew's State theatre.

WGN, Chicago, 370 (C. S. T.)—9:31 A. M., time. 9:35, stock and farm quotations. 10, wheat. 10:30, wheat and cable reports. 11, wheat, weather, dairy reports. 11:30, wheat, grain and livestock receipts. 11:56, time. 12, wheat, board of trade. 12:10 P. M., board of trade quotations; hog sales. 12:35, Tea Room orch. 1, wheat. 1:05, Tea Room orch. 1:35, readings. 1:40, Drake concert ensemble and Blackstone string quintet. 2:30, musical recital. 3, miscellaneous entertainment. 5, stock exchange and market. 5:30, Skeezix time for children. 5:57, time.

WGR, Buffalo, N. Y., 319 (E. S. T.)—10:45 A. M., Gold Medal home service talk by Betty Crocker. 6:30 P. M., Kneif's Tokio orch. 8, "The Board of Education and Its Relation to the Public," by Mrs. Wm. Felton. 9, concert by Robertson-Cataract Elec. Co. of Buffalo, Rochester, Syracuse and Utica. 10, recital by Robert Fletcher. 10:30, Fred Dempsey, Danny Engeli and Henry Murtagh, song writers.

WGY, Schenectady, N. Y., 379.5 (E. S. T.)—2 P. M., music; talk, "How to Select Stockings," Miss Ruth Scott, New York State College of Home Economics, Cornell University. 6:20, sport talk by Harold Anson Bruce, director of athletics, Union College. 6:40, dinner music by Ten Eyck trio, Albany. 7:30, program by Julia Lemmler, pianist; Marion McKeon, soprano; George A. Avery, tenor; Euretta M. Avery, reader, and Ralph Martin, pianist.

Tuesday, March 17

CKAC, Montreal, Can., 411 (E. S. T.)—4 P. M., weather and stock reports. 7, kiddies stories. 7:30, Windsor Hotel dinner concert. 8:30, Irish hour; talk. 10:30 P. M. to Midnight, Windsor Hotel dance orch.; frolics.

KOA, Denver, 323 (M. S. T.)—12:20 to 12:50 P. M., Rialto (theatre) organ recital. 1, N. Y. stock reports (2 o'clock quotations); livestock; fruit and vegetable report and weather. 3, half hour matinee, for housewives. 6 to 6:30, dinner music (instrumental). 6:30, final reading, N. Y. stock reports; livestock; vegetables and late news bulletins. Silent night.

WFAA, Dallas, Tex., 476 (C. S. T.)—12:30-1 P. M., address, Charles E. Osborne, Dallas Y. M. C. A., on health; music. 6:30-7:30, Haulea School of Hawaiian Music, J. B. Stevenson, superintendent, in vesper recital. 8:30-9:30, Camp Fire Girls, Schubert Choral Club. 11-12 (Midnight), Palace Theatre organ recital, Dwight Brown playing.

WEEL, Boston, 303 (E. S. T.)—12:15 P. M., Lenten service direct from B. F. Keith's Theatre under the auspices of the Greater Boston Federation of Churches; B. U. College Liberal Arts Choir. 1, Civitan Club. 2, musicale. 6:30, Big Brother Club. 7:15, Fleur Brousseau, mezzo-soprano. 7:30, Dok-Eisenbourg and his Sinfonians. 8, from New York; musicale. 8:30, Gold Dust Twins. 9, Eveready hour. 10, Goodrich Silvertown Cord orch.

WWJ, Detroit, 352.7 (E. S. T.)—8 A. M., setting-up exercises by R. J. Horton, Detroit

Y. M. C. A. 9:30, "Tonight's Dinner" and a special talk. 10:25, weather. 11:55, time. 12:05 P. M., Klein's Hotel Statler orch. 3, Detroit News orch. 3:50, weather. 3:55, market reports. 6, dinner concert. 8, concert from WEAF.

WKAQ, Porto Rico, 340.7 (E. S. T.)—1, musical selections by WKAQ orch; director Jesus Figueroa. 2, songs by Josefina Moreno, piano by Mrs. Figueroa. 3, news. 4, musical selections by WKAQ orch.

KGW, Portland, Ore., 491.5 (P. S. T.)—11:30 A. M., weather. 12:30 P. M., concert by Rose City Trio. 5, children's program by Uncle Dave. 7:15, markets, weather, news and police reports. 8, Oregon Agricultural College lecture. 8:30, concert. 10, Multnomah Hotel Strollers (2 hours).

KPO, San Francisco, 423 (P. S. T.)—7 A. M., Daily Dozen (health exercises) by Bernard Drury, piano accompaniment by Mel Lyons. 10, chat for the housewives on "Home Making" by "Prudence Penny" of the San Francisco Examiner. 10:30, News. 10:40, "What is playing at the Local Theatres." 10:50, market report on eggs, butter, cheese and poultry. 12 noon, time; scripture. 1 to 2 P. M., Seiger's orch. 2:30 to 3:30, matinee by the Pavo Real orch. 4:30 to 5:30, Seiger's orch. 5:30 to 6:30, children's hour stories by Big Brother of KPO, taken from the Book of Knowledge. 6:20, garden hints. 6:30 to 7, dinner program by the Camp Fire Girls. 7:30 to 8, Seiger's orch. 8 to 10, U. S. Army Band.

WGR, Buffalo, N. Y., 319 (E. S. T.)—11 A. M., Mrs. Katharine Norton Britt, Mgr. Buffalo Home Bureau. 6 P. M., Hallpryd string trio, dinner music. 8, joint broadcasting with WEAF, New York City, including the Eveready hour from 9 to 10.

WGY, Schenectady, N. Y., 379.5 (E. S. T.)—2 P. M., music; one-act play, "The Girl" by the WGY matinee players. 2:30, organ selections by Stephen E. Boisclair, from Proctor's Harmanus Blecker Hall, Albany. 6:30, dinner music by New Kenmore Hotel orch. 7:30, address, "Financing a College Education," by Hartley R. Dewey, assistant treasurer of Union College. 7:40, Irish program by WGY orch. and Joseph Culhane, tenor. 9, Brunswick hour of music; music memory contest provided by recording artists of Brunswick Balke-Collider Company; also broadcast by WJZ, WRC, KDKA and KYW. 10:30, Meyer-Davis orch., Washington, D. C., also broadcast by WJZ and WRC. 11:30, organ recital by Stephen F. Boisclair, from Proctor's Harmanus Blecker Hall, Albany.

KTHS, Hot Springs, Ark., 374.8 (C. S. T.)—8:30 to 9:45 P. M., Saint Patrick's night concert, featuring Irish folk songs and melodies by the C. L. Fischer orch. and tenor solos by Tubby Veil. 9:45 to 10:45, dance by the Meyer-Davis-Norling orch., Jacques Renard, director.

ALW, Cincinnati, O., 423.3 (C. S. T.)—10:45 A. M., weather; business reports. 11:55, time. 12 M., physical exercises from the Central Y. M. C. A.; William Stradtman, instructor. 12:15 P. M., program by the Delta Omicron Sorority. Clifford Lang, Prince of Ivories. 1:30, business reports. 3, market reports. 4, piano recital by pupils; talk, "Auction Bridge," Lucy Blackburn. 6, concert. 8, program under the auspices of Coffee Co.; George Maier; Quartet of Brass arranged by William Kopp. 8:30, Hughes High School Band, direction of A. R. Kratz. 9:30, Camp Fire Girls, with short talk by Beatrice Shillito.

KNX, Los Angeles, Cal., 337 (P. S. T.)—6:7:30 P. M., dinner hour program, Durant. 7:30-8, style talk by Constance Service. 8-9, musicale. 9-10, KNX feature program. 10-12, Lyman's orch. (movie night).

WBAP, Fort Worth, Texas, 476 (C. S. T.)—12:05 to 12:30 P. M., Ward's "Trail Blazers," played in their studio. (W. E. B.) 7:30 to 8:30 P. M., program of classical music arranged by Mrs. Helen Brandies. (C. B. L.) 9:30 to 10:45, E. Clyde Whitlock's violin ensemble. (W. E. B.)

WEAR, Cleveland, Ohio, 390 (E. S. T.)—7 to 8 P. M., Metcalf Memorial organ recital by Mr. Vincent H. Percy. 8 to 10, concert arranged by WEAF of New York and relayed through WEAR.

KGO, Oakland, Cal., 361 (P. S. T.)—11:30 A. M.—1 P. M., luncheon concert, courtesy Pacific States Electric Co. 1:30, N. Y. and S. F. stock reports and weather. 4 to 5:30, concert orchestra of the Hotel St. Francis, San Francisco, Vinton La Ferrera conducting. 6:45, final reading, stock reports, weather, S. F. produce news, and news items. 8, part one: St. Patrick's Day program; medley of old time Irish Reels. J. O. Aber; KGO male quartet; address, "Irish Names in America," Philip M. Carey; Beatrice L. Sherwood, pianist; Richard Lundgren, bass; address, "The Origin of St. Patrick's Day," Norman H. Nesbitt, M. A., Hugh Williams, tenor; Corinne Keefer, contralto; Irish Repartee (dialogue) by H. E. Jager and Carl Anderson; Willard J. Schindler, baritone. Part two: Hawaiian Harmony Kings; Ethel E. Keyser, soprano; address, "My most thrilling experiences hunting mountain lions," Jay Bruce, State lion hunter for the Fish and Game Commission of California. 10 P. M. to 1 A. M., dance music program by Henry Halstead's orch. and soloists, Hotel St. Francis, San Francisco.

WGN, Chicago, 370 (C. S. T.)—9:31 A. M., time. 9:35, stock and farm quotations. 10, wheat. 10:30, wheat and cable reports. 11, wheat, weather, dairy reports. 11:30, wheat, grain and livestock receipts. 11:56, time. 12, wheat, board of trade. 12:10 P. M., board of trade quotations; hog sales. 12:35, Tea Room orch. 1, wheat. 1:05, Tea Room orch. 1:35, readings. 1:40, Drake concert ensemble and Blackstone string quintet. 2:30, musical recital. 3, miscellaneous entertainment. 5, stock exchange and market. 5:30, Skeezix time for children. 5:57, time.

Wednesday, March 18

CKAC, Montreal, Can., 411 (E. S. T.)—1:45 P. M., Windsor Hotel luncheon concert. 4, weather and stock reports.

WKAQ, Porto Rico, 340.7 (E. S. T.)—8 to 10 P. M., concert from the Plaza Baleriody de Castro by the Municipal Band of San Juan, director Professor Manuel Tizel.

KOA, Denver, 323 (C. M. T.)—12:20 to 12:50 P. M., organ recital. 1, N. Y. stock reports (2 o'clock quotations); live stock; fruit and vegetable report and weather. 6, N. Y. stock reports; livestock; vegetables, news. 8, music by Schmitt orch. 8:10, Clem Yore, poet of the Rockies; KOA orch.; instrumental and vocal solos. 10 P. M. to midnight, dance by Mann orch.

WEEL, Boston, 303 (E. S. T.)—12:15 P. M., Lenten service direct from B. F. Keith's Theatre under the auspices of the Greater Boston Federation of Churches; Centenary Choir, Auburndale. 2, musicale. 6:30, Big Brother Club. 7:25, Elizabeth Haley, soprano. 7:50, Harry Einstein, the Bad Boy from the Good Home. 8, the Traveler Shoe orch. 8:30, M. B. Cohan's half hour musicale. 9, Gillette Safety Razor Opera Company. 10, Dok-Eisenbourg and his Sinfonians.

PWX, Havana, Cuba, 400 (E. S. T.)—Concert at the Malecon Band Stand, by the band of the Cuban Navy, Lieut. Juan Iglesias, leader.

WFAA, Dallas, Tex., 476 (C. S. T.)—12:30-1 P. M., musical program by Alex. Hughes, pianist. Station silent for the remainder of day and night.

WWJ, Detroit, 352.7 (E. S. T.)—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, Public Health Service bulletins and talks. 10:25, weather. 11:55, time. 12:05 P. M., Klein's orch. 3, Detroit News orch. 3:50 weather. 3:55, market reports. 6, dinner concert. 3, Detroit News orch.; Anne Campbell, poetess. 10, Goldkette's orch.

KFAE, Pullman, Wash., 348.6 (P. S. T.)—2 P. M., piano solos, Thelma Johnson, Palouse; banjo solos, George Hunt; preparing for the Spring Garden, Prof. C. L. Vincent; The Vacuum Tube, Dean H. V. Carpenter; Pointers on Dairy Farming, Prof. E. V. Ellington; Rearing Pullets with High Priced Feed, W. D. Buchanan.

KGW, Portland, Ore., 491.5 (P. S. T.)—11:30 A. M., weather. 12:30 P. M., concert by Rose City Trio. 5, children's program. 6, concert. 7:15, markets, weather, news, police reports. 8, concert. 10, Colburn's Melody Men.

KPO, San Francisco, 423 (P. S. T.)—7 A. M., "Daily Dozen" by Bernard Drury, piano accompaniment by Mel Lyons. 10:30, News. 10:40, "What is playing at the Local Theatres. 11:50, market report on eggs, butter, cheese and poultry. 12 noon, time signals from the Naval Observatory; reading of the scripture. 1 to 2 P. M., Seiger's orch. 2:30 to 3:30, matinee program by Johnny Buick's Amphians. 4:30 to 5:30, Seiger's orch. 5:30 to 6:30, children's hour stories by Big Brother of KPO, taken from the Book of Knowledge. 7 to 7:30, Seiger's orch. 7:30 to 8, Band Instrument Co., Reg Code, director. 8 to 11, piano solos by Wilma Dainty; soprano solos by Melvina H. Cohn; two-piece band by the Hamme Bros.; musical program by talent from Watsonville, Cal.

KTHS, Hot Springs, Ark., 374.8 (C. S. T.)—8:30 to 10 P. M., return engagement of the Waterloo Fiddle Band, champions of Nevada county, Ark., with country quartet and specialties. 10 to 11, dance concert by Charles L. Fischer and his 11-piece Eastman orch.

ALW, Cincinnati, O., 423 (C. S. T.)—10:45 A. M., weather and business. 11:55, time. 12 M., physical exercises from the Central Y. M. C. A.; William Stradtman, instructor. 12:15 P. M., Mu Phi Sorority; piano solos by Irene Downing and Marjory Hebestreit; dance by Ahaus orch. 1:30, business reports. 3, market reports. 4, program for the "Shut-Ins" given by Duning Benevolent and Musical Service (Cincinnati Exchange Club), Thayer Settlement Schools, other institutions. 6, concert. 10, entertainment; Esberger's Inst. Quartet; selections by the Lyric Male Quartet; (accompanist); concert program by the Electric Instrumental Trio. 11, Sharp's Collegians of Miami University (from Oxford for special radio performance); solos by Clifford Lang, pianist.

WEMC, Berrien Springs, Mich., 286 (C. S. T.)—8:15 P. M., program by Ladies of Home Economics Department of Emmanuel College; Miss Mary Lamson, weekly bird chat.

KNX, Los Angeles, Cal., 337 (P. S. T.)—6:15-7 P. M., dinner program. 7-8, orch., Josef Rosenfeld, leader. 8-10, KNX feature program. 10 to 12, dance orch.

WBAP, Fort Worth, Texas, 476 (C. S. T.)—12:05 to 12:30 P. M., musical program. 7:30 to 8:30, program arranged by the Music Study Club of Fort Worth, under the direction of Mrs. Paul C. Brown. (C. B. L.) 9:30 to 10:45, dance program by Johnny Jackson's Texas Hotel orch. (The Hired Hand.) Midnight to 1 A. M., dance program by Frensey Moore's Black and Gold Serenaders. (W. E. B.)

WEAR, Cleveland, Ohio, 390 (E. S. T.)—7 to 8 P. M., dinner concert by Ivan Francisci and his Hotel Cleveland orch., direct from Hotel Cleveland.

WCAL, Northfield, Minn., 336.9 (C. S. T.)—9:45 A. M., St. Olaf College chapel services.

WOS, Jefferson City, Mo., 440.9 (C. S. T.)—8 P. M., addresses: "Fertilizing the Corn Crop," by M. F. Miller, professor of soils, College of Agriculture, Columbia; "Southeast Missouri," by Roy Godsey; readings by Morton H. Pemberton, Centralia; old time fiddlin' music sponsored by William A. Lantz of Guthrie.

KGO, Oakland, Cal., 361 (P. S. T.)—11:30 A. M. to 1 P. M., luncheon concert, courtesy Pacific

(Wednesday, March 18, continued)
 States Electric Company, 1:30, N. Y. and S. F. stocks report and weather. 3, musical program, and speaker from Cora L. Williams Institute, 4 to 5:30, concert orchestra of the Hotel St. Francis, San Francisco, Vinton La Ferrara conducting. 6:45, final reading, stock reports, weather, S. F. produce news, and news items. Silent night.
 WGN, Chicago, 370 (C. S. T.)—9:31 A. M., time, 9:35, stock and farm quotations, 10, wheat, 10:30, wheat and cable reports, 11, wheat, weather, dairy reports, 11:30, wheat, grain and livestock receipts, 11:56, time, 12, wheat, board of trade, 12:10 P. M., board of trade quotations; hog sales, 12:35, Tea Room orch., 1, wheat, 1:05, Tea Room orch., 1:35, readings, 1:40, Drake concert ensemble and Blackstone string quintet, 2:30, musical recital, 3, miscellaneous entertainment, 5, stock exchange and market, 5:30, Skeezix time for children, 5:57, time.
 WGR, Buffalo, N. Y., 319 (E. S. T.)—10:45 A. M., Gold Medal home service talk by Betty Crocker, 8:15-10:15 P. M., Philharmonic Society of New York, direct from Carnegie Music Hall, New York City.
 WGY, Schenectady, N. Y., 379.5 (E. S. T.)—6:30 P. M., program for children, 6:45, adventure story from "Youth's Companion," 7, Albany Strand Theatre orch., Julius Boxhorn, conductor.

Thursday, March 19

WEAR, Cleveland, Ohio—7 to 8 P. M., Metcalf memorial organ recital by Mr. Vincent H. Percy, 8 to 11, program arranged by WEAF of New York and relayed through WEAR.
 KGO, Oakland, Cal., 361 (P. S. T.)—10 A. M., classroom instruction by Oakland public schools, 11:30 A. M. to 1 P. M., luncheon concert, courtesy Pacific States Electric Company, 1:30 P. M., N. Y. and S. F. stock reports and weather, 4 to 5:30, concert orch. of the Hotel St. Francis, San Francisco, Vinton La Ferrara conducting, 6:45, final reading, stock reports, weather, S. F. produce news, and news items, 7:15, golf lesson, Joe Novak, 8, "Billy," a comedy in three acts, by George Cameron, presented by the KGO Players under the direction of Wilda Wilson church; music by the Arion trio, 10 P. M. to 1 A. M., dance music program by Henry Halstead's orch. and soloists, Hotel St. Francis, San Francisco.
 WCAL, Northfield, Minn., 336.9 (C. S. T.)—9 P. M., musical program by Mrs. Sara Bjorseth Brye, pianist; Alice Stibb, pianist; Herbert Hauge, saxophone; John Gardsmo, baritone.
 WBAP, Fort Worth, Texas, 476 (C. S. T.)—12:05 to 12:30 P. M., musical program, 7:30 to 8:30, musical program arranged by the Euterpean club of Fort Worth, (C. B. L.) 9:30 to 10:45, musical program, presenting artists of Texas Christian University, (W. E. B.)
 WGR, Buffalo, N. Y., 319 (E. S. T.)—6:7:30 P. M., Hallpryd string trio, dinner music, 8-11, joint broadcasting with WEAF, New York City, including the Otwater Kent Radio Artists from 9 to 10.
 WGY, Schenectady, N. Y., 379.5 (E. S. T.)—2 P. M., music; talk, "How to Select Gloves," Miss Ruth Scott, New York State College of Home Economics, Cornell University, 2:30, organ recital by Stephen E. Boisclair, 6:30, dinner music by Hotel Ten Eyck trio, Albany, 7:30, review of new books, by William Jacoby orch., 8:15, comedy, "Agatha's Aunt," by Sidney Foler, presented by WGY players, 11:30, organ recital by Stephen E. Boisclair, from Proctor's Harmanus Bleecker Hall, Albany.

CKAC, Montreal, Can., 411 (E. S. T.)—4 P. M., weather and stock reports, 4:45, Harold Leonard's Red Jackets, 8:30, program under the directorship of the Canadian National Railways, call letters CNRM.
 WKAQ, Porto Rico, 340.7 (E. S. T.)—8:30 to 10 P. M., concert from restaurant "La Cafetera," courtesy of Luis Jordan.
 WFAA, Dallas, Tex., 476 (C. S. T.)—12:30-1 P. M., DeWitt McMurray, editor The Semi-Weekly Farm News; talk, music, 6:30-7:30, Vesper recital by the Lone Star Five's orch.; Ray Ogden, manager, 8:30-9:30, Baptist Quartet from Van Alstyne, Teas, 11-12 (midnight), Violin recital by Edward Cramer, first violinist of the Palace Theatre.
 KOA, Denver, 323 (M. S. T.)—12:20 to 12:50 P. M., Rialto (theatre) organ recital, 1, N. Y. stock reports (2 o'clock quotations); live stock; fruit and vegetable report and weather, 3, Half hour matinee for housewives, 6, final reading, N. Y. stock reports; live stock, vegetables and late news bulletins, Silent night.
 WEEI, Boston, 303 (E. S. T.)—12:15 P. M., Lenten service direct from B. F. Keith's theatre under the auspices of the Greater Boston Federation of Churches; Miss L. M. Van De Mark, soprano, 1, Assembly luncheon, Boston Chamber of Commerce, 3:15, Noah's Arkadians, Joe W. Rines, director, 6:30, Big Brother Club, 7:25 Greater Boston Federation of Churches, 7:55, Pathe News Flashes, 8, from New York, musicale.

WWJ, Detroit, 352.7 (E. S. T.)—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, Public Health Service bulletins and talks on subjects of general interest, 10:25, weather, 11:55, time, 12:05 P. M., Klein's orch, 3, Detroit News orch, 3:50, weather, 3:55, market reports, 6, dinner concert, 8, concert broadcast from New York through WEAF.
 KGW, Portland, Ore., 491.5 (P. S. T.)—11:30 A. M., weather, 12:30 P. M., concert by Rose

City Trio, 5, children's program, 7:15, market, weather, news, police reports, 8, Oregonian concert orch, 10, Multinam Hotel Strollers (2 hours).
 KFO, San Francisco, 423 (P. S. T.)—7 A. M., "Daily Dozen" by Bernard Drury, piano accompaniment by Mel Lyons, 10:30, News Bulletins, 10:40, "What is playing at the Local Theatres," 11:50, market report on eggs, butter, cheese and poultry, 12 noon, time, scripture, 1 to 2 P. M., program by Rud Seiger's Fairmont Hotel orch., by wire telephony, 4:30 to 5:30, Seiger's orch, 5:30 to 6:30, children's hour stories by Big Brother of KFO, taken from the Book of Knowledge, 6:30, "What is playing in the Local Theatres," 7 to 7:30, Seiger's orch., by wire telephony, 8 to 9, organ by Theodore J. Irwin, 9 to 10, soprano solos by Patricia Calloway; program under the management of Mrs. Wm. Empey, cornetist, 10 to 11, Gene James' Rose Room Jowl orch., playing at the Palace Hotel.
 KTHS, Hot Springs, Ark., 374.8 (C. S. T.)—8:30 to 9 P. M., frolic by the Meyer Davis Comedy Trio, Phil Wall, piano; Sam Izen, singer; Jack Cressy, clarinetist, 9 to 10, organ recital from the Princess Theatre by Lawson Reid, 12:15 to 1:45 A. M., Midnight Studio Lark by Phil Baxter and his singing orch.
 WLW, Cincinnati, O., 423 (C. S. T.)—10:45 A. M., weather, business reports, 11:55, time, 12, physical exercises from the Central Y. M. C. A.; William Stradtman, instructor, 12:15 P. M., noonday concert, health talk by Dr. Carl Wilz, back, 1:30, business reports, 3, market reports, 4, French lesson by Madame Ida Teimpidis; piano recital by Adelaide Apfel, 6, dinner hour concert, 10, three minute message from the Civil Service Department of the United States Government, 10:03, concert program; orch. and male quartet.
 KNX, Los Angeles, Cal., 337 (P. S. T.)—4 P. M., Estelle Lawton Lindsay's Travel Talk, 6:30-7:30, L. A. County Assn. of Optometrists sponsoring, 8:10, KNX feature program, 10-11, Lyman's Cocoanut Grove orch.

WGN, Chicago, 370 (C. S. T.)—9:31 A. M., time, 9:35, stock and farm quotations, 10, wheat, 10:30, wheat and cable reports, 11, wheat, weather, dairy reports, 11:30, wheat, grain and livestock receipts, 11:56, time, 12, wheat, board of trade, 12:10 P. M., board of trade quotations; hog sales, 12:35, Tea Room orch., 1, wheat, 1:05, Tea Room orch., 1:35, readings, 1:40, Drake concert ensemble and Blackstone string quintet, 2:30, musical recital, 3, miscellaneous entertainment, 5, stock exchange and market, 5:30, Skeezix time for children, 5:57, time.
Friday, March 20
 CKAC, Montreal, Can., 411 (E. S. T.)—1:45 P. M., luncheon concert from the Windsor Hotel, 4, weather and stock reports, 4:30, No lessons.
 KOA, Denver, 323 (M. S. T.)—12:20 to 12:50 P. M., organ, 1:00, N. Y. stock reports (2 o'clock quotations); live stock; fruit and vegetable report and weather, 3, half hour matinee for housewives, 6, final reading, N. Y. stock reports; live stock; vegetables and late news bulletins, 6:40, Book of Knowledge program (questions and answers), 8, ten minutes of music by Fred Schmitt and his Rialto theatre orch., Denver, 8:10, studio program, piano numbers by pupils, mixed quartet; address: "Music in the Life of the Child," by Mrs. Frederika H. Wadley, and KOA orch. selections.
 WEEI, Boston, 303 (E. S. T.)—12:15 P. M., Lenten service direct from B. F. Keith's Theatre under the auspices of the Greater Boston Federation of Churches, People's Baptist Church Choir, 2, Happy Hawkins and his orchestra, 6:30, Big Brother Club, 7:30, program courtesy Neapolitan Ice Cream Company, Neapolitan Male Quartet, 8:30, Sadrion Trio, 9, Broderick's Orchestra of Lowell, 10, organ recital from the Boston Chamber of Commerce; Louis Weir, director.
 WFAA, Dallas, Tex., 476 (C. S. T.)—12:30-1 P. M., address, Dr. Robert Stewart Hyer, president emeritus of Southern Methodist University, on the Sunday school lesson, 4:30-5, woman's hour, with music, reading and talk, 6:30-7:30, Vesper recital by Jack A. Davis, pianist, 8:30-9:30, Municipal Band from Plano, Texas; Dr. C. J. Hicks, manager.
 WWJ, Detroit, 352.7 (E. S. T.)—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, Public Health Service bulletin and talks on subjects of general interest, 10:25, official weather forecast, 11:55, Arlington time relayed by the Western Union, 12:05 P. M., Jules Klein's Hotel Statler orch, 3, Detroit News orch, 3:50, weather, 3:55, market reports, 6, dinner concert, 8, Detroit News orch, 9, Jean Goldkette's Victor Recording orch.
 KFO, San Francisco, 423 (P. S. T.)—7 A. M., "Daily Dozen" by Bernard Drury, piano accompaniment by Mel Lyons, 10, chat for the housewives on "Home Making" by "Prudence Penny" of the San Francisco Examiner, 10:30, "Ye Towne Cryer" News bulletins, 10:40, "What is playing at the Local Theatres," 11:50, market report on eggs, butter, cheese and poultry, 12 noon, time signals from the Naval Observatory; reading of the scripture, 1 to 2 P. M., Seiger's orch, 12:45, Commonwealth Club luncheon speech, broadcast from the Palace Hotel, 4:30 to 5:30, Seiger's orch, 8 to 10, orch., presented by the direction of Wilt Gunzendorfer.
 WLW, Cincinnati, O., 423 (C. S. T.)—10:45 A. M., weather forecast and business reports, 11:55, correct time, 12, physical exercises from the Central Y. M. C. A.; William Stradtman, in-

structor, 12:15 P. M., dance program by the Ahaus Brunswick Shop orch.; William Cook, director, 1:30, business reports and stock quotations.
 KTHS, Hot Springs, Ark., 374.8 (C. S. T.)—8:30 to 9 P. M., selections by Fischer orch, trio, 9 to 10, program by the Meyer Davis-New Arlington Ensemble, Jacques Renard, director.
 WEMC, Berrien Springs, Mich., 286 (C. S. T.)—9 P. M., Radio Choir in "Famous Reformation Hymns"; Miss Opal Hoover, saxophonist; Bible chat, Fred Mote.
 KNX, Los Angeles, Cal., 337 (P. S. T.)—11:30 A. M., Estelle Lawton Lindsay's talk to women, 1 P. M., N. D. Garver, chief testing engineer of KNX, 6:30-7:30, dinner hour program, 8:10, College Frats program, 11-12, Lyman's Cocoanut Grove orch.
 WGBS, N. Y. C., 316 (E. S. T.)—6:30 P. M., Herman Bernard, managing editor of RADIO WORLD, "Radio Hookups and Problems," Mr. Bernard is on the air at this station every Friday at 6:30 P. M.
 KGW, Portland, Ore., 491.5 (P. S. T.)—11:30 A. M., U. S. weather forecast, 12:30 P. M., concert by Rose City Trio by courtesy Pacific States Electric Company, 5, children's program, 6, dinner concert, 7:15, market, weather, and news bulletins, and police reports, 8, lecture sponsored by University of Oregon Extension division, 10:30, Hoot Owls.
 KFAE, Pullman, Wash., 348.6 (P. S. T.)—Soprano solos, Vera Bohlich, Grandview; violin solos, Marguerite MacLachlan, Dayton; Keeping rabbits, Charles Stone; what is worth seeing in Paris, Prof. Carl M. Brewster; controlling disease helps marketing, George L. Zundel; planning spring pageants, Prof. M. L. Daggy, book chat, Alice Lindsay Webb.
 WBAP, Fort Worth, Texas, 476 (C. S. T.)—12:05 to 12:30 P. M., Ward's "Trail Blazers," playing in their studio, (W. E. B.) 4, educational lecture; weekly book review by Peter Molyneux, 7:30 to 8:30, Wagner's Old Time Fiddlers, (C. B. L.) 9:30 to 10:45, program presenting artists of Texas Woman's College, (W. E. B.)
 WEAR, Cleveland, Ohio, 390 (E. S. T.)—7 to 8 P. M., program by Alumni of Akron University, 8 to 10, program from the studio; International Quartet; Florence Wasson, soprano; James Blair, bass; Marie Simmel Jones, contralto; Sam Roberts, tenor; Mrs. J. P. Powell Jones, accompanist; Rudolph Ringwall, violinist; Budd Cross, pianist.
 KGO, Oakland, Cal., 361 (P. S. T.)—11:30 A. M., to 1 P. M., luncheon concert, courtesy Pacific States Electric Company, 1:30, N. Y. and S. F. stock reports and weather, 3, studio musical program and speaker, 4 to 5:30, concert orch. of the Hotel St. Francis, San Francisco, Vinton La Ferrara conducting, 6:45, final reading, stock reports, weather, S. F. produce news, and news items, Silent night.

WOS, Jefferson City, Mo., 440.9 (C. S. T.)—8 P. M., address: "Sowing Alfalfa in Springtime," by Samuel M. Jordan of the Missouri State Board of Agriculture; original poems by LeRoy H. Kelsey, secretary to Governor Sam A. Baker, called the "Edgar A. Guest of Missouri"; St. Pat's Ball, Missouri University, Columbia.
 WCAL, Northfield, Minn., 336.9 (C. S. T.)—9:45 A. M., St. Olaf College chapel services, 8:30 P. M., book talk, by Dr. George Weida Spohn, head of the department of English at St. Olaf College.
 WGN, Chicago, 370 (C. S. T.)—9:31 A. M., time, 9:35, stock and farm quotations, 10, wheat, 10:30, wheat and cable reports, 11, wheat, weather, dairy reports, 11:30, wheat, grain and livestock receipts, 11:56, time, 12, wheat, board of trade, 12:10 P. M., board of trade quotations; hog sales, 12:35, Tea Room orch., 1, wheat, 1:05, Tea Room orch., 1:35, readings, 1:40, Drake concert ensemble and Blackstone string quintet, 2:30, musical recital, 3, miscellaneous entertainment, 5, stock exchange and market, 5:30, Skeezix time for children, 5:57, time.
 WGR, Buffalo, N. Y., 319 (E. S. T.)—10:45 A. M., Gold Medal home service talk by Betty Crocker, 6:30-7:30 P. M., Buffalo Trust hour, 8-9, "Madame Butterfly," educational opera entertainment by the Radio Opera Educational Booklet, 9-10, University of Buffalo, Musical Organization, 10-11, Larkin string orch.

WGY, Schenectady, N. Y., 379.5 (E. S. T.)—2 P. M., music; talk, "Artists in Piano and Song," by Mrs. St. Julien Bell, Woman's Club of Schenectady, 6:30, International Sunday school lesson, 7, Albany Strand Theatre orch., Julius Boxhorn, conductor, 7:30, health talk, 7:40, grand opera, "Il Trovatore," presented by WGY Grand Opera Company, William Fay, director, 10:30, program by Hawaiian four; Bessie Slavin, soprano, and: Thelma V. Tabor, pianist.

Saturday, March 21

CKAC, Montreal, Can., 411 (E. S. T.)—7 P. M., kiddies stories, 7:30, Harry Salter's trio from the Windsor, 8:30, variety program, 10:30, Harold Leonard's red jackets from the Windsor grill.
 WFAA, Dallas, Tex., 476 (C. S. T.)—12:30-1 P. M., address, Epps G. Knight, 6-7, Vesper recital by Honey Boys orch, 11-12 (midnight), Adolphus Hotel orch., playing in the junior ballroom.
 KTHS, Hot Springs, Ark., 374.8 (C. S. T.)—8:30 to 9:45 P. M., concert by the Charles L. Fischer orch., with tenor solo specialties, 9:45 to 10:45, dance concert by the Meyer Davis-New Arlington Hotel orch., Jacques Renard, director.
 WLW, Cincinnati, O., 423 (C. S. T.)—10:45 A. M., weather forecast and business reports, 11:55, correct time, 12, setting-up exercises from the Central Y. M. C. A.; William Stradtman, instructor, 1:30 P. M., business reports; stock

(Saturday, March 21, continued)

quotations, 3, dance program and other features. 6, dinner hour concert. 8:15, popular music presented symphonically by Henry Lange and his Hotel Sinton orch.

KPO, San Francisco, 423 (P. S. T.)—7 A. M., "Daily Dozen" by Bernard Drury, piano accompaniment by Mel Lyons. 10:30, news bulletins. 10:40, "What is playing at the Local Theatres." 11:50, market report on eggs, butter, cheese and poultry. 12 noon, time signals from the Naval Observatory; reading of the scripture. 1 to 2 P. M., Seiger's orch. 2:30 to 3:30, musical matinee. 3:30 to 5:30, tea dansant; Gene James' Rose Room Bowl orch., by wire telephony, from the Palace Hotel. 6:20, garden hints. 6:30, what is playing at the Local Theatres. 8 to 12, Weidner dance orch.

KGW, Portland, Ore., 491.5 (P. S. T.)—11:30 A. M., weather. 12:30 P. M., concert by Rose City Trio by courtesy Pacific States Electric Company. 10, Colburn's Melody Men of the Hotel Portland, and intermission solos.

PWX, Havana, Cuba, 400 (E. S. T.)—Concert at the studio of Station PWX, by the tenor, Fausto Alvarez; soprano, Julie P. Villate and others.

WWJ, Detroit, 352.7 (E. S. T.)—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, Public Health Service bulletin and talks on subjects of general interest. 10:25, weather. 11:55, time. 12:05 P. M., Jules Klein's Hotel Statler orch. 3, The Detroit News orch. 3:50, weather. 3:55, markets.

KOA, Denver, 323 (M. S. T.)—12:20 to 12:50 P. M., Rialto (theatre) organ recital. 1, final reading N. Y. stock reports; live stock and weather. 9 to midnight, dance music program by Joe Mann and his Rainbow-Lane orch., Shirley-Savoy Hotel, Denver.

WBAP, Fort Worth, Texas, 476 (C. S. T.)—1 P. M., Bradstreet's financial reviews and R. G. Dun's business report. 7, review of the inter-denominational Sunday school lesson by Mrs. W. F. Barnum.

WCAL, Northfield, Minn., 336.9 (C. S. T.)—9:45 A. M., St. Olaf College chapel services. 12, midnight musicale.

KGO, Oakland, Cal., 361 (P. S. T.)—11:30 A. M. to 1 P. M., luncheon concert, courtesy Pacific States Electric Company. 12:30 noon, final reading stock reports and weather. 4 to 5:30 P. M., concert orchestra of the Hotel St. Francis, San Francisco, Vinton La Ferrara conducting. 8 Part One: presented by the Amphion Club; J. Winston Petty, 'cellist; Dean Donaldson, violinist and speaker; Austin Armer, flutist; Evelyn Hahn, flutist; Beatrice Colton, pianist; French songs by Helen Bacigalupi; Margaret Fish, pianist; Mary Aelia Chamberlain, violinist; Scott Elder, violinist; Beatrice Colton, pianist; Charles S. Douglas, tenor; Frank Denke, pianist; California String Quartet. Part Two: address, "The Philippines," John W. Dunlop. 10 P. M. to 1 A. M., dance music program by Henry Halstead's orch. and soloists, Hotel St. Francis, San Francisco.

WGN, Chicago, 370 (C. S. T.)—9:31 A. M., time. 9:35, stock and farm quotations. 10, wheat, 10:30, wheat and cable reports. 11, wheat, weather, dairy reports. 11:30, wheat, grain and livestock receipts. 11:56, time. 12, wheat, board of trade. 12:10 P. M., board of trade quotations; hog sales. 12:35, Tea Room orch. 1, wheat. 1:05, Tea Room orch. 1:35, readings. 1:40, Drake concert ensemble and Blackstone string quintet. 2:30, musical recital. 3, miscellaneous entertainment. 5, stock exchange and market. 5:30, Skeezix time for children. 5:57, time.

WGR, Buffalo, N. Y., 319 (E. S. T.)—6:7:30 P. M., Hallpyrd string trio, dinner music.

WGY, Schenectady, N. Y., 379.5 (E. S. T.)—9:30 P. M., dance music by Phil Romano's orch., New Kenmore Hotel, Albany; popular songs.

Sunday, March 22

CKAC, Montreal, Can., 411 (E. S. T.)—4:30 P. M., band concert.

WFAA, Dallas, Tex., 475.9 (C. S. T.)—6:7 P. M., Radio Bible class, Dr. William M. Anderson, pastor of the First Presbyterian Church, teacher; Bible study and Gospel song. 7:30-8:30 service at Central Congregational Church, Dr. Thomas H. Harper, pastor. 8:30-9:30, musical recital by the Baylor College Choral Club of Belton, Texas. 9:30-11, the Foxtrotters orch., Lee J. Broilier, manager.

KPO, San Francisco, 423 (P. S. T.)—10:30 A. M., "What is playing at the Local Theatres." 11 to 12 noon, undenominational and non-sectarian church services; the soloist is Miss Minnie Neulen, contralto; organ selections by Theodore J. Irwin. 6:30 P. M., "What is playing at the Local Theatres." 8:30 to 10, Rudy orch.

WWJ, Detroit, 352.7 (E. S. T.)—11 A. M., services at St. Paul's Episcopal Cathedral, broadcast from the cathedral. 2 P. M., The Detroit News orch. 7:20, "Roxy and His Gang," broadcast from the Capitol theatre, New York, N. Y.

WEEL, Boston, 303 (E. S. T.)—3:45-5:30 P. M., Men's Conference Y. M. C. A., Brooklyn, N. Y. 7:20-9:15, "Roxy and His Gang," New York Capitol Theatre. 9:15-10:15, organ recital, Columbia University Chapel, N. Y.

WCBD, Zion, Ill., 344.6 (C. S. T.)—8 P. M., Male Chorus and the Brass Quartet, assisted by Ralph Bull, Dorothy Bull, Luke Ball, Mark Whiteside, L. J. Hire, P. B. Newcomer.

WBAP, Fort Worth, Texas, 476 (C. S. T.)—11 A. M., complete services of St. Paul's M. E. Church, Rev. C. D. Meade, pastor; Mrs. F. L. Jaccard, organist. 4 P. M., concert from the Rialto theatre. 11, midnight frolic by Kerner's

Crazy Hotel orch., broadcast from the lobby of the Crazy Wells Hotel, Mineral Wells, Texas, by remote control. (C. B. L.)

WHO, Des Moines, 526 (C. S. T.)—11:15 A. M., church service, sermon by Dr. Chas. S. Medbury at the University Church of Christ. 4 P. M., program, under direction of Dean Holmes Cowper of Drake University. 7:30, Reese-Hughes orch.

WOS, Jefferson City, Mo., 440.9 (C. S. T.)—7:30 P. M., religious service of the Central Evangelical Church, Rev. E. W. Berlekamp, pastor.

WCAL, Northfield, Minn., 336.9 (C. S. T.)—8:30 P. M., sacred program; sermon by Dr. Martin Hegland, head of the department of Religion at St. Olaf College.

WCN, Chicago, 370 (C. S. T.)—11 A. M., Uncle Walt reads the funnies to the children. 11:45, concert from theatre. 2 P. M., Edwin S. Seder, organ. 2:30, artists concert. 3:30, recital Musical College. 9, concert directed by Charles H. Gabriel, Jr., with WGN singers and by Drake concert ensemble.

KFI, Los Angeles, Cal., 467 (P. S. T.)—10 A. M., services by Church Federation of Los Angeles, "The Game of Life"; musical program. 4 P. M., Vesper services given by male quartet and instrumental trio. 6:45, music chat. 7, Metropolitan Theatre orch. 8, violinist and pianist, light opera numbers. 9, Examiner program. 10, orch.

Monday, March 23

WCBD, Zion, Ill., 344.6 (C. S. T.)—Zion Band assisted by mixed quartet.

KPO, San Francisco, 423 (P. S. T.)—10:30 A. M., "Ye Towne Cryer" News bulletins. 10:40, "What is playing at the Local Theatres." 12 noon, time signals from the Naval Observatory; reading of the scripture. 1 to 2 P. M., Rudy Seiger's Fairmont Hotel orch., by wire telephony. 4:30 to 5:30, Rudy Seiger's Fairmont Hotel orch., by wire telephony. 5:30 to 6:30, children's hour stories by Big Brother of KPO, taken from the Book of Knowledge. 7 to 7:30, Rudy Seiger's Fairmont Hotel orch., by wire telephony. 8 to 9, organ recital by Theodore J. Irwin, official organist, at the Wurllitzer; solisit, Mrs. Mark T. H. Shwyder, contralto. 9 to 10, program under the auspices of the J. Allec Cleaning Co., 10 to 11, Gene James' Rose Room Bowl orch., playing at the Palace Hotel.

CKAC, Montreal, Can., 411 (E. S. T.)—1:45 P. M., Windsor Hotel luncheon concert. 4, weather and stock reports. 4:30, 10 lessons.

KFAE, Pullman, Wash., 348.6 (P. S. T.)—8 P. M., contralto solos, Vay Kerns, Garfield; piano solos, Neva Lois Thompson, age 12; Modern Youth and Parental Control, Dean of Women, Annie M. Fertig; Money Values of Housework, Dean of Home Economics, Florence Harrison; Home Demonstration Clubs, Miss Maud Wilson; Agriculture in Washington, Talk 1, W. W. Underwood.

WBAP, Fort Worth, Texas, 476 (C. S. T.)—12:05 to 12:30 P. M., musical program. 7:30 to 8:30, special program arranged by Mrs. Edith Casey for hospital patients. (C. B. L.) 9:30 to 10:45, Ward's "Trail Blazers," playing popular music, broadcast from the Montgomery-Ward studio. (The Hired Hand).

WHO, Des Moines, 526 (C. S. T.)—7:30-8 P. M., Stewart Watson, American baritone; Helen Birmingham, accompanist; Sciota Mac Adow Herndon, soprano. 8-9, program, under direction of Dean Holmes Cowper of Drake University. 11:15-12, organ recital by L. Carlos Meier at the Capitol Theatre, Des Moines, Iowa.

WOS, Jefferson City, Mo., 440.9 (C. S. T.)—8 P. M., addresses: "The Show-Me Spirit," by John Boyd, state supervisor of agricultural education; J. T. Williams, Morgan Co.; musical program by Al Moore's orch. of Central and Howard-Payne Colleges of Fayette.

WCAL, Northfield, Minn., 336.9 (C. S. T.)—9:45 A. M., St. Olaf College chapel services. 11 P. M., organ recital by Elnor Overland from the Grand theatre. Tuesday, March 24, 9:45 A. M., St. Olaf College chapel services.

WGN, Chicago, 370 (C. S. T.)—9:31 A. M., time. 9:35, stock and farm quotations. 10, wheat. 10:30, wheat and cable reports. 11, wheat, weather, dairy reports. 11:30, wheat, grain and livestock receipts. 11:56, time. 12, wheat, board of trade. 12:10 P. M., board of trade quotations; hog sales. 12:35, Tea Room orch. 1, wheat. 1:05, Tea Room orch. 1:35, readings. 1:40, Drake concert ensemble and Blackstone string quintet. 2:30, musical recital. 3, miscellaneous entertainment. 5, stock exchange and market. 5:30, Skeezix time for children. 5:57, time.

KFI, Los Angeles, Cal., 467 (P. S. T.)—5 P. M., news. 5:30, news. 6:45, radiatorial period. 7, Evening Herald program. 8, musical trip around the world featuring the Hollywood string quartet. 9, classical hour. 10, Examiner program.

Tuesday, March 24

CKAC, Montreal, Can., 411 (E. S. T.)—4 P. M., weather and stock reports. 7, kiddie stories. 7:30, Windsor Hotel dinner concert. 8:30, studio concert. 10:30, Windsor Hotel dance program.

KPO, San Francisco, 423 (P. S. T.)—7 A. M., "Daily Dozens" by Bernard Drury, piano accompaniment by Mel Lyons. 10:30, "Ye Towne Cryer" news bulletins. 10:40, "What is playing at the Local Theatres." 10, chat for the housewives on "Home Making" by "Prudence Penny" of the San Francisco Examiner. 11:50, market report on eggs, butter, cheese and poultry, under the auspices of the California Poultry Producers' Assn. 12 noon, time signals from the Naval Observatory; reading of the scripture. 1 to 2 P. M., Rudy Seiger's Fairmont Hotel orch., by wire telephony. 4:30 to 5:30, Rudy Seiger's Fairmont

Hotel orch., by wire telephony. 5:30 to 6:30, children's hour stories by Big Brother of KPO, taken from the Book of Knowledge. 6:20, garden hints. 6:30, "What is playing at the Local Theatres." 7 to 7:30 orch. 8 to 10, program under the management of Jack Thomas, tenor. 10 to 11, Gene James' Rose Room Bowl orch., by wire telephony.

WBAP, Fort Worth, Texas, 476 (C. S. T.)—12:05 to 12:30 P. M., Ward's "Trail Blazers," playing in their studio. (W. S. B.) 7:30 to 8:30, musical program arranged by the Harmony Club of Fort Worth. (C. B. L.) 9:30 to 10:45, musical program presenting artists from the College of Industrial Arts, Denton, Texas. (W. E. B.)

WGN, Chicago, 370 (C. S. T.)—9:31 A. M., time. 9:35, stock and farm quotations. 10, wheat. 10:30, wheat and cable reports. 11, wheat, weather, dairy reports. 11:30, wheat, grain and livestock receipts. 11:56, time. 12, wheat, board of trade. 12:10 P. M., board of trade quotations; hog sales. 12:35, Tea Room orch. 1, wheat. 1:05, Tea Room orch. 1:35, readings. 1:40, Drake concert ensemble and Blackstone string quintet. 2:30, musical recital. 3, miscellaneous entertainment. 5, stock exchange and market. 5:30, Skeezix time for children. 5:57, time.

KFI, Los Angeles, Cal., 467 (P. S. T.)—5 P. M., news. 5:30, news. 6:45, radiatorial period. 7, pipe organ studio. 8, Examiner program. 9, dance orchestra. 10, Melody Girls.

Wednesday, March 25

CKAC, Montreal, Can., 411 (E. S. T.)—1:45 P. M., luncheon concert. 4, weather and stock market reports.

KPO, San Francisco, 423 (P. S. T.)—7 A. M., "Daily Dozen" by Bernard Drury, piano accompaniment by Mel Lyons. 10:30, "Ye Towne Cryer" News bulletins. 10:40, "What is playing at the Local Theatres." 11:50, market report on eggs, butter, cheese and poultry. 12, time signals from the Naval Observatory; reading of the scripture. 1 to 2 P. M., Rudy Seiger's Fairmont Hotel orch., by wire telephony. 5:30 to 6:30, children's hour stories by Big Brother of KPO, taken from the Book of Knowledge. 7 to 7:30, Rudy Seiger's Fairmont Hotel orch., by wire telephony. 7 to 8, program by the Conn Band Instrument Co., Reg Code, director. 8 to 10, piano solos by Ruth Ludwigson; soprano solos by Athea Burns Flenn, accompanied by Bernice Deardory; baritone solos by A. C. Clellan.

PWX, Havana, Cuba, 400 (E. S. T.)—Concert band, General Staff Band of the Cuban Army; Cuban and foreign music; Captain Jose Torres, band leader.

KFAE, Pullman, Wash., 348.6 (P. S. T.)—8 P. M., Kappa Delta sorority program; Pointers on Dairy Farming, talk 12, Prof. E. V. Ellington; The Vacuum Tube, radio talk, Dean H. V. Carpenter; Economics of Hay Production, R. N. Miller.

WBAP, Fort Worth, Texas, 476 (C. S. T.)—12:05 to 12:30 P. M., musical program. 7:30 to 8:30, East Broadway string band, under the direction of W. J. Cracy. (C. B. L.) 9:30 to 10:45, dance program by Johnny Jackson's Texas Hotel orch. (The Hired Hand.) Midnight to 1 A. M., dance music by Frensey Moore's Black and Gold Serenaders. (W. E. B.)

WHO, Des Moines, 526 (C. S. T.)—2:15 P. M., lecture by Charles A. Payne on "America's Glory Land." 6:30, Reese-Hughes orch. from the main dining room of the Hotel Fort Des Moines. 7:30, Mrs. Clyde Yountz, soprano; Miss Kathryn Mason, pianist; talent from the American Academy of Fine Arts, under direction of D. Dwight Harned. 9, Des Moines Theatre Symphonic orch., under direction of Prof. Leon A. Dashoff. 9:45, Bankers' Life Radio orch., under direction of Wm. L. Marsh.

WOS, Jefferson City, Mo., 440.9 (C. S. T.)—8 P. M., addresses: "Spraying Fruits," by A. P. Boles, extension asst. professor of horticulture, College of Agriculture, Columbia; "alue of Poultry in Missouri," by V. O. Hobbs, Kansas City; "Let Us Help You Plan a Vacation Trip," by George A. Picken, general secretary of The Missouri Association; "More and Better Sheep and Wool for Missouri," by D. C. Rogers, of the Missouri State Marketing Bureau; program of classical and operatic music by the Bichet-Botz Sisters assisted by Mrs. Homer Talbott, pianist, and Mrs. Genevieve Bratton, violinist.

WCAL, Northfield, Minn., 336.9 (C. S. T.)—9:45 A. M., St. Olaf College chapel services.

WGN, Chicago, 370 (C. S. T.)—9:31 A. M., time. 9:35, stock and farm quotations. 10, wheat. 10:30, wheat and cable reports. 11, wheat, weather, dairy reports. 11:30, wheat, grain and livestock receipts. 11:56, time. 12, wheat, board of trade. 12:35, Tea Room orch. 1, wheat. 1:05, Tea Room orch. 1:35, readings. 1:40, Drake concert ensemble and Blackstone string quintet. 2:30, musical recital. 3, miscellaneous entertainment. 5, stock exchange and market. 5:30, Skeezix time for children. 5:57, time.

KFI, Los Angeles, Cal., 467 (P. S. T.)—5 P. M., news. 5:30, news. 6:45, radiatorial period. 7, Nick Harris detective story, "The Cause of Divorce"; Southland string quintette (Hawaiian); chat by Detective Nick Harris. 7:30, program by insurance company. 8, Herald program. 9, Examiner program. 10, Patrick Marsh orch.

Thursday, March 26

WCBD, Zion, Ill., 344.6 (C. S. T.)—Zion orch., assisted by Daniel Mason, J. D. Thomas, Hulda Klammer.

KPO, San Francisco, 423 (P. S. T.)—7 A. M., "Daily Dozen" by Bernard Drury, piano accompaniment by Mel Lyons. 10:30, "Ye Towne

How One of New York's Most Famous News-Stands Treats RADIO WORLD on Publication Day



HERE is a picture of David Farley's popular newsstand in the Times Bldg., New York City. Mr. Farley is known to all publishers and to thousands of the periodical buying public. This is the way his newsstand appeared recently on the day that RADIO WORLD was published. Mr. Farley is shown at the left. To the right is Mr. Farley's young and efficient assistant, Nick Parloma. (Underwood & Underwood.)

(Thursday, March 26, continued)
 Cryer" News bulletins. 10:40, "What is playing at the Local Theatres." 11:50, market reports on eggs, butter, cheese and poultry. 12 noon, time signals from the Naval Observatory; reading of the scripture. 1 to 2 P. M., Seiger's orch. 4:30 to 5:30, Seiger's orch. 5:30 to 6:30, children's hour stories by Big Brother of KPO, taken from the Book of Knowledge. 6:30, "What is playing at the Local Theatres." 7 to 7:30, Rudy Seiger's Fairmont Hotel orch., by wire telephony. 8 to 9, organ recital by Theodore J. Irwin, official organist, at the Wurlitzer. 9 to 10, program under the management of May Clarke Burns, soprano. 10 to 11, Gene James' Rose Room Bowl orch., by wire telephony.

CKAC, Montreal, Can., 411 (E. S. T.)—4 P. M., weather and stock market reports. 4:45, dance programs from the Windsor Grill. 8:30, special concert by Frontenac Breweries.

WBAP, Fort Worth, Texas, 476 (C. S. T.)—12:05 to 12:30 P. M., musical program. 7:30 to 8:30, the Mansfield Municipal Band of Mansfield, Texas. (C. B. L.) 9:30 to 10:45, popular music by "The Troubadours" of Brownwood, Texas. (W. E. B.)

WHO, Des Moines, 526 (C. S. T.)—7:30-9 P. M., The Hawkeye orch., under direction of Mr. I. U. Dreyfus. 11-12, Gail Fitch and his dance orch.

KFI, Los Angeles, Cal. 467 (P. S. T.)—5 P. M., news. 5:30, news. 6:45, radiatorial period, Dr. Arthur Stern, of Y. M. C. A., "Handball and Health." 7, Novelty four (Hawaiian quartet). 7:30, saxophone quartet and sextette. 8, musical program. 9, Aeolian trio (violin, cello and piano) playing. 10, Examiner program.

Friday, March 27

CKAC, Montreal, Can., 411 (E. S. T.)—1:45

P. M., Windsor Hotel luncheon trio. 4, weather and stock reports. 4:30, Ilo lessons.

KPO, San Francisco, 423 (P. S. T.)—7 A. M., "Daily Dozen" by Bernard Drury, piano accompaniment by Mel Lyons. 10, chat for the housewives on "Home Making" by "Prudence Penny" of the San Francisco Examiner. 10:30, "Ye Towne Cryer" News bulletins. 10:40, "What is playing at the Local Theatres." 11:50, market report on eggs, butter, cheese and poultry. 12 noon, time signals from the Naval Observatory; reading of the scripture. 12:45 P. M., talks broadcast from the Commonwealth Club luncheon at the Palace Hotel. 1 to 2, Seiger's orch. 4:30 to 5:30, Seiger's orch. 8 to 10, orch., Wilt Gunzendorf, director.

KFAE, Pullman, Wash., 348.6 (P. S. T.)—8 P. M., Founder's Day, (all W. S. C. Alumni will be listening in), music by Men's and Women's Glee Clubs; string trio, violin, cello and piano. addresses by the four men of longest service on the faculty: Ex-President E. A. Bryan of the economics department, Vice-President O. L. Walker of the college of engineering, Dr. Solon Shedd of the geology department, and Dr. Sofus B. Nelson of the agricultural extension division.

WBAP, Fort Worth, Texas, 476 (C. S. T.)—12:05 to 12:30 P. M., Ward's "Trail Blazers," playing in their studio. (W. E. B.) 4, educational lecture; weekly book review by Peter Molyneux. 7:30 to 8:30, Hood County Male Quartet of Granbury, Texas. (C. B. L.) 9:30 to 10:45, dance program by Fred Cahoon's orchestra. (The Hired Hand.)

WOS, Jefferson City, Mo., 440.9 (C. S. T.)—8 P. M., addresses: "Missouri's Road Program," by B. H. Piepmeyer, state highway engineer; "The Peculiarities of Handling Stock Hogs in Missouri," by Dr. Homer A. Wilson, state veterinarian; original poems by LeRoy H. Kelsey, secretary

to Governor Sam A. Baker, called the "Edgar A. Guest of Missouri"; varied musical program by talent from Hannibal, Missouri.

WHO, Des Moines, 526 (C. S. T.)—7:30 P. M., Stewart Watson, American baritone, accomp. by Helen Birmingham; Sara Helen Eaton, violinist; Grace Haffner, accompanist; Emma Keller May, soprano; Dorothy Dyer Everett, accompanist; Williamson Brothers, mandolin, guitar and banjo artists.

KFI, Los Angeles, Cal., 467 (P. S. T.)—5 P. M., news. 5:30, news, 6:45, radiatorial period. 7, Examiner program. 8, pipe organ. 9, Herald program. 10, Myra Belle Vickers and her artist pupils.

Saturday, March 28

CKAC, Montreal, Can., 411 (E. S. T.)—7 P. M., kiddies stories. 7:30, Windsor Hotel dinner concert. 8:30, variety program. 10:30, Windsor Hotel dance program.

KPO, San Francisco, 423 (P. S. T.)—7 A. M., "Daily Dozen" by Bernard Drury, piano accompaniment by Mel Lyons. 10:30, "Ye Towne Cryer" News bulletins. 10:40, "What is playing at the Local Theatres." 11:50, market report on eggs, butter, cheese and poultry. 12 noon, time, scripture. 1 to 2 P. M., Seiger's orch. 2:30 to 3:30, musical matinee. 3:30 to 5:30, Gene James' Rose Room Bowl orch., playing at the Palace Hotel. 6:20, garden hints. 6:30, "What is playing at the Local Theatres." 8 to 12, Weidner's dance orch.

PWX, Havana, Cuba, 400 (E. S. T.)—8 P. M., concert, Prof. Juan Gonzalez.

KFI, Los Angeles, Cal., 467 (P. S. T.)—5 P. M., news. 5:30, news. 6:45, radiatorial period. 7, Lake Arrowhead orch. direction of Mel Lemon, banjoist. 7:45, book shelf chat. 8, Examiner program. (Concluded on page 23)

The Radio University



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

WHY are the rheostats in the Anderson Superdyne placed in the positive lead?—E. W. Bowers, 814 Prince St., Grand Rapids, Mich.
They work well in either lead. Some prefer the minus lead.

WHAT are the requirements for using a Sodian tube in the Superdyne? (2) Can a Sodian tube be used in a single-circuit regenerative set without eliminating the regenerative feature?—Floyd E. Fawver, Seligman, Mo.

A negative grid return, 45 volts on the plate. (2) Yes.

HOW can I build a wavetrapp for a Neutrodyne?—O. H. Bingham, Knoxville, Tenn.

Wind a 35-turn coil on a 3/4" diameter tubing. A 23-plate variable condenser is shunted across it. The whole instrument is then placed in series with the aerial.

I HAVE a Diode tube that uses a 1 1/2-volt A battery. The condenser is 23 plates. What kind of coil should I use?—W. L. Bristow, Hq. 91st Division Presidio of San Francisco, Cal.

The Diode is a 2-element tube and therefore cannot be used in a regenerative circuit. You may use any crystal circuit, primary coil 10 turns, secondary 50 turns, a 23-plate variable condenser shunted across the coil. The tubing is 3" diameter. Primary wound right over the secondary and coils.

I BUILT the Anderson Superdyne and find that the stations come in too close together, but do not interfere. Is there any way to broaden tuning?—Chas. Hines, 585 Colburn St., Toledo, O.
Not without spoiling the set. Use vernier.

I WOULD like a good all-around set, using three tubes, ultra-selective and possessing good volume?—W. W. Massey, 1743 F St., N. W., Washington, D. C.
Bernard's reflex in this issue.

WILL a Gen-Win coupler work in the Anderson 4-tube Superdyne? (2) How many turns for the plate coil, and what size wire is used? (3) Can I use a honeycomb coil instead?—Walter L. Hawkins, P. O. Box 165, Rockville Center, Long Island, N. Y.

Yes. (2) There is no plate coil, but an RFT instead. See issues of Nov. 22 and 29. (3) Yes, a 75-turn honeycomb. Remove 15 turns, wind the excess wire over it as the primary of the RFT.

IN REFERENCE to the Super-Heterodyne, Dec. 6 issue, can I use a condenser in place of the variometer? I have two .0005 mfd. condensers on hand. (2) Can a Federal 1/2 mfd. capacity be used for C1?—Rufe Scott, Galena, Mo.

Yes, you may use one of the .0005 condensers across a 50-turn honeycomb coil. This will give you control of the regeneration. (2) Yes.

I AM trying to build a 2-tube reflex set using a fixed crystal detector. I cannot even get the familiar tube noises on the set. It is perfectly dead.—Lynwood Timmons, London Mills, Ill.
The trouble lies in the fixed crystal or audio transformer, assuming, of course, that the set is hooked up correctly.

CONSIDERING all of the following points, which is the best set I could build using 3 to 6 tubes: DX, volume, selectivity, sensitivity, tone

quality, economy and non-radiating? (2) How does the Superdyne compare with other circuits of approximately the same number of tubes?—H. E. Steiner, Providence, R. I.

The Neutrodyne, properly neutralized. (2) Very favorably.

CAN a power amplifier be added to the Blue Bird set as described in the issue of Feb. 7?—Scott D. Kellogg, 1287 24th St., Ogden, Utah.

Yes, connect the primary to the phone output jack.

I HAVE had very good success with my Superdyne, but am unable to touch my dials without the signal disappearing.—W. H. Riely, Box 257, Welch, W. Va.

This is due to body capacity. See that the rotor plates are connected to the grid return (filament) and not to the grid. Reverse connections to aerial. Shielding would be the only other alternative. Keep the grid leak far back from panel, 5" or more.

IN REFERENCE to the Super-Sensitive Receiver described in the issue of Feb. 14, by adding two stages of AF would I be able to get loud-speaker DX? (2) How is the selectivity of this set? (3) How does it compare with the 1925 Superdyne? (4) Would the Eastern Coil be all right for this circuit? (5) What size and how many turns for a loop for this circuit?—Edw. E. Freseler, 175 3rd St., Eastport, Md.
Yes. (2) Good. (3) About the same. (4) Yes. (5) 2-foot square; 15 turns.

I BUILT the 3-Circuit Tuner You Can Log, issue of Nov. 8, but cannot get satisfactory results. It will not oscillate when tuned higher than 300 meters. I am using a 201A tube with 22 1/2 volts on the plate.—C. F. Rushmore, 827 1/2 E. 154th St., Cleveland, O.

Try 45 volts on the plate. Add approximately 8 more turns to the tickler. Put a .001 fixed condenser across the detector plate output and B+ detector voltage. The trouble most likely is in the tube.

I DESIRE a circuit for a set of about 3 or 4 tubes that will not cost very much to build and will be selective and sensitive—Oscar J. Zehnal, Cleveland, O.

See issues of Jan. 10, 17 and 24, the 1925 Superdyne.

ON the cover of the issue of Feb. 21 is a 1-tube reflex circuit. I should like to know if 22 or 45 volts of B battery would do as well as the 90 volts?—Geo. Korpach, 170 East End Ave., New York City.
No.

WHEN I place my hand over the tuning coil I get distant stations, but removing my hand I can get no distance.—Iver C. Mastrup, 518 Lincoln Ave., San Rafael, Cal.

Increase the number of turns on the primary, make the coupling closer. Keep the grid leak at least 5" from panel. Connect rotor plates of variable condensers to filament (grid return) not to the grid.

I READ of C. P. Oleson's success with the \$5 loudspeaker, as he set forth in his results letter in the March 7 issue. I want to build this speaker, as described by Herbert E. Hayden in the February 14 issue, but would like you to

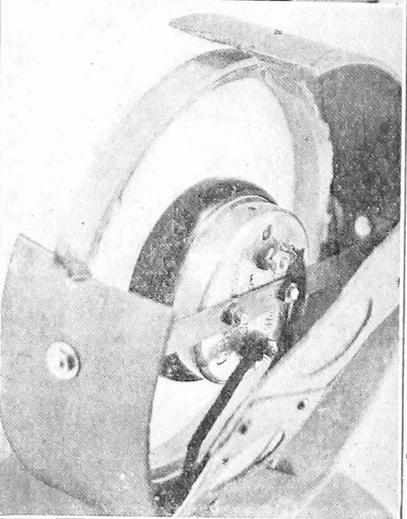


FIG. 107 (top), side view of the Hayden speaker. FIG. 108 (middle photo) shows the two perforated covers which have been lined with China silk or gold gauze. They have nothing to do with the operation of the speaker. They are merely decorative. To clarify construction a section has been cut out of the cardboard ring (Fig. 109), which shows the front cover, the embroidery hoops with paper or parchment diaphragm. Devos & Reynolds, William & Fulton streets, New York City, have the parchment, both genuine and imitation.

clarify the details regarding the diaphragm and the silk covering.—Wm. J. Carver, 700 Ocean Ave., Brooklyn, N. Y.

See Figs. 108 and 109. The diaphragm is parchment or bond paper. The silk or gold gauze is merely ornamental. Note that the cardboard, perforated to give a microphone effect, is duplicated, to provide front and back. A phone from a headset may be used instead of a regular unit.

OF the following audio-frequency amplifiers, which do you consider the best? One stage of transformer-coupled amplification, plus two stages of resistance coupled amplification; two stages of transformer coupled amplification with one stage of resistance coupled amplification, or one stage of transformer coupled amplification.
(Concluded on page 26)

Join RADIO WORLD'S University Club

and we will enter your name on our subscription and University lists by special number. Put this number on your queries and they will be answered personally the same day as received.

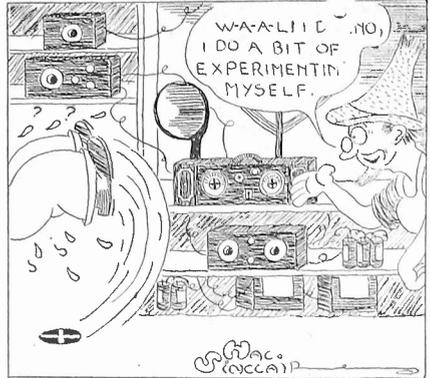
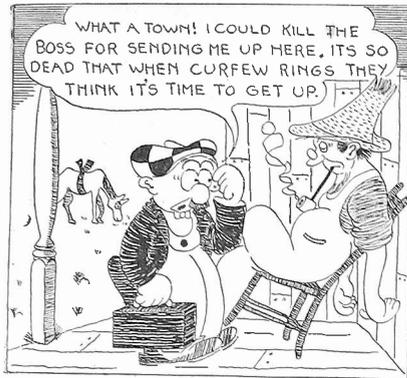
And Get Free Question and Answer Service for the Coming 52 Weeks.

RADIO WORLD, 1493 Broadway, New York City:

Enclosed find \$6.00 for RADIO WORLD for one year (52 Nos.) and also consider this as an application to join RADIO WORLD'S University Club, which gives me free information in your Radio University Department for the coming year, and a number indicating my membership.

Name
Street
City and State

MR. DX HOUND



The Radio Trade

The "Marvel Five"

THE Radio Syndicate of New York, at 240 Broadway, New York City, is marketing a new 5-tube tuned radio-frequency set called the "Marvel Five" that is achieving wonderful results as to clarity, distance and selectivity. The circuit is new in tuned RF and is the work of one of the best-known radio engineers. In some poor locations in Brooklyn and New York Chicago was brought in without an aerial and all the locals without aerial or ground. The set has only two dials to control and is one of the simplest to operate, is extremely well built of low-loss materials throughout and has a combined jack and filament switch. The cabinet is solid mahogany, piano finished with piano hinge and is one of the most beautiful for the price in the market. The set is absolutely guaranteed for one year and to insure best results with their product, the Radio Syndicate gives free to each purchaser five laboratory made tubes, balanced for the set sold. At the head of the Radio Syndicate of New York is Lieut. James Jemal, U. S. N. R. F., who has had much practical experience in the operation of radio equipment. His company is winning friends everywhere with its prompt, business-like methods, and the quality of its merchandise in addition to unusually popular prices.

CANADA'S RADIO WEEK BOOMED SET SALES

WASHINGTON. CANADA'S National Radio Week, February 2 to 8, resulted in increased sales of complete sets and, in a lesser degree, of parts, according to a report to the Department of Commerce. Since most of the sets in use in Canada are of American make, this may mean increased sales for American manufacturers.

Free Mailing Lists
Will help you increase sales. Send for FREE catalog giving contents and prices on classified names of your best prospective customers—National, State, Local—Individuals, Professions, Business Firms.
99% Guaranteed
ROSS-Gould Co. St. Louis

"Bruno" RADIO PARTS
are Quality Products that assure satisfaction.
BRUNO RADIO CORPORATION
220 FULTON STREET NEW YORK CITY

ALEXANDER RADIO ELECTRIC CO., INC.
1003 PINE ST. ST. LOUIS, MO.
PLEASE SEND ME FREE YOUR NEW RADIO CATALOG
NAME _____
ADDRESS _____
CITY _____
Fill Out and Mail

Exports in December Exceeded a Total of \$1,000,000

WASHINGTON. EXPORTS of radio apparatus during December totalled \$1,080,168. Some of the chief purchasers of American radio equipment during the month were: Spain, \$36,057; Canada, \$584,285; Mexico, \$39,074; Argentina, \$25,472; Brazil, \$27,855; Japan, \$153,866, and Australia, \$91,928.

Coming Events

[Readers are requested to send in dates and places of future events not scheduled in this department.]

- MARCH 14—End of Cincinnati Radio Show, Music Hall.
 - APRIL 19 TO 25—International Radio Exposition, Steel Pier, Atlantic City, N. J.
 - SEPT. 12 TO 19—Fourth Annual National Radio Exposition, by American Radio Exposition Co., 522 Fifth Ave., N. Y. C., to be held in Grand Central Palace.
 - SEPT. 14 TO 19—Second Radio World's Fair, 258th Field Artillery Armory, Kingsbridge Rd. and Jerome Ave., New York City.
 - SEPT. 14 TO 19—Pittsburgh Radio Show, Motor Square Garden. (Postponed from Jan. 19.)
 - SEPT. 15 TO 19—Washington (D. C.) Radio Show.
 - SEPT. 23 TO OCT. 4—International Wireless Exhibition, Geneva, Switzerland.
 - NOV. 9 TO 15—Milwaukee Radio Exposition, Civic Auditorium.
 - NOV. 17 TO 22—Fourth Annual Chicago Radio Exposition; Coliseum.
 - DEC. 1 TO 6—Boston Radio Show, Mechanic's Hall.
- Date not set yet for exposition, also to be held in Chicago, direction of Harold Bolster.

RADIO MAILING LISTS

15870 Radio Dealers	Per M \$7.50
970 Radio Dealers in Mexico	Per List 10.00
1808 Radio Mfrs.	Per List 15 00
2324 Radio Jobbers	Per List 20.00
1125 Radio Jobbers, rated \$5,000 and up	Per List 15.00
714 Radio Jobbers, rated \$50,000 and up	Per List 10.00
597 Radio Mfrs. making complete sets	5.00
126 Radio Battery Mfrs.	2.50
125 Radio Cabinet Mfrs.	2.50
60 Crystal Mounters for Wireless apparatus	2.50
25000 Radio Amateurs	Per M 7.50
325 Phonograph and Music Radio Dealers	5.00
7400 Radio owners	Per M 7.50

Guaranteed 98% correct. Ask for Price List and all other lists.
A. F. Williams, Mgr., List Dept.
Established 1880
166 W. Adams St. Chicago, Ill.

By HAL SINCLAIR

Literature Wanted

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.
Trade Service Editor,
Radio World,
1493 Broadway, New York City.
I desire to receive radio literature.
Name _____
City or town _____
State _____
Are you a dealer? _____
If not who is your dealer?
His Name _____
His Address _____

- Wm. J. Ross, 5154 Fountain, Los Angeles, Cal.
- S. Manske, 757 Marshall St., St. Paul, Minn.
- C. C. Engstrom, Luther Ave. Du Bois, Pa.
- Thos. Y. Flyth, N. Emporia, Va.
- J. A. Faveau, St. Rimi Co., Quebec, Canada.
- Thos. J. Dunlap, Box 22, Lockhart, Texas.
- Robert Price, 1102 Mesa (West), Pueblo, Col.
- L. M. H. Radio Service, 238 Bower St., Jersey City, N. J.
- C. N. Sperry, 1330 3rd Ave. North, Fargo, N. D.
- H. L. Veits, 9110 Marshall Ave., Cleveland, Ohio.
- G. E. Aase, Munot, N. D.
- H. E. Walters, 1306 West Van Buren, Phoenix, Ariz.
- W. L. Scott, 2731 Ave. E, Fort Worth, Texas.
- J. P. Frank, Jr., 226 North 2nd St., Danville, Ky.
- M. L. Miller, Lafayette, La.
- H. M. Sammons, Lafayette, La.
- Wallace E. White, Anadorko, Okla.
- Elmer O. Scates, 417 Lovers Lane, Lexington, Tenn.
- Carl Midner, Paxton, Montana.
- Jack Storrs, 114 Mary St., Lawrenceburgh, Ind.
- Harry P. Snyder, 313 Front St., Lawrenceburgh, Ind.
- J. A. Havice, 718 Island Ave., McKees Rocks, Pa.
- H. Potter, 505 East 142nd St., New York City.

Business Opportunities Radio and Electrical

Rates: 50c a line; Minimum, 2 lines.
FINANCING—Will negotiate with new enterprise, individual or established business needing capital. Incorporating attended to. Box 95, Wall Street Station, New York.

RADIO PARTS MANUFACTURED
We manufacture all kinds of punch press and screw machine parts for radio; have you any parts you want made? We can give you service; our quality is the best and our prices the lowest. The C. E. Sheppard Company, Long Island City, N. Y. Stillwell 6000.

MACHINE SHOP LOOKING FOR MANUFACTURING PROPOSITION; machine tool, instrument and experimental work; design, develop new ideas; rent space. Community Machine Works, 122 Centre St., N. Y. C.

WOODWORKER HAVING A WELL-EQUIPPED PLANT manufacture small and fancy cabinets, radio speaker and loops; quality work at quantity prices. Maron Mfg. Co., 519 West 45th St., N. Y. C.

INVESTMENT \$1,000—\$5,000 IN CORPORATION manufacturing small, portable radio; cannot fill orders with present output. Box J. 1, RADIO WORLD.

A THOUGHT FOR THE WEEK
THEATRE managers declared years ago that motion pictures were a menace to the theatrical business. After fighting pictures for some years, they made use of them—and to very good results. Why not do the same with radio?

RADIO WORLD



Radio World's Slogan: "A radio set for every home."

TELEPHONE LACKAWANNA 6976 and 2063

PUBLISHED EVERY WEDNESDAY

(Dated Saturday of same week)

FROM PUBLICATION OFFICE

HENNESSY RADIO PUBLICATIONS CORPORATION

ROLAND BURKE HENNESSY, President

M. B. HENNESSY, Vice-President

FRED S. CLARK, Secretary and Manager

1493 BROADWAY, NEW YORK, N. Y.

(Putnam Bldg., Times Square and 43rd Street)

European Representatives: The International News Co.,

Breams Bldgs., Chancery Lane, London, Eng. Paris, France. Brentano's 38 Avenue de l'Opera.

EDITOR, Roland Burke Hennessy

MANAGING EDITOR, Herman Bernard

SUBSCRIPTION RATES

Fifteen cents a copy. \$6.00 a year. \$3.00 for six months. \$1.50 for three months. Add \$1.00 a year extra for foreign postage. Canada, 50 cents.
 Receipt by new subscribers of the first copy of RADIO WORLD mailed to them after sending in their order, is automatic acknowledgment of their subscription order. Changes of address should be received at this office two weeks before date of publication. Always give old address also. State whether subscription is new or a renewal.

ADVERTISING RATES

General Advertising		
1 Page, 7 1/2" x 11"	482 lines	\$300.00
1/2 Page, 7 1/2" x 5 1/2"	231 lines	150.00
1/4 Page, 4 1/2" D. C.	115 lines	75.00
1 Column, 2 1/4" x 11"	154 lines	100.00
1 inch		10.00
Per agate line		.75
Times Discounts		
52 consecutive issues		20%
26 times consecutively or E. O. W. one year		15%
4 consecutive issues		10%

WEEKLY, dated each Saturday, published Wednesday. Advertising forms close Tuesday, eleven days in advance of date of issue.

CLASSIFIED ADVERTISEMENTS

Ten cents per word. Minimum, 10 words. Cash with order. Business Opportunities, 50 cents a line; minimum, \$1.00.

Entered as second-class matter, March 28, 1922, at the Post Office at New York, New York, under the act of March 3, 1879.

MARCH 14, 1925

Vindication



"AND my wife said I couldn't make a set!"

Reflex Patent's Value Upheld

WASHINGTON.

THE Schloemilch and Von Bronk reflex patent purchased by the Navy Department from the Alien Property Custodian is the basic reflex patent and a license under it will enable manufacturers to produce efficient sets. This is the opinion of experts of the Navy Department.

Since the announcement that the Navy Department would license American manufacturers under the radio patents seized from the Germans during the war, statements have been current that the Schloemilch and Von Bronk patent is practically valueless because of its limited scope. While the value of the patent has never been thoroughly gone into by the Navy, the belief is that a good set can be produced with it.

Reflex Singled Out

About 150 applications have been received by the Navy from manufacturers for use of the reflex patent. A license under the patent will be granted to every manufacturer who meets the conditions set up by the Navy.

"We do not attempt to place a valuation on the Von Bronk and Schloemilch patent," says Captain McNeely, Chief of the Radio Division of the Naval Bureau of Engineering. "Under the decision of the Attorney-General and the Secretary of the Navy we are prepared to grant licenses to manufacturers under the radio patents purchased from the Alien Property Custodian. We would not attempt to say that one patent is any more valuable than another. But we do know, that of the 70-odd radio patents available, the manufacturers have singled out the reflex as the most desirable."

Patent Deemed Basic

"This convinces me that the reflex patent is of particular value. The manufacturers who have applied for licenses under this patent know what they are doing, and they would not want a dead cat."

Whether the Von Bronk and Schloemilch patent is the basic reflex patent probably may have to be decided in the courts. The question has been gone into by Naval radio engineers and they are of the opinion that it is.

* * * Patent Not Basic, Says Priess

SINCE October, when the Navy Department decided to issue licenses to American manufacturers under 129 German patents seized by the Alien Property Custodian during the World War, there have been numerous inquiries relative to the expected appearance of new reflex sets.

The majority of the patents and applications involved were originally owned by the Telefunken Company, a German corporation. Among the patents were some related to reflex and tuned radio frequency circuits and the well-known Wilhelm Schloemilch and Otto Von Bronk patent. Under a series of contracts, the first dated Feb. 21, 1913, substantial rights in these patents and applications were assigned by the Telefunken Company to the Atlantic Communication Company, a German corporation organized under the laws of the State of New York.

Priess' Views

Schloemilch and Von Bronk have popularly been associated in the public mind as the originators of the reflex circuit.

In an interview William Priess, an engineer who designed the product of an American reflex manufacturer, was asked to interpret the situation created by the release of the German patents to American manufacturers.

"Schloemilch and Von Bronk had it in their power to obtain basic patents on the reflex idea," said Mr. Priess, "but their lack of development of the idea and their carelessness in drawing patent claims defeated their procurement of a basic or valuable patent. The patent which actually was issued to them is of little, if any, value today as a reflex patent because of its extremely limited scope."

Cites Defects

"When they made their application to the Patent Office they listed five claims and four drawings. Only one of the claims and one drawing had to do with double duty use of tubes. This one specified as essential elements the gaseous, soft vacuum tube and the telephone transformer. Neither of these is employed in radio practice today, and that is evidence that this particular patent is of no value. A reflex set will not work using a soft tube as an amplifier."

"What is known as reflex today has no comparison with what Schloemilch and Von Bronk attempted to do. Stability, multistage, operation, selectivity, clarity for radio telephony, were apparently never the subject of investigation by these two men."

"In considering the release of patents owned by our Government through a situation brought about by the war when German property was placed under the jurisdiction of the United States under the control of the Alien Property Custodian, one must take into account the fact that there are pending against the United States by United States radio inventors and radio companies claims upward of \$40,000,000 for radio patent infringements during the war."

"The Government in releasing such patents as this Schloemilch and Von Bronk patent is not selling but exchanging licenses with manufacturers. It sets up as a trader, allowing manufacturers rights under all the Government-controlled radio patents in exchange for Government rights under the manufacturers' radio patents."

"I may say, in passing, that the Government officials conducting this situation are showing excellent trading abilities which in the long run will save millions of dollars of the taxpayers' money."

Peru to Have Station

WASHINGTON.

PERU is soon to have its first broadcasting stations according to reports to the Department of Commerce. The station will be a replica of 2LO at Marconi Home, London, will be known as OAB and will send on a wavelength of 360 meters.

They are in or en route to Lima, Peru, some six hundred receiving sets, half of which are of American make and the other half British.

Money Voted for World Parley

WASHINGTON.

THE House of Representatives has approved an appropriation for \$75,000 for an international radio conference to be held in Washington this fall. Should the appropriation also receive the approval of the Senate, which is deemed likely, invitations will shortly be issued by the State Department to other nations to send representatives.

FOR BERNARD'S RADIO WORLD

1925 MODEL 4-TUBE DX WONDER

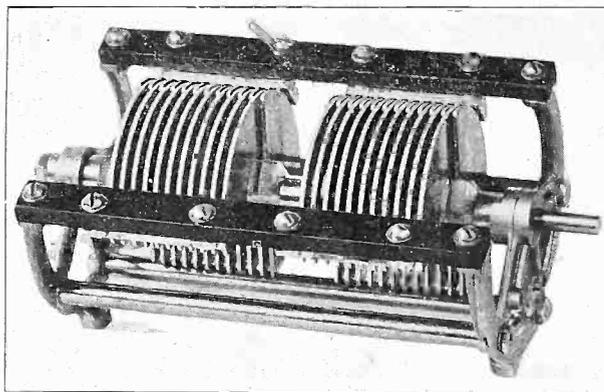
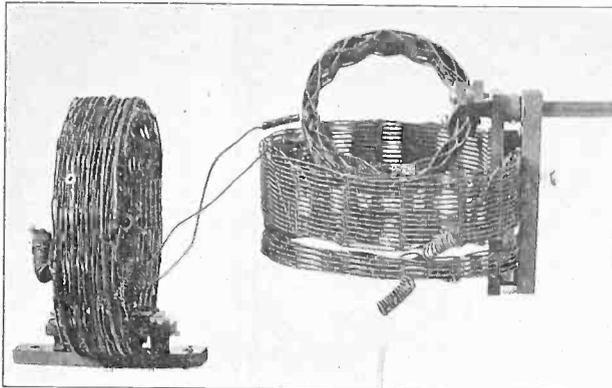
Greatly Superior to the Superdyne Circuit

Use the Famous Wallace Coils

A real low-loss product correctly wound to cover entire broadcast range. A laboratory development by our skilled engineers, guarantees you real satisfaction for Bernard's 1925 Hookup.

Price, complete, with **\$7.50** blue print.....

As Certified and Indorsed by Herman Bernard



Use the Famous FLEWELLING CONDENSER

Made by Buell Mfg. Co., Chicago, Ill.

A Low-Loss Instrument of Precision
Mechanically Superior—Rugged

THE CONDENSER DE LUXE

100% Perfect for Bernard's
1925 Model DX Wonder. **\$9.00**
Price, Complete

As Certified and Indorsed by Herman Bernard

HUNDREDS OF ENTHUSIASTIC FANS HAVE REACHED THE HEIGHTS OF RADIO RECEPTION BY THE USE OF OUR STANDARD GUARANTEED PARTS OF HIGHEST QUALITY. JOIN THEM!

COMPLETE PARTS FOR BERNARD'S FAMOUS 1925 MODEL DX WONDER

AS SPECIFIED AND CHECKED OVER BY HERMAN BERNARD

One Wallace Low-Loss Coupler; One Matched Radio-Frequency Transformer	\$7.50	One Variable Bradley Leak.....	\$1.65
One Flewelling Double Condenser.....	9.00	One Bradleystat	1.65
Two 4" Black Accuratone Dials.....	ea. 2.95	One Bradley Push-Pull Battery Switch.....	.60
One Federal No. 65 Audio-Frequency Transformer	4.95	One 7x24" Black Radion Panel.....	2.85
One Federal No. 65A Audio-Frequency Transformer	4.95	One Tri-Jack (or single-circuit jack).....	.90
Four Federal Sockets.....	ea. .90	Two Silver Eureka Dial Pointers.....	ea. .10
One .00025 Mfd. Dubilier Grid Condenser.....	.35	Two Lengths of Spaghetti.....	.25
		One Terminal Block.....	.60
		Wire, Screws, etc.....	1.00

\$ 42.50

WALLACE RADIO COMPANY, Inc.

135 LIBERTY STREET, NEW YORK CITY

RESULTS GUARANTEED

MAIL ORDERS PROMPTLY FILLED

Ten per cent. of total must accompany all orders.

Bernard's 3-Tube DX Reflex

(Concluded from page 6)

the single-circuit variety. At least two switch points are placed on the panel, or three may be used, if a dead one is desired in center. One switch point is connected to the P post of the second audio-transformer, the other switch point to the plate of the third and last (second audio) tube. The switch arm is joined to the spring of the jack, the right angle of the jack going to B plus amplifier voltage (usually 90). Thus earphone service, or even speaker operation on some locals, may be obtained from the first audio output, and the greater volume from the second audio output. The detector output is not tapped. As the plates of both amplifier tubes take the same B voltage, the operation of the switch enables one to tap either the first or second audio output without removing the plug from the jack. The first audio output, at a quick glance, might seem to be short-circuited, since the plate is tapped from the P post of AFT1, whose B post goes to B plus amplifier voltage, while the jack angle also goes to this B voltage. However, close inspection will show that the primary of the second audio transformer (PB of AFT2) is merely in parallel with the phones.

Coil Connections

A word about the coil connections. Take care to connect the aerial to the top terminal of L1, the bottom terminal thereof to ground. The next terminal (the beginning of the secondary L2, next to the ground connection) goes to the G post of the AFT1, the end of L2 to the grid. The rotor of the condenser C1 goes to the beginning or filament end of L2, the stator to the end or grid connection. The same directions hold true of L3L4. The plate coil may be connected either way.

One rheostat R1 controls the two amplifier tubes. It should be 6 ohms. But an

List of Parts

- One 7x21" panel.
- One 7x20" baseboard.
- One terminal strip (binding posts).
- Two RF transformers, as described. (L1L2, L3L4).
- One plate coil, as described (L5).
- Two audio-frequency transformers of different ratios are used, the higher ratio should be in the first stage. (AFT1, AFT2).
- Three .0005 mfd. variable condensers. (C1, C2, C3).
- Three sockets.
- Two UV201A tubes or 301A tubes.
- One Sodion tube.
- One 6-ohm rheostat (R1).
- One 20-ohm rheostat (R2).
- One variable grid leak (R3).
- One fixed condenser, .001 (C5).
- One fixed condenser, .00025 mfd. (C4).
- One single-circuit jack (J).
- One push-pull battery switch. S1.
- One tapswitch consisting of two or three switchpoints, two end stops and a switch arm. (S2).
- 100 ft. aerial wire, 50 ft. No. 14 insulated leadin wire, screws, hardware, solder, round tinned busbar for internal connections.

Amperite, D11 type, may be used instead, thus omitting one minor control. A rheostat must be used in the detector tube. It should be in the positive leg, as shown, unless the Sodion is used.

The battery switching system enables one to turn on and off all three tubes with one operation. If it is desired to turn off the second audio tube when listening on the first stage, put a second battery switch, in the A+ lead of the third socket.

An Optional Condenser

No fixed condenser shown across the

BENSON'S 6-TUBE SUPER-HETERODYNE

Employing Short-Wave Intermediate Transformers
 Crystal Detector and 3 Reflexed Audio Stages
 Used. Works DX on loop. Picture and schematic diagrams, also textual explanation of wiring. Send 30c for Feb. 28 and March 7 Issues.
 RADIO WORLD, 1493 Broadway, New York City

secondary of the first audio-transformer. Probably none will be needed. But if music quality proves none too good, put a .001 mfd. fixed condenser there, connecting one side of the condenser to the G post, the other to the F post.

Take care to have all grid returns direct to battery leads or branches thereof, and not to filament posts. In other words, do not force the grid return through the resistance of a rheostat.

The Grid Leak and Condenser

The grid leak should be variable. It is connected from the grid post of the detector tube socket to the filament plus post of the most convenient socket. C4 is the grid condenser, .00025 mfd.



"A THING OF BEAUTY AND A JOY FOREVER."

5 TUBE TYPE 5A \$50

188 Greenwich St., N. Y. C.

JOFFE-GOLBERT CO.

Distributors of

- Gilfillan Neutrodyne
- Somerset Receivers
- Marwol Sets
- Amplion Speaker
- Radio Furniture
- Radio Accessories

33 WEST 60TH ST. NEW YORK

LITTLE WONDER!

SOLDERLESS LUG

Holds Bus Wire Like Gilfillan
 Connect or Disconnect Wires
 Without Disturbing Terminals!
 Price 10 for 5c. Ask your dealer.
 Distributors Wanted.
 Mfd. by PAUL GLAMZO
 208 Lafayette St. New York



This 5-tube tuned radio frequency set has been termed the

"Champion of Them All"

Wonderful proposition to dealers.

AMEREX ELECTRIC CORP.

232-E GREENWICH STREET NEW YORK

S. HAMMER RADIO CO.

303 Atkins Avenue, Brooklyn, N. Y.
 Please send me FREE, Your NEW
RADIO CATALOG

Name
 Address
 City..... State.....
FILL OUT AND MAIL

A \$5 HOME-MADE LOUDSPEAKER, by Herbert E. Hayden, in Feb. 7 issue. Send 15c for copy, RADIO WORLD, 1493 Broadway, New York City.

Do You Want a Radio Publication Gratis? For NEW RADIO WORLD Subscribers Ordering NOW

Radio World has made arrangements

This is the way to get two publications

- To offer a year's subscription for any one of the following publications
- with one year's subscription for RADIO WORLD
- RADIO NEWS or
- POPULAR RADIO or
- RADIO BROADCAST or
- WIRELESS AGE or
- RADIO DEALER or
- RADIO JOURNAL or
- RADIO (San Francisco) or
- BOYS' LIFE

- for the price of one:
- Send \$6.00 today for RADIO WORLD
- for one year (regular price)
- for 52 numbers)
- and select any one of the other
- eight publications for twelve months.
- Add \$1.00 a year extra for
- Canadian or Foreign postage.
- Present RADIO WORLD subscribers
- can take advantage of this offer by
- extending subscriptions one year
- if they send renewals NOW.

RADIO WORLD'S SPECIAL TWO-FOR-PRICE-OF-ONE SUBSCRIPTION BLANK

RADIO WORLD, 1493 Broadway, New York City.

Enclosed find \$6.00, for which send me RADIO WORLD for twelve months (52 numbers), beginning..... and also without additional cost, Radio News, or Popular Radio, or Radio Broadcast, or Wireless Age, or Radio Dealer, or Radio Journal, or \$10.00 for two yearly subscriptions.

Indicate if renewal.
 Offer Good Until
 March 25, 1925

Name
 Street Address.....
 City and State.....

CONSULT
BARBLEY
 For Ambassador Results
 Write us for prices on 3 and 4 tube kits made of all genuine Ambassador parts.
Bob Barbley, "The Ambassador Man"
 Dept. RW, 135 Liberty Street New York

SALESMEN
 Calling on Radio Dealers
WANTED
 To Handle Radio Tubes as a Sideline
THORIA TUBE COMPANY
 Dept. W Middletown, Ohio

NEW - NEW - NEW
FRESHMAN MASTERPIECE
KNOCKED DOWN KIT
 Everything complete to build this wonderful receiver **\$39.50**
 No cabinet included.
 Send order with cash to-day.
 WIRE or Phone; we will send C. O. D.
 Regular discounts to dealers.
THE BOWER RADIO SHOP
 Wholesale Radio READING, MICHIGAN

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 Street Boston, Mass.

Make \$100 a Day
FREE INSTRUCTION TELLS HOW
 Many Sales Are Half Profit When you sell our nationally advertised radio sets and supplies. We Guarantee your success, under the "Gould Plan," by allowing you to return goods which you do not sell. It would pay you to get our price list and free instructions "How To Sell Radio." Write for it.
Federal Radio Co. 103 East 13th St. Kansas City, Mo.

BUSINESS OPPORTUNITIES
 (See page 19 for others)

PHONOGRAPH-RADIO BUSINESS, ESTABLISHED 15 years, busy section New York City; exclusive territory Victor-Victrola, Sonora and Brunswick; also carry leading radios; \$25,000 over stock and fixtures secures business; excellent opportunity active man. Box M4, Radio World.

RADIO-ESTABLISHED EXPORT ORGANIZATION available to reputable manufacturers of standard products; year round distribution. Box J. 2, RADIO WORLD.

RADIO BUSINESS
 Corporation, wholesale and manufacturers of radios and radio parts, covered by valuable patents, with jobbers and distributors all over the U. S. A., also large export business, would like to get in connection with reliable purchasers; principals only; cash required at least \$25,000; good reasons for selling; patent item is used on every set and is real money-making proposition. Box J. 3, RADIO WORLD.

HOW TO MAKE A STORAGE B BATTERY described by Herbert E. Hayden in March 7 issue. Copy, 15c. RADIO WORLD, 1493 Broadway, New York City.

Programs

(Concluded from page 17)
 gram. 9, male quartet singing "A Night on the Plantation." 10, Radio Club songs.

Sunday, March 29

WOS, Jefferson City, Mo., 440.9 (C. S. T.)—7:30 P. M., religious service of the Episcopal Church, Jefferson City, the Rev. Renison, rector.
 WGN, Chicago, 370 (C. S. T.)—11 A. M., Uncle Walt reads the funnies to the children. 11:45, concert from theatre. 2 P. M., Edwin S. Seder, organ. 2:30, artists concert. 3:30, recital Musical College. 9, concert directed by Charles H. Gabriel, Jr., with WGN singers and by Drake concert ensemble.

Monday, March 30

CKAC, Montreal, Can., 411 (E. S. T.)—1:45 P. M., Windsor Hotel luncheon concert. 4, weather and stock reports. 4:30, 10 lessons.
 KFAE, Pullman, Wash., 348.6 (P. S. T.)—8 P. M., tenor solos, Harvey Wixson; violin solos, Raymond Howell, Pullman; Our Moral Responsibility to Criminals, Judge Thomas Neill; Care of Minor Infections, Mrs. Myrtle Mount, school nurse; Trees for Home Beautification, M. D. Armstrong; Opportunity in Mechanical Engineering, G. E. Thornton; talk on New Books, Alice L. Webb.
 WOS, Jefferson City, Mo., 440.9 (C. S. T.)—8 P. M., address, "A Living and a Life," by George W. Reavis, director vocational education; varied musical program by talent from Louisiana, Missouri, by remote control.

FILKO LIGHTNING ARRESTER
 SCIENTIFICALLY CORRECT
 RADIO LIGHTNING ARRESTER

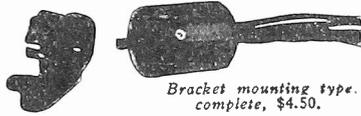
with the \$100.00 Guarantee



\$1.50
 \$2.10 in
 Canada

Protects your set from lightning or we repair or replace the set. Send 2c stamp for literature on improved reception. Dept. R.W.314.

DX Instrument Company
 Harrisburg, Pa.



Bracket mounting type, complete, \$4.50.

One Plug on the Jones MULTI-PLUG instantly disconnects antenna, ground, A and B batteries from your set. One push reconnects. And it can't be plugged in wrong! Eight foot cable permits placing batteries out of way—in basement, closet or elsewhere. Makes your set portable. All leads plainly coded.

Jones MULTI-PLUG

THE STANDARD SET CONNECTOR

Used by

Howard-Workrite-Zenith-Mu-Rad

Write for illustrated folder of Panel Mounting and Binding Post types.

HOWARD B. JONES

618 S. Canal St.

Chicago

Federal Standard RADIO Products
 Over 130 standard radio parts, each bearing the Federal Iron-oid performance guarantee.
 Write for Catalog.
Federal Telephone & Telegraph Co.
 Buffalo, N. Y.

DISTANT STATIONS WITH APEX VERNIER DIALS
 \$2.00 \$2.50 \$3.00
 APEX ELECTRIC MFG. CO.
 1423 W. 35TH ST. CHICAGO

Quality Parts—Lowest Prices
 Standard Goods Assure Perfect Reception

Acme Radio Trans (all types).....	\$3.55
Acme Audio Transformer A Z.....	3.55
General Radio .400 ohm Potentiometer	1.15
Brownlie Vernier Detector.....	1.50
Bremer-Tully Tuner	3.55
Eastern DX Superdyne Coils.....	6.00
New FRESHMAN Knockdown Kit	31.50

RADIO SHOP

- GENES**
- | | |
|--|--------|
| Gen. Instr. Condensers, .0005..... | \$3.95 |
| 50,000 ohm Grid-Leak and mount, ea..... | .95 |
| .005 Dubilier Fixed Condenser, ea..... | .60 |
| .001, .002 and .00025 Dub. Fixed Cond., each | .30 |
- All "Bruno" Parts In Stock.
 20% Discount on All Sets.

GEORGE'S RADIO SHOP
 214 St. Nicholas Ave., cor. 121st St., N. Y. C.
 10% Deposit with order, balance to postman.

FRESHMAN MASTERPIECE
 A 5-Tube, Tuned Radio Frequency Receiver that represents the greatest value ever offered in \$60 a radio set.....
 Write for particulars.
CHAS. FRESHMAN CO., INC.
 FRESHMAN BUILDING
 240-248 W. 40th ST., NEW YORK

COMPLETE 1924 INDEX OF RADIO WORLD
 Appeared in RADIO WORLD dated Oct. 18, 1924, and Jan. 10, 1925. 15c per copy. RADIO WORLD, 1493 Broadway, New York.

A GREAT ISSUE NOW IN PREPARATION
RADIO WORLD'S THIRD ANNIVERSARY NUMBER
DATED APRIL 4

Why you should be represented in important space on RADIO WORLD'S THIRD ANNIVERSARY NUMBER—increased sales, as this issue will be advertised in other papers to 5,000,000 potential buyers of radio sets and parts. Will have special articles by authorities, and other special text and pictorial features.

Regular rates in force as follows:

1 Page, \$300.00; ½ Page, \$150.00; ¼ Page, \$75.00; 1 Column, \$100.00; 1 inch, \$10.00; Per Agate Line, 75c.
--

Full page ads, if the copy is received on or before March 23, will be run in two colors without extra cost, on request. A really great sales medium.
 Dated April 4. Published April 1.
 Last form closes Tuesday, March 24.

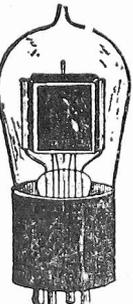
RADIO WORLD, 1493 BROADWAY, NEW YORK CITY

Theory of Wave Band Tuning

ACME REFLEX, SUPERHETERODYNE
AND OTHER LOOP SET OWNERS
 Double your distance and volume with a LOOP-TENNA COUPLER. No extra dials. Compact size 2"x3"x1/2". Results guaranteed. \$5.00 postpaid.
C. H. HITCH
 6020 VERMONT AVENUE DETROIT, MICH.

FAHNESTOCK CLIPS
 "Popular Wherever Radio Is Used"
 14 Sizes in Beautiful Display Case
 Dealers write for big money-making proposition.
FAHNESTOCK ELECTRIC CO.
 Long Island City, L. I.

INDEPENDENT



NEW TUBES EACH \$1.59
 ALL TYPES OF HIGH CONDUCTANCE AND LOW IMPEDANCE, ALL MATCHED VOLUME

3 for Four Dollars
 5 for Seven Dollars
 Matched Characteristics

REPAIRED OR EXCHANGED \$1.39
 5 FOR \$6.00
 Matched Characteristics

QUICK DELIVERIES EVERY TUBE CARRIES A MONEY BACK GUARANTEE
 Dealers—Agents—Wanted Everywhere

RADIO TUBE OUTLET
 207 Market St. Newark, N. J.
 Exclusive Distributors for Associated Manufacturers

The LARGEST RADIO STORES in AMERICA

Hook-ups!
 All the latest and best Kits in our new **RADIO CATALOG**



FREE

NO other Radio Catalog includes such a complete assortment of the best and latest Knock-Down Kits, Parts and Accessories. You need this book—Write for your **FREE** copy today!

We Save You Money!
 Our business is to buy up manufacturers' and government surplus stocks, jobber and dealer bankrupt stocks—but only brand-new, fully guaranteed, nationally advertised apparatus. Our catalogue crammed with bargains.

CHICAGO SAUSAGE STOCK STORES

509 So. State St., CHICAGO, ILL., Dept. R.W.6

OFFICIAL LIST OF STATIONS
 Complete, Accurate, Up-to-date
 Will be published in Radio World's Anniversary Number, April 4.

By Warren Perley

THE designer of a receiving tuner to cover a definite band of wavelengths is very much interested in the range of tuning afforded by a given combination of inductance and variable capacity. It is generally admitted that capacity tuning is preferable to inductance variation by means of variometers, so we shall confine ourselves to fixed coils and variable condensers.

Inductance and capacity in series form a circuit which is especially responsive to a particular frequency or wavelength. The wavelength to which this combination responds best is termed the resonant wavelength and is the one at which the reactances of the coil and condenser are equal, thus cancelling all effects of reactance.

Effect of Variation

Now if we vary either the inductance or the capacity, the resonant wavelength is changed. The resonant wavelength is proportional to the square root of the product of inductance and capacity. If the inductance is fixed the resonant wavelength is proportional to the square root of the capacity. With a given coil it is necessary to quadruple the capacity in order to double the wavelength.

A circuit tuned by a variable condenser has a minimum and a maximum circuit capacity. These two capacities and the fixed inductance determine the minimum and maximum wavelengths to which the circuit will respond. Since the inductance is fixed, the variation of capacity obtainable determines the tuning range.

How to Find Ratio

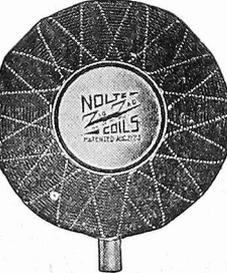
The greater the maximum circuit capacity the longer the wave to which the circuit will tune. In the majority of receiving circuits a maximum capacity of 400 to 500 micro-microfarads appears to be correct (normally about 17 plates in one case, 23 in the other). The capacity obtained in a good variable air condenser allows a great enough tuning range to cover a considerable band of wavelengths.

When the inductance is fixed the tuning range is dependent upon the ratio of the maximum to the minimum circuit capacities. If the maximum capacity is 500 micro-microfarads and the minimum is 20 m.m.f., the ratio is 500 to 20 or 25 to 1. The capacity variation is 25 and, since the wavelength is proportional to the square root of the capacity, the wavelength range of variation is five.

Stray Capacities

This means that the greatest wavelength to which the circuit will respond is five times the minimum wavelength. Assuming that the inductance is of a

T. R. F. COILS
 NEW TYPE F24



Requires no Angle Mounting

Guaranteed **NON-OSCILLATING ON ALL WAVE LENGTHS.**

Per Set (3), \$4.50

Manufacturers, write for net prices.

NOLTE MFG. CO.
 61C GAUTIER AVE., JERSEY CITY, N. J.

value to tune to 150 meters at minimum capacity, it is evident that the maximum wavelength is 750 meters. Seldom is it possible with variable condensers available to obtain a minimum

Best R. F. 5 Tube Hookup
 Uses same panel, same layout, same (but fewer) parts than Neurodyne. Gives selectivity and pleasing volume from Coast to Coast. Hundreds have changed their Neuts to this. Only extra parts, 22 feet real gold sheathed bus wire, lithographed circuit and complete data, prepaid, for \$5.00. Nothing else to buy. Satisfaction guaranteed. Data about circuit—10c. 48 page parts catalog for stamp. We accept stamps same as cash.
KLADAG RADIO LABORATORIES, Kent, Ohio

NEUTRODYNE KIT \$19.75
 Complete Kit of licensed Neurodyne parts including panel, tube sockets, rheostats, Jack, fixed condensers and grid leak. Neuroformers complete with variable condensers and neutrons. Every part included even to screws and wire. Easy read plans.
 Send No Money Order by Postcard
 Pay the Postman
RADIO SURPLUS STORES
 HELENA MONTANA

ACME POWR-BEE
 Better Than "B" Battery
NO HUM NO NOISE
 Reduces the cost of radio. At your dealers or write
THE ACME ENGINEERING CO.
 Dept. 8 LOUISVILLE, KY.
 Dealers write for big sales proposition

THE GENUINE LOUDSPEAKER
\$1.50 Vacuum Tubes \$1.50
 C. O. D., JUST PAY POSTMAN
 MONEY BACK GUARANTEE
JAMES H. KONKLE
 192 Market Street Newark, N. J.

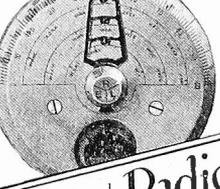
BUY RADIO BY MAIL
 SEND 10c TO-DAY FOR
OUR NEW CATALOG
SIMPLEX RADIO SALES CO.
 1806 Lafayette Ave. St. Louis, Mo.

BILTMORE RECEIVERS.



Combines all the essentials of fine Radio reception to the highest degree at lowest prices. Write for descriptive circular. Dept. X.
BILTMORE RADIO Co.
 BOSTON 30, MASS.

Made by the Ham-mand Mfg. Co., your assurance of quality and dependability. Produced solely for the Phenix Radio Corporation.



Direct Radio Tuning!
 \$250

Pencil-record a station on the dial—thereafter, simply turn the finder to your pencil-mark to get that station instantly. Beautifully silvered dial—easy, quick to mount. Eliminates fumbling, guessing.

Designed by R. E. Lacault, inventor of the famous Ultradyne Circuit. The monogram seal (R.E.L.) is your assurance of Lacault design.

ULTRA-VERNIER TUNING CONTROL
PHENIX RADIO CORPORATION
 9 Beckman Street New York City

Minimum Capacities in Circuits

circuit capacity as low as 20 micro-microfarads. Some of the best variable air condensers have a minimum capacity of this order, but any parasitic capacities in the circuit add to that of the condenser, thus increasing the minimum.

Any inductance coil has a certain amount of distributed capacity; leads and connections have capacity to each other and to earth as well as to the apparatus in the circuit. A vacuum tube has capacity between its grid and filament which affects the circuit somewhat. The grid-plate capacity together with the tickler coil or plate inductance introduces the effect of capacity which is particularly noticeable at low settings of the tuning condenser.

High in Regeneration

A regenerative detector circuit (or radio amplifier) may have a minimum circuit capacity at broadcast wavelengths as great as 100 micro-microfarads (.00001 mfd.) The maximum circuit capacity would not be the maximum of the condenser plus a hundred micro-microfarads, but plus something less than 100 m.-mfd. The capacity ratio would be between five and six and the wavelength ratio only a little over two. In such circuits the plate inductance or tickler coil should be as small as possible to obtain a large tuning range.

The distributed capacity of the inductance coil should be kept as low as possible. Since layer coils are to be preferred since the inductance for a given length of wire is greater than for staggered windings. All leads and connections not at ground potential should be well separated.

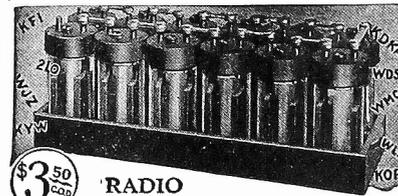
A fair minimum circuit capacity is about 50 micro-microfarads. With a maximum capacity of 500 micro-microfarads, a capacity ratio of 10 is obtained. The wavelength variation is then approximately 3.2

to 1. If the minimum wavelength is 150 meters, the maximum is about 480 meters. The increased minimum causes a reduction of tuning range.

Variable air condensers are seldom highly efficient at or near minimum setting and it is not considered good practice to depend upon tuning below 10 points on a 100 division scale. The reliable tuning range for variable condensers with a full capacity of 500 micro-microfarads is about

3 to 1. Such a condenser may cover the band of 200 to 600 meters with the proper inductance.

It is evident that we should choose variable condensers for their tuning ranges and that the minimum capacity should be as small as possible.



\$3.50
RADIO Storage "B" Battery
Lasts Indefinitely—Pays for Itself

Economy and performance unheard of before. Recharged at a negligible cost. Approved and listed as Standard by leading Radio Authorities, including Pop. Radio Laboratories, Pop. Sci. Inst. Standards, Radio News Lab., Letfax, Inc. and other important radio institutions. Equipped with Solid Rubber Case, an insurance against acid and leakage. Extra heavy glass jars. Heavy rugged plates. Order yours today!

SEND NO MONEY Just state number of batteries wanted and we will ship day order is received. Extra Offer: 4 batteries in series (36 volts), \$13. Pay expressman after examining batteries. 5 per cent discount for cash with order. Mail yours—*now!*

WORLD BATTERY COMPANY Chicago, Ill.
 1219 So. Wabash Ave., Dept. 82
 Makers of the Famous World Radio "A" Storage Battery
 Prices: 6-volt, 100 Amp. \$12.50; 150 Amp. \$14.50; 140 Amp. \$16.00.
 All equipped with Solid Rubber Base.

World FOR RADIO STORAGE BATTERIES
 (KDKA) (WEAF) (WGN) (WJS) (KHJ) (KGO) (KFAF) (WJY) (KOP)

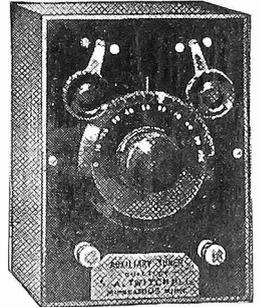
AUXILIARY TUNER

Patents Pending

Better Than a Wave Trap

Improved Model

A TWITCHELL AUXILIARY TUNER



connected to your instrument will positively eliminate all local interference and enable you to bring in distant stations at any time.

They are in successful use within 400 feet of large broadcasting stations.

They also enable you to receive on longer wave length than you can get without it.

Copyrighted Diagram \$ 50

All parts including cabinet 9.00

Complete, Tuner, Walnut cabinet. 15.00

All Goods Prepaid

S. A. TWITCHELL

1930 Western Avenue MINNEAPOLIS, MINN.

CLEARATONE



Radio Tubes
 Types 11-12-199-200-201A
 Built to the Most Rigid Specifications
\$1.50

METER TESTED
 199 with Standard Base
 Satisfaction Guaranteed
 Mail Orders Carefully Filled

RADIO TUBE LABORATORIES
 296 Broadway, New York City



New York's newest and most beautifully furnished hotel—accommodating 1034 guests

Broadway at 63rd Street.

ROOM WITH PRIVATE TOILET \$250

ROOM WITH PRIVATE BATH \$350

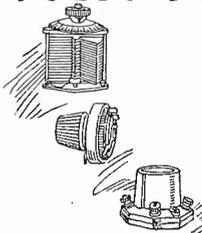
ALL OUTSIDE ROOMS



Radio Headquarters

Why not buy your set or parts at Radio Headquarters? Only tested and approved radio equipment is sold. Every set sold by us is guaranteed to give satisfactory results.

Ward's Radio Catalogue



The best Radio Experts made this catalogue—men who devote their entire time to Radio—who are up to the minute with everything new, who tell you the best hook-ups, who have selected for you the best tested parts, who have chosen the best sets—so simple that you yourself can easily install them—so reliable that we guarantee them to give satisfaction.

Write for your copy of this Catalogue. See for yourself the

low prices. Buy your radio at Radio Headquarters.

Our 53 Year Old Guarantee Ward's has dealt with the American people for 53 years under a definite guarantee of "Money back if you are not satisfied." All our Radio sets are guaranteed to give satisfactory results and back of this guarantee is a reliability that for 53 years has not been questioned. Address our home nearest you. Dept. 42 R

Montgomery Ward & Co.

The Oldest Mail Order House is Today the Most Progressive

Chicago Kansas City St. Paul Portland, Ore. Oakland, Calif. Fort Worth

Radio University

(Concluded from page 18)

plus one stage of push-pull amplification.—Aida Krupp, 301 West 54th St., N. Y. C.
The amplification obtainable by using transformer coupling is greater than that obtained with resistance coupling, and if efficient transformers are selected the quality of amplification is almost as good. In most cases, therefore, a standard two-stage transformer amplifier will suffice, but better quality results from one trans-

former stage and two or three resistance stages added thereto.

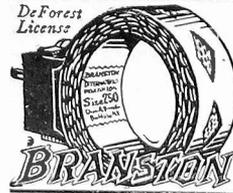
I AM living on a plantation here in Mexico, with only Indians around me, in the woods six days' ride from the nearest post office, so I am anxious to have a radio receiving set that would enable me to listen in on stations from various States. I have asked for information from various New York houses, but none of them has been able to give me definite information as to distance or set. They rather seem to avoid it. I know static conditions are bad here several months of the year. I am willing to spend \$250. Being buried here in the woods radio would be a great treat for my family and we would surely enjoy lectures and music from the outside world. Mexico City, Havana and New Orleans would be fairly easy to hear, but, of course, I would like to hear New York. Please send me some information that will help me select a set.—James Wall, Outway, Tex.

In your particular case a Super-Heterodyne receiver that can be used with a loop antenna and with outdoor wires would undoubtedly be most serviceable. The outdoor wire would increase the distant range and the loop could be used when static is heavy. There are so many variable factors that govern the distance a set will cover that no fixed range can be guaranteed: Weather conditions, ground conditions, location of the set, quality of the instruments, skill of the operator in tuning and power of the transmitter all figure in the final results. Bad static and the strength of the sun's rays will undoubtedly prevent you from hearing as far as New York in the Summer. During the Winter a Super-Heterodyne might pick up New York on the loop and a Neutrodyne or tuned radio frequency set in connection with an outdoor antenna would be likely to cover that distance fairly regularly. When you are ready to install the antenna, and if you have space, it would be a good idea to put up three antennae, point one toward New York, one toward Chicago and the other toward San Francisco, and have a switch to throw either one into the circuit. Take the lead-in off the end nearest the cities toward which they point. Use a wire about 125 feet long, including the lead-in.

THERE are a few points I would like to have cleared up about a counterpoise when used in connection with a radio receiving set. First, the relative distance between the aerial and counterpoise and the counterpoise and ground; the width of the counterpoise and aerial and length of each; the importance of the exact centering of the counterpoise under the aerial, and last, should the signals be appreciably reduced in strength?—Irving Reinitz, 364 Sumpter St., Brooklyn, N. Y.

For receiving purposes the distance between the aerial and counterpoise should be at least thirty feet, and more if possible. There is no specific law governing the height of the counterpoise from the ground, and equally as good results are obtained from about one foot to about twelve feet in most cases. The usual height is about eight feet, however. It has been found that the width should be as great as possible and the counterpoise contain about twice as many wires as are in the aerial. The counterpoise need not be centered directly under the antenna, the main idea being to have a capacity between the counterpoise and the ground. The usual location for a counterpoise, however, is under the aerial. The length of the wire in the counterpoise should be made longer than the antenna if possible. This is, however, not so important. With such an arrangement the signal strength should not be decreased in the least, and, if anything, increased.

I HAVE a five-tube set, bought second-hand. It works well at times, but at any time the reception is liable to be cut off suddenly. I find that it is caused by the dimming or complete going out of the first radio frequency tube. This dimming occurs when aerial, ground and B batteries are discontinued. This led me to blame the A battery, so I bought a new one and three new tubes, but the trouble is still there. None of the other tubes flicker when the first one varies in brilliancy. Sometimes the light returns itself, and I can bring it back by moving the tube in the socket. What do you think is the trouble?—C. C. Mulligan, 6802 Ridge Blvd., Brooklyn, N. Y.
There is undoubtedly a loose connection in the socket or in the wiring leading to the first tube. Inspect the contact springs of the socket to determine if they are making a firm connection with the prongs of the tube.



HONEYCOMB COILS

The Universal all-wave inductance. Back and front panel mountings. Send 25c for Super Het., R. F. and Honeycomb Coil Circuits and Complete Catalog.

Chas. A. Branston, Inc.
Dept. 5, 815 Main St.
Buffalo, N. Y.



Study Weather, Static Condition, with Barometer. Delivery Guaranteed on receipt Money Order. \$5.00

RADIO BAROMETER CO.
220 Devonshire Street
Boston, Mass.

HERCULES AERIAL MAST



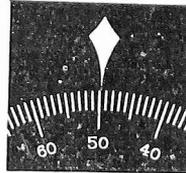
20 Ft. Mast \$10
40 Ft. Mast \$25
60 Ft. Mast \$45
All steel construction, complete with guy wires and masthead pulley. We pay freight.
S. W. HULL & CO., Dept. E3
2048 E. 79th St., Cleveland, O.

Write for literature and FREE Blueprint

EUREKA DIAL POINTER

A jewelry product which beautifies your set. Screws fast to panel.

SAMPLE MAILED UPON RECEIPT OF STAMPS



10c ea. Gilt or Nickel

Dealers—Send \$3.25 for handsome three-color display card which nets you a fair profit. Every set made can use Eureka Pointers.

Jobber wanted in each large city

Manufactured by C. W. BUTTS, Inc.
42 Hedden Place East Orange, N. J.



Tunes straight through the locals, gets distance. Brings in more stations—clearly and with volume—in a given length of time than any other set. Direct comparisons invited. Zenith receiving sets cost more, but they do more.—The exclusive choice of MacMillan for his North Polar Expedition.

Zenith Radio Corporation
332 S. Michigan Avenue, Chicago

Now Only **5 75**
Direct to You

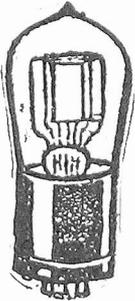
MAJOR SPEAKER

Special Offer

Handsome Crystalline finish fibre horn 2 1/2" high. Plugs in like headphones. Remarkable volume and clarity of tone. UNCONDITIONAL ALL Y GUARANTEED. SEND NO MONEY. After you examine your Major Speaker and are satisfied, pay postman small c. o. d. charges. \$5.75 for limited time only. Order Now.

The Major Speaker Co.
31 Euclid Arcade Annex
Cleveland, Ohio

NEW REFLEX TUBES



\$1.50

CANADA 35c EXTRA
All Tubes Guaranteed.
Mail Orders Solicited.

DENNING RADIO MFG.

455 SPRINGFIELD AVE.
NEWARK, N. J.

FREE!



Everyone Interested in RADIO Should Write for this FREE Radio Book

(Just send your name. No postage. Let us surprise you with our amazing values of all the up-to-date radio apparatus.)

Complete best-quality parts as used in RADIO WORLD Laboratories by

HERMAN BERNARD for RADIO WORLD'S

4-TUBE SUPERDYNE

Including Low-Loss Coils, Flewelling Condenser, Federal Transformers, Drilled, Engraved, Panel, etc.

Approved by Herman Bernard **\$42.50**

Positively no Substitutes.

Ask This Magazine About Us.

Wholesale Radio Service

Dept. B
9 CHURCH ST. NEW YORK CITY

The DAVEN RESISTANCE COUPLED AMPLIFIER KIT

For those who build their own, and insist on quality amplification, there's nothing to equal Resistance Coupling. The

DAVEN AMPLIFIER KIT

comes with full instructions for assembly. Easy to build—efficient in operation. (Without sockets and condensers.)

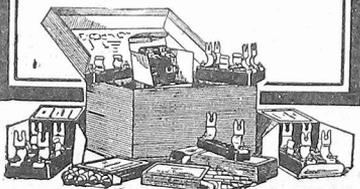
Supplied in either 3 or 4 stages. Sold Everywhere.

Ask your dealer for the "RESISTOR MANUAL." It's full of information on Resistance Coupling. Price, 25c.

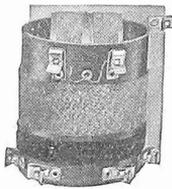
DAVEN RADIO CORP.

"Resistor Specialists"

Newark New Jersey



Tested and approved by Radio World "TRI-TUNER"



Build Your Own Set! Use Arc Rad Products. A Three-Circuit Coil, all Litz wound on natural bakelite.

SENT PREPAID **\$3.00**

Panel shield and hook-ups included. Fahnestock clips used.

Eliminates Soldering

ARC RAD PRODUCTS

48 South 7th Street Newark, N. J.
EVERY PRODUCT GUARANTEED

JOIN THE A. B. C.

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.

- Ralph Pugh, RD4, Warro, Ind.
- K. D. Carter, 657 Por. Ave., Winnipeg, Manitoba, Can.
- Eddie Cox, 431 E. Taylor St., Portland, Ore.
- Chas. C. Dennish, 65 Lafayette St., Trenton, N. J.
- Paul Ward, RD-2, Sharpsburg, Pa.
- Bruce Maxwell, Palmerton, Ont., Can.
- C. H. Orcutt, 445 Havaland Ave., Cal.
- Jose T. Urquiza, Calle Certificados, Col. Postal, Mexico, D. F.
- Virgil Thompson, Wishek, N. D.
- Edw. Hoffman, 436 31st Ave., San Francisco, Cal.
- Alvin Flynn, 632 Adams Ave., Scranton, Pa.
- James T. Rappleye, 79 Garrison St., Bethlehem, Pa.
- Leo Huser, 843 Cerritos Ave., Long Beach, Cal.
- Perry Rathbun, Temple, Okla.
- P. E. Everto, 105 S. 4th St., Box 149, Marshalltown, Ia.
- Kenneth R. Forbes, Interlaken, N. Y.
- J. Gordon Dozier, Box 438, Harrisville, R. I.
- A. A. Lanzarone, 375 N. Church St., Spartenburg, S. C.
- Walter Graham, Walters, Okla.
- Alfred Midkill, 5600 Portland Pl., E. St. Louis, Ill.
- Britton A. Marlow, 408 S. Mababar St., Huntington Pk., Cal.
- Fred Bunch, Statesville, N. C.
- Frank E. Young, 9 Prospect St., Danialson, Conn.
- John S. Kenoyer, 2249 Perkins Ave., Long Beach, Cal.
- Chas. S. Cooper, 54 Millet St., Dorchester, Mass. (6 requested).
- P. T. Kimber, 36 St. Patrick St., St. Catherines, Ont.
- Joe Regelman, 914 Adelina Pl., North Bergen, N. J.
- J. E. Marshall, 416 Guerner St., Auburn, Me.
- John Listiak, Jr., 71 N. Richview Ave., Youngstown, Ohio.
- W. Kaiser, 63 Mercer St., Newark, N. J.
- Joe Heard, Jr., 645 Lucilla Dr., Baton Rouge, La.
- John H. Peters, 858 N. 42nd St., Philadelphia, Pa.
- Armand St. Piene, Rimoriskii, Que., Can.
- J. G. Dozier, Harrisville, R. I.
- Richard Nicholson, 2709 Mt. Elliott Ave., Detroit, Mich.
- F. Mueller, S. Langhorne, Pa.
- Frank J. Goldsmith, 6190 Vermont Ave., Detroit, Mich. (4).
- Ed. Johansen, 19 Brownell St., Stapleton, N. Y.
- Leo Heiser, 843 Cerritos Ave., Long Beach, Cal.
- John Horsager, Berlen, N. D.
- Benj. Plaut, 28 Parkhurst St., Newark, N. J.
- Wm. Webb, 251 Broadside Ave., Amsterdam, N. Y.
- Truman Morm, High Bridge, N. J.
- J. L. Wilson, Box 681 Wacoys, Tex.
- Wm. A. Mundhenk, 545 Terrace Ave., Cincinnati, Ohio.
- N. L. Eberhardt, 8106 St. Clair St., Cleveland, Ohio.
- Walter Hoffman, Freemansburgh, Pa.
- John Oszulak, 183 Goodyear Ave., Buffalo, N. Y.
- Frances A. Surface, RF2, Lebanon, O.
- Harold Wilson, 1019 Penny St., Davenport, Ia. (2).
- V. P. Hall, 21 Rockland St., Rockland, Me.
- A. A. Lanzarone, 375 North Church St., Spartenburgh, S. C.
- Chas. W. Nash, 912 Arkansas Ave., Atlantic City, N. J.
- Geo. H. Redfearn, Republic, Mo.
- Richard B. Saich, 15 Eaton St., Hartford, Conn.
- Robert McKenny, 532 2nd St., Daytona, Fla.
- H. Winkler, 1530 East 10th St., Brooklyn, N. Y.
- Oscar M. Huseby, Nome, N. D.
- Julius Charleston, 1504 North 7th St., Philadelphia, Pa.
- Dr. John M. Gilmore, McVeytown, Pa.
- Carl Mildner, Paxton, Mont.
- Coby Lorenzo, 1911 Bush St., Oakland, Cal.
- Kenneth A. Davies, Clarion, Iowa.
- Asa Schenck, 704 West 24th St., Oklahoma City, Okla.
- Arthur Maul, 26 Turrill Ave., Lapeer, Mich.
- Albert A. Snyck, Jr., 145 Scoville Ave., Buffalo, N. Y.

A. B. C. Editor, RADIO WORLD, 1493 Broadway, New York City.

Please enroll me as a member of the American Broadcast Club.

Name

Address

City or Town

State

GETS THE STATION MICROTOR

Infinitesimal Control of Condensers and Rotors 1 Division of MICROTOR Knob turns Rotor 1-5400 Revolution.

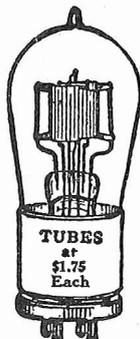
Controls standard dials to and including 4" diameter. Easy, Universal application. 50c. Postpaid, on receipt of cash. MANUFACTURERS' & INVENTORS' ELEC. CO. Distributors write for terms. 29-31 Gold Street Dept. RW New York City



Famous for Quality and Service

Amplitron Tubes

Bonded to Give Service—List Price.....\$4. We will send you new AMPLITRON any model—\$2.50 Dealers and Jobbers—Write for Discounts. Pennant Radio Laboratories Dept. RW., 23 Central Ave., Newark, N. J.



SAVE \$1.25 ON COST OF NEW TUBES BY HAVING YOUR OLD TUBES REBUILT AT \$1.75 EACH.

Guaranteed equal to new. Send us your tubes by parcel post. We return them parcel post, C.O.D. and try to maintain 24-hour service.

HARVARD RADIO LABORATORIES 400 Old Colony Ave. Boston, Mass.

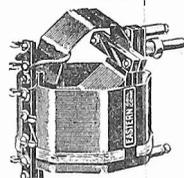
Superadio Low Loss Kit



\$48.50 Complete MORE SELECTIVITY MORE VOLUME MORE DISTANCE BY TEST Than you have ever been able to buy for \$48.50 Complete in every detail even to panel and cabinet, contains Lopez famous Low Loss Tuner, Heath "Radiant" Low Loss Condenser, Superadio 2 in 1 and 3 in 1 Units, Etc., Etc. All Fully Guaranteed. Dealers, write for discounts. WILLIAM A. WELTY & CO. Radio Department 88 S. STATE STREET CHICAGO, ILL.

LOW-LOSS COILS

in the Famous Pickle bottle form designed by M. B. Sleeper



Certified by HERMAN BERNARD for use in the Radio World's 1925 Model DX SUPERDYNE Guaranteed for best results in this wonder circuit Price \$8.00 per set At your Dealers or direct postpaid. EASTERN COIL CORP. Dept. R.W., 22 Warron St., Now York, N. Y.

"Liberty Supreme"

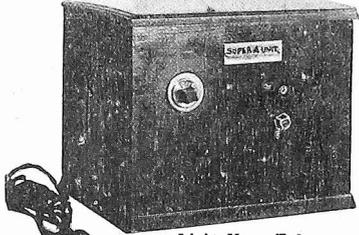
5 Tubes Balanced Radio; Coast to Coast on Loud Speaker; Beautiful Solid Walnut Cabinet; Panel, 7x30 Inches; Room in Cabinet for "B" Batteries.

Dealers, write for particulars. We guarantee your sale.

List price without accessories \$150.00

LIBERTY RADIO MFG. CO. KANSAS CITY, MISSOURI

PIANO, RADIO AND MUSIC business, doing \$17,000 year; sacrifice at \$2,500; well stocked. Box W. 4, RADIO WORLD.



Light Your Tubes Right from Lamp Socket

SUPER-A-UNIT

replaces the "A" battery, furnishes 8 volts for the filaments direct from 110 v. lamp socket. CLEAN — ECONOMICAL — CONVENIENT Price for A.C. \$48, for D.C. \$32 Send no money. Pay expressman. If not satisfied return in ten days; money will be refunded. DEALERS—Write for proposition U. S. RADIO EXCHANGE 925 BROADWAY NEW YORK, N. Y.



BELLTONE RADIO TUBES

TYPE 201-A 199 \$1.75 TYPE 12

199 With Standard Base Life, Tone and Volume With Money-Back Guarantee Mail Orders Promptly Filled

Manhattan Lamp Works Room 411, 324 West 42nd Street, New York City

"Morsing Bus-Bar Union"

Assemble Round or Square Bus Bar and Solder Three Wires at a Time. Quick Assembling. Repairs Can Be Made Without Taking Set Apart.

Enough for one set, 25c No. 1 for 14; No. 2 for 12 wire. Ten dozen for \$1.00.

Newark Watch Case Material Co. 15 Ward Street Newark, N. J. DISTRIBUTORS WANTED

ONLY THREE TUBES

and it is the equal of any five-tube set ever built. It has selectivity and volume equal to any Super-heterodyne or Neutrodyne. It has the purity and quality of tone of the crystal set. It has the simplicity of control of the single-circuit set. It has brought in Honolulu, Paris, London and other foreign stations on a loud speaker. It gets distant stations while a 500-watt station only three blocks away is broadcasting. It has only two controls and can be logged. It is not a reflex; it is the result of years of careful scientific research and experiment. Any novice can build one successfully from our diagrams with complete instructions and special coil. PRICES Diagram, instructions and coil..... \$5.00 Three-tube instrument ready to use... 50.00 One-tube instrument ready to use... gets everything on head-phones... 18.50 Build or buy one of these wonderfully sensitive instruments and you will want no other. All goods shipped prepaid.

S. A. TWITCHELL CO. 1930 WESTERN AVE. MINNEAPOLIS, MINN.

Prosecutor Seeks Extradition in Bootleg Tube Case

FREE BOOKLET FOR INVENTORS

IF YOUR INVENTION is new and useful it is patentable. Send me your sketch. Z. H. POLACHEK, 70 Wall St., New York.

Reg. Patent Attorney-Engineer

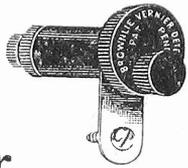
CUT OUT THIS AD

Send it to us with \$1.50 and receive a perfect tube—any type.

Mastertone Radio Co.
903 Broad St. Newark, N. J.



Best Reflex Crystal Detector



Says THOS. W. BENSON, noted radio engineer, specifying it exclusively for use in his 6-tube reflexed Super-Heterodyne, featured in the Feb. 28 and March 7 issues of RADIO WORLD. The same conclusion was reached by the Aemo Apparatus Co. regarding the use of this crystal in reflexes.

No longer does the whisker scratch the crystal, or is the sensitiveness killed by heavy spring pressure—the Vernier Regulator takes care of that. It will surprise you to know how sensitive Crystal Detectors are when correctly made.

BROWNLIE VERNIER DETECTOR

For Panel or Base Mounting **\$2.00** including Crystal. Guaranteed

At your dealers, otherwise send purchase price and you will be supplied postpaid.

ROLAND BROWNLIE & COMPANY
22 Saunders Street Medford, Mass.

ASSISTANT District Attorney Weller of New York County took steps to extradite John Bradley of Slocum Avenue, Morsemere, N. J., from New Jersey for trial on a conspiracy indictment in connection with the alleged fraudulent disposal of 50,000 radio tubes for more than \$200,000 on the representation that they had been manufactured for the Radio Corporation of America. The tubes, according to an investigator for the corporation, had been disposed of through dealers in this city.

Bradley, one of seven men recently arrested in New York City and in Newark, N. J., was accused of having conspired with a man, believed to have fled to Canada.

Elliott E. Fischer and Isidor Gold were held in \$300 for trial in Special Sessions as was David Phillips. They were charged with violating the state trade-mark law in selling bootleg tubes stamped in imitation of the trade-mark of the Radio Corporation.

Frederick Craig of Kearny, N. J., had been arrested with Bradley on a charge of manufacturing the bootleg tubes in Newark. Bradley was accused of having acted as the general sales manager in the distribution of the spurious tubes.

Mr. Weller said the corporation sells its tubes at \$2.66 each wholesale, while the bootleg tubes were being sold to dealers for \$2. All of the men pleaded not guilty.

RADIO COMPASS STATIONS AIDED LOS ANGELES FLIGHT

LAKEHURST, N. J.
CAPT. GEORGE W. STEELE, commander of the dirigible Los Angeles, speaking after the return flight from Bermuda, said:

"The voyage was greatly helped, if not

altogether made successful, by the radio compass stations. They assisted wonderfully. A great deal of the time the sky was cloudy and we could not take observations. We were guided by the directions from the radio compass stations and we picked up the light at Bermuda dead ahead and did not have to change our course in the slightest."

THOUSANDS OF BARGAINS

FACTORY GUARANTEED MUSE, BY MAIL

Genuine New Radiotron or Cunningham Tubes

UV-199—300—201A—WD-11—12..... **\$2.39**

C299—300—301A—C11—12..... **\$2.39**

Fresh Burgess or Eveready "B" Batteries

22 1/2 Volt large size \$1.68—45 Volt \$5.09 size \$8.88

Write for Free new Complete Catalog on Sets and Parts

STONE ELECTRIC CO., 714 Pine St., St. Louis, Mo.
All Mds. F.O.B. St. Louis, Mo. Dept. W

PANELS

FOR ANY KNOWN

CIRCUIT DRILLED AND ENGRAVED

PRICES ON REQUEST

Cortlandt Panel Engraving Co.
81 Cortlandt St. New York City

TEN TIMES TESTED

Towers

Scientific Phones

\$2.95

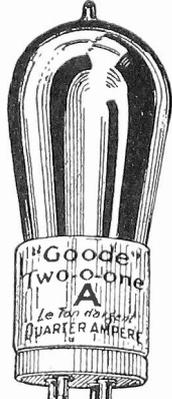


THE "GOODE" TWO - O - ONE

A

Le Ton d'argent

Guaranteed



BY MAIL ONLY

\$2.00

Postpaid

QUARTER AMPERE AMPLIFIER-DETECTOR

RADIO TUBE

GUARANTEED SATISFACTORY

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

ONE—"Goode" Detector-Amplifier **\$2.00**

THREE—"Goode" Detector-Amplifiers **\$5.50**

(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, New York draft, or personal check to

The Goode Tube Corporation

Incorporated Dept. B

OWENSBORO KENTUCKY

"SELECTODYNE COILS"

COPYRIGHT APPLIED FOR

SELECTIVITY-TONE-POWER ALL THAT THE NAME IMPLIES

FOR THE **ROBERTS CIRCUIT**

A low loss winding that is self-neutralizing. The neutralizing condenser and bucking winding are eliminated with their loss of selectivity and volume. A new development in radio frequency amplification setting a much higher standard of efficiency.

GUARANTEED WITHOUT RESERVATION

PRICE, \$7.50 PER SET

AT YOUR DEALERS OR DIRECT BY MAIL

SOME TERRITORY STILL OPEN TO JOBBERS—WRITE OR WIRE

"When Better Coils Are Made They'll Be Selectodynes."

CAST DUPLER COMPANY

MANUFACTURERS AND DISTRIBUTORS

245 East Seventh Street, Long Beach California

FILL OUT AND MAIL NOW

SUBSCRIPTION BLANK

RADIO WORLD

RADIO WORLD 1493 Broadway, New York City

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

SUBSCRIPTION RATES:

Single Copy \$.15

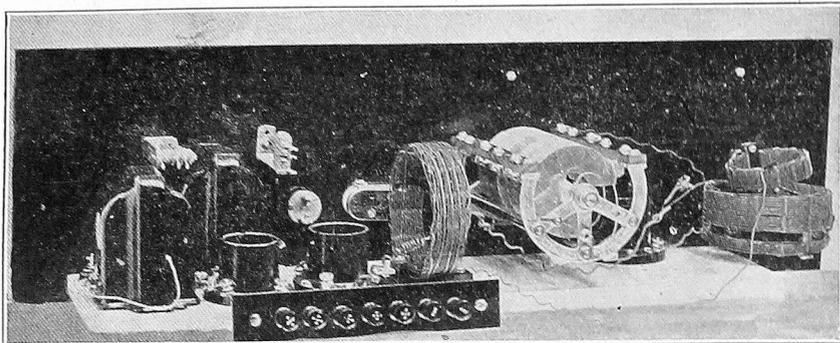
Three Months 1.50

Six Months 3.00

One Year, 52 Issues 6.00

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

Fan Takes Pride in His New Set



REAR VIEW of Clark Waters' set. It is the 1925 Model 4-Tube DX Wonder. The Wallace low-loss coils were used with a Flewelling double condenser.

New Broadcasters

WASHINGTON.

Eight new class A stations were licensed by the Department of Commerce during the past week. They follow:

Call	Stations	Meters	Watts
KFBE	Horn & Wilson's "Radioland," 1023 Morro St., San Luis Obispo, Cal.	215.7	50
KFWA	Browning Bros. Co., 2451 Kiesel St., Ogden, Utah	214.2	500
KUOM	State University of Montana, Missoula, Montana	244.8	250
WHBF	Beardsley Specialty Com- pany, 217 18th St., Rock Island, Ill.	222	100
WHBG	John S. Skane, 1310 North Fourth St., Harrisburg, Pa.	231	20
WHBH	Culver Military Academy, Culver, Indiana	222	100
WHBI	Chesaning Electric Co., Shesaning, Michigan	227	50
WKBE	K. & B. Electric Co., 59 Emerald Ave., Webster, Massachusetts	231	10

Clear-O-Dyne

Four and Five Tube Sets

No set of an equal number of tubes will do more, yet the price is very moderate.

The Cleartone Radio Co.
466 East McMillan Street
CINCINNATI, OHIO

CROSLEY

RADIO CATALOG FREE

Describes fully the complete line of radio frequency sets, regenerative sets (licensed under Armstrong U. S. Patent No. 1,113,191) and parts.

Write for Catalog Today

THE CROSLEY RADIO CORPORATION
POWER CROSLEY Jr., President
3402 Sasassafras Street Cincinnati, Ohio

The tube that CAN'T BLOW OUT



501 A Blo-Pruf Tubes \$3.00

Sent post paid on a money back guaranty. If the tube blows out inside of six months from any cause it will be immediately exchanged.

BLO-PRUF TUBE CO.
16 STUART ST. BOSTON, MASS.

Regular \$30 Value
3 TUBE SET \$18.50

3 Circuit
Tuner Guaranteed to give as good results as sets selling at \$60. Fine mahogany Cabinet. Engraved Panel and dials to match. We pay transportation. Send Post Office or Express Money Order. Gives satisfaction or money refunded.

JULIUS HOWARD, Dept. R.W.
217 West 125th Street, New York, N. Y.

"THE 1925 MODEL 4-tube DX circuit has pleased me immensely," writes Clark Waters, R.F.D. 30, Stamford, Conn. "I am showing you in this photograph what I have done. The panel would disclose the two Accuratune dials, the new design, which fasten directly to the shaft and require no panel holes. The dial pointers are the Eureka. A Bradleyohm is the detector filament control, while two switches are used. One is the A battery push-pull, the other a toggle switch to shunt the first or second audio stage to the single-circuit jack at will. A plug is in the jack. Now, as for the assembly, etc., the back view shows the new Wallace low-loss coupler and RFT, with the new Flewelling duplex (or double) condenser. Also, the new General Radio audio transformers are used and give the same results as the Federal did in another set. The fourth socket is hidden behind the audio transformer at left. An Eby terminal strip is shown (binding posts). This is a great DX set, wonderful tone, great volume."

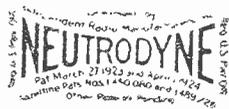


Write Today
For Descriptive
Folder of

THE HOWARD 5-TUBE NEUTRODYNE

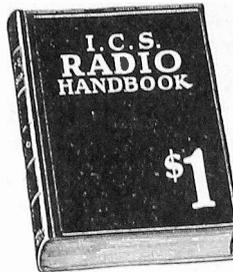
This Remarkable Set Has Created a Sensation Among Radio Enthusiasts.

Beautiful Walnut Cabinet with Special Howard Neutrodyne, Tube Sockets and Rheostats.



HOWARD MFG. COMPANY
451-469 E. Ohio St. Chicago, Ill.

Now you can understand RADIO



JUST OUT
514 PAGES

Compiled by
HARRY F. DART,
E.E.

Formerly with the
Western Electric Co.,
and U. S. Army In-
structor of Radio.

Technically edited by
F. H. Doano

NO MORE need you turn from book to book, hoping to find what you want. It is all here, in 514 pages crammed full of every possible radio detail. Written in plain language, by engineers for laymen. More than 100,000 sold.

IT EXPLAINS: Electrical terms and circuits, antennas, batteries, generators and motors, electron (vacuum) tubes, many receiving hook-ups, radio and audio frequency amplification, broadcast and commercial transmitters and receivers, super-regeneration, codes, etc.

Send \$1 today and get this 514-page I. C. S. Radio Handbook—the biggest value in radio today.

International Correspondence Schools
Box 8795-C, Scranton, Penna.

I enclose One Dollar. Please send me—post-paid—the 514-page I. C. S. Radio Handbook. It is understood that if I am not entirely satisfied I may return this book within five days and you will refund my money.

Name

Address

Check here and enclose \$1.50 if you wish the deluxe edition, bound in leatheroid.



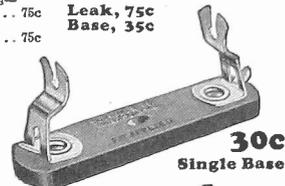
Metallic DURHAM Fixed or Variable Grid Leaks

At dealers or postpaid

Prices
Fixed Metallics
Over 1/4 meg. 50c
Under 1/4 meg. 60c

Variables
1,000 to 100,000 ohms 75c
100,000 ohms 75c
2 megs. 75c
10 megs. 75c

Variable on
Condenser Base
Leak, 75c
Base, 35c



All about Resistance Amplifiers—25c
Build a distortionless amplifier. Parts for two stages cost less than one good transformer. Complete detailed instruction booklet, 25c. At your dealer's or postpaid.

Satisfaction Guaranteed
DURHAM & CO., Inc.
1930 Market St., Philadelphia

Canadian Dist., De Forest Radio Corp., Ltd., Toronto

Write for the FREE working drawings of the set that heard LONDON and all the big European stations:
ELGIN SUPER-REINARTZ
 the set that leads in selectivity and distance. Your name and a stamp will bring the drawings—FREE!
ELGIN RADIO SUPPLY CO.
 Dept. A, 207 E. Chicago St. Elgin, Ill.

KITS

To Build Your Own Receiver

- Roberts—2 tube, Parts..... \$31.44
- Roberts—4 tube, Parts..... 48.35
- Rasla—1 tube, Parts..... 23.78
- Rasla—2 tube, Parts..... 31.43

GENUINE ERLA KITS IN FACTORY SEALED CONTAINERS

Write for Our 100-Page Catalog

LIBERTY MAIL ORDER HOUSE
 682, 106 Liberty St., New York, N. Y.

The New Type 54

SLEEPER MONOTROL

Reg. U. S. Pat. Off.

Grimes Inverse Duplex System

The only set that has 3 stages of tuned radio frequency ON ONE TUNING DIAL.

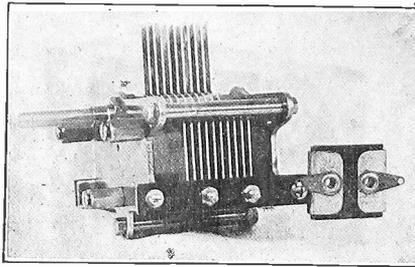
23 Other Important Improvements

Write for booklet "W." It's FREE.

SLEEPER RADIO CORPORATION

434 Washington Street Long Island City, N. Y.

SAFETY FIRST



WHEN hooking up a regenerative circuit of the Weagant X type it is well to put a fixed condenser in series with the plate and the variable condenser. Then if by accident the variable condenser plates touch, you will not blow out your tube or tubes.

LATEST PATENTS

WASHINGTON.

SIX patents on radio inventions were granted by the Patent Office. A brief description follows:

CARRIER Wave Receiving System (No. 1,526,408), invented by Fred W. Young, of Long Island City, N. Y. Provides a circuit such that demodulators of different kinds may be used without substantial change in the circuit itself.

MEANS for and Method of Limiting Interference in Wireless Signaling (No. 1,526,852), invented by John Hays Hammond, Jr., of Gloucester, Mass. Limits the effect of interference caused by static and other disturbances encountered in wireless telegraphy, and in the preferred embodiment thereof it depends, for its operation upon characteristics of gaseous or like detectors.

WIRELESS Transmission System (No. 1,526,311), invented by Max C. Batzel, of Wilkensburg, Pa. Provides a system of amplifier circuits, comprising a vacuum tube generator and an amplifier, with means to couple the amplifier circuit to the radiating system.

MOUNTING for radio vacuum tubes (No. 1,526,353), invented by Stanley D. Livingston, of Freeport, N. Y. A combined tube and resistance

mounting as a unitary structure, which is adapted to fit on or into a mounting designed for another type of tube.

PIEZO-Electric Loud Speaker (No. 1,526,319), invented by Lewis W. Chubb, of Edgewood, Pa. Makes use of the properties of a piezo-electric crystal for controlling energy in accordance with telephonic currents.

THEOSTAT (No. 1,526,441), invented by James C. Snell, of Oak Park, Ill. A rheostat for quick or coarse and fine adjustment for corresponding variations in the resistance in the circuit.

MAHOGANITE and BLACK RADION PANELS

DIALS, KNOBS, TUBING, SOCKETS
 RADION LOUD SPEAKER HORNS, ETC.

"THAT SPECIAL SIZE" FOR YOUR PHONOGRAPH, PORTABLE OR SUPER

ALL STOCK SIZES

WHOLESALE RETAIL

Send for Complete Price List

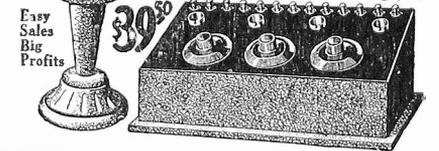
New York Hard Rubber Turning Co.
 212 Centre Street New York City

Make \$100 Weekly—sell RADIO

Demonstrate Once—Results Mean Sure Sale

Coast to coast, lowest prices, attractive four-tube instrument \$39.50. Big commission to you. Exclusive territory to proven salesmen. Territory going fast, write today for large illustrated book No. 100. Don't fail to name your county.

OZARKA, Inc.
 809 Washington Blvd. Chicago, Ill.



Easy Sales
 Big Profits

WHY NOT SAVE 20%

FROM LIST PRICE ON EVERYTHING?

NO EXCEPTION— ALL STANDARD RADIO MERCHANDISE OF EVERY TYPE AND MANUFACTURE

from complete sets to parts, tubes, and loud speakers, such as:

- | | | | |
|--------------|-----------------|---------------|------------------|
| Atwater-Kent | Eiseman Magneto | Kennedy | Radio Corp. |
| A. C. Dayton | Federal | Malone-Lemmon | Western Electric |
| Balkite | Freshman | Magnavox | Workrite |
| Cunningham | Grebe | Paragon | Zenith, etc. |

MAIL ORDERS FILLED; 10% DEPOSIT WITH ORDER. 25% ON ORDERS OVER \$25

YOU PAY US ONLY AFTER DEDUCTING 20% OFF LIST PRICE

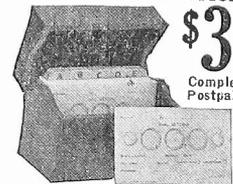
ECONOMY RADIO SALES CO., P. O. Box 99, Station O, Dept. 10, New York, N. Y.

THE ASTON CARD INDEX

RECORD YOUR RADIO STATIONS

Copyright 1924 by S. T. Aston & Son

Telephone Franklin 2159



\$3.00
 Complete Postpaid

100 Cards, Mahogany Finish or Oak Cabinet, and Index Dividers. A Useful Accessory to Any Set. Give Name of Set and Sketch of Dial Arrangement. Postpaid on Receipt of Cash or Money Order. Dealers Write for Terms.

S. T. ASTON & SON
 114 WORTH STREET NEW YORK CITY

RADIO WORLD'S QUICK-ACTION CLASSIFIED ADS.

10 CENTS A WORD. 10 WORDS MINIMUM

SPECIAL REPRESENTATIVE of the United States Radio-Krait Corporation, of 1457 Broadway, New York City, wishes to make appointment with prospective managers in your city for the purpose of opening up branch stores in any city in the United States. Interview may be arranged by letter or telephone. Address all inquiries to Mr. R. W. Burns, Pres., care United States Radio-Krait Corporation, 1457 Broadway, N. Y. C.

ELIMINATE "B" BATTERIES—\$1.00 secures instructions and blueprints. Complete parts, including metal case and tubes, \$22.50. Unit assembled, \$27.50. Interstate Radio Laboratories, 287 Johnson Ave., Newark, N. J.

REFLECTONE — SMALLEST LOUDSPEAKER IN EXISTENCE. Only five inches high. Unusual tonal quality result of latest scientific development in sound reproduction. A beautiful ornament which will meet every requirement for amplified reception in your home. Adjustable unit guaranteed. Postpaid upon receipt of \$5.00. W. A. Dickson, 514 Lissner Bldg., 524 South Spring Street, Los Angeles, Cal.

TUNE IN WITH KNOWLEDGE—"Introduction to Radio" in two volumes. Price postpaid, 60c., or two sets for \$1.00. MoRBoRn RaDiO, 536 West 112th Street, Suite 32, New York.

TESTED GALENA CRYSTALS 50c a pound. Mineral Novelty Co., Joplin, Mo.

ONE TUBE RADIO SETS, complete with tube, batteries and phones, \$17.50. Nangle Co., 601 Washington Boulevard, Oak Park, Ill.

BARGAINS in brand-new sets, Radiola 3—\$29. Freshman Masterpiece, \$49. Crosley Tririd, \$39. Nangle Co., 601 Washington Boulevard, Oak Park, Ill.

FRESHMAN MASTERPIECE, \$47.00; Radiotron tubes, \$2.75. Magnavox R3, \$28.50. T. E. French, 3-36 Montgomery, Minn.

NOW—A few new Crosley sets, all models at 20% discount. Robert Sterrett, Lebanon, Ky.

LIGHTNING STORAGE BATTERY COMPOUND. Charges discharged batteries instantly. Eliminate old method entirely. Gallon free to agents. Lightning Co., St. Paul, Minn.

AGENTS—Write for free samples. Sell Madison "Better-Made" Shirts for large Manufacturer direct to wearer. No capital or experience required. Many earn \$100 weekly and bonus. MADISON MILLS, 564 Broadway, New York.

BACK NUMBERS OF RADIO WORLD WANTED—The publisher wants issues of Oct. 4, Nov. 8, Nov. 22, 1924. Send these copies and current issues will be sent you. Mail postal if copies are sent. Circulation Manager, Radio World, 1493 Broadway, New York City.

BE RADIO MAN of your county. I show you how. Send \$2.00 for samples. Money back guarantee. James H. Konkle, 192 Market Street, Newark, N. J.

PIONEER BAKELITE VARIOMETERS-VARICOUPERS, \$2.00 Each, postpaid. Write for circular. Orders filled in rotation. Marson Sales, St. Clair Bldg., San Francisco, Calif.

DINING AND SLEEPING CAR CONDUCTORS (white) Exp. unnecessary. We train you. Send for book of Rules and application. Supt. Railway Exchange, Sta. C, Los Angeles.

LOW-LOSS INDUCTANCE FORMS—Linen Impregnated Bakelite. 50c each. The Kehler Radio Laboratories, Abilene, Kansas.

PATENTS—Write for free Guide Books and Record of Invention Blank before disclosing inventions. Send model or sketch of your invention for our prompt Examination and Instruction. No charge for the above information. Radio, Electrical, Chemical, Mechanical and Trademark experts. Victor J. Evans & Co., 294 Ninth, Washington, D. C.

COMPLETE 1924 INDEX OF RADIO WORLD, appeared in RADIO WORLD, dated Oct. 18, 1924, and Jan. 10, 1925. 15c per copy.

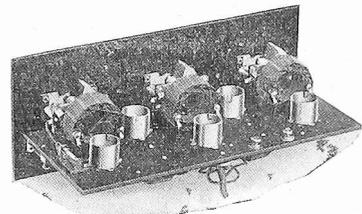
The Mighty Monarch of DX

BRUNSWICK
TRADE MARK
DELUXE

5-TUBE RADIO
FREQUENCY RECEIVER



The Brunswick De Luxe
On sale by all good dealers



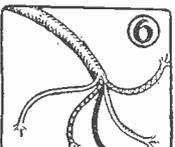
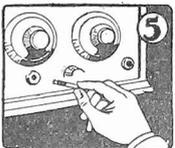
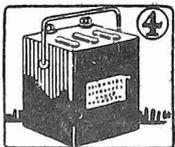
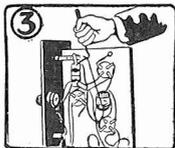
The
BIG
6

SPECIAL FEATURES
that make an instantaneous
hit with the fan

- 1-NIGHT TESTED
- 2-VOLUME-CLARITY-SELECTIVITY
- 3-"BUTTONHOOK" TESTED
- 4-BATTERY ECONOMY
- 5-LOCK SWITCH
- 6 FIVE-LEAD CABLE

\$60

ALL FOR



WITH the perfection of THE BRUNSWICK DE LUXE a five-tube tuned radio frequency set has at last been developed that achieves the utmost in results and satisfaction.

Construction through the joint efforts of famous radio engineers and experts THE BRUNSWICK DE LUXE embodies a score of features found in no other instrument—features that endow it with performance qualities entirely new to radios.

Through its perfectly tuned radio frequency circuit, distant stations are quickly found—always at the same point on the dial. That annoying interference of local stations is completely overcome and broadcasting from those stations miles away comes through clear as a bell.

In volume, tone and selectivity THE BRUNSWICK DE LUXE has proved its superiority to radios of many times its price. Its ability to get distance quickly and easily, however, has established it as the masterpiece of radio engineering.

GUARANTEED TO GIVE COMPLETE SATISFACTION OR WE AUTHORIZE YOUR DEALER TO REFUND YOUR MONEY AT ONCE.

In addition with your purchase of a BRUNSWICK DE LUXE you are entitled to the full benefit of the *Brunswick Service* which will be rendered you freely and cheerfully by our experts.

If Your Dealer Cannot Supply You Send Us His Name and We Will Arrange a Demonstration

Distributed Solely by

HAROLD M. SCHWAB, Inc.

55 VESEY STREET, NEW YORK

SUPER-DESIGN SUPER-CONSTRUCTION SUPER-PERFORMANCE

**Partial List of Stations
Actually Heard on This Set
from New York City**

WJJD	Gooseheart, Ill.	WOS	Jefferson City, Mo.
WDAF	Kansas City, Mo.	WMBF	Miami Beach, Fla.
KGO	San Francisco, Cal.	WWAD	Philadelphia, Pa.
WSAI	Cincinnati, O.	KFKX	Hastings, Neb.
WTAS	Elgin, Ill.	WMH	Cincinnati, O.
WHB	Kansas City, Mo.	WDBX	New York City, N. Y.
WFI	Philadelphia, Pa.	WBS	Newark, N. J.
WGN	Chicago, Ill.	WAH	Richmond Hill, N. Y.
WCBD	Zion City, Ill.	WOR	Newark, N. J.
CKAC	Montreal, Can.	WJZ	New York City, N. Y.
WQJ	Chicago, Ill.	WNYC	" " " "
WPG	Atlantic City, N. J.	WJY	" " " "
WOAI	San Antonio, Texas	WHN	" " " "
WCCO	Minneapolis-St. Paul, Minn.	WEBJ	" " " "
WLW	Cincinnati, O.	WEAF	" " " "
WTAS	Elgin, Ill.	WFBH	" " " "
WEAN	Providence, R. I.	WGR	Buffalo, N. Y.
		WBZ	Springfield, Mass.
		WFI	Phila., Pa.
		WOO	Phila., Pa.

DEALERS —Write us for description, wholesale price, advertising plan, sales cooperation, etc.

EVEREADY HOUR
EVERY TUESDAY AT 9 P. M.
 For real radio enjoyment, tune in the
 "Eveready Group." Broadcast through
 stations

WEAF	New York	WFI	Philadelphia
WJAR	Providence	WCAE	Pittsburgh
WEEI	Boston	WGR	Buffalo

*Dry "B" Batteries
 are an economical
 dependable and
 convenient source
 of plate
 current!*

There's more life in Eveready Batteries

Buy Eveready "B" Batteries and you get electricity in its surest, safest and most compact form. They reduce your operating expense. New developments in the Union Carbide and Carbon Research Laboratories, Inc., have been converted into new manufacturing processes in the Eveready factories. Good as they always have been, Eveready "B" Batteries are much better today.

The Eveready achievement of giving you more hours of "B" Battery service for less money has cut the cost of running receivers in half, and in some cases the new Evereadys make "B" Battery expense only a third of what it used to be.

There is an Eveready Radio Battery for every radio use.

Manufactured and guaranteed by
NATIONAL CARBON COMPANY, INC.
Headquarters for Radio Battery Information
 New York San Francisco
 Canadian National Carbon Co., Limited, Toronto, Ontario

EVEREADY Radio Batteries

—they last longer



No. 7111.
 1 1/2-volt
 Dry Cell
 "A"
 Battery
 for all
 dry cell
 tubes



No. 772.
 45-volt
 Large
 Vertical
 Price
 \$3.75



No. 770.
 45-volt
 Extra
 Large
 Vertical
 for heavy
 duty
 Price
 \$4.75



No. 771.
 4 1/2-volt
 "C"
 Battery
 improves
 quality,
 saves "B"
 Batteries
 Price 60c