VACATION NUMBER 15 CENTS

RADIO WORLD

Title Reg. U.S Pat. Off

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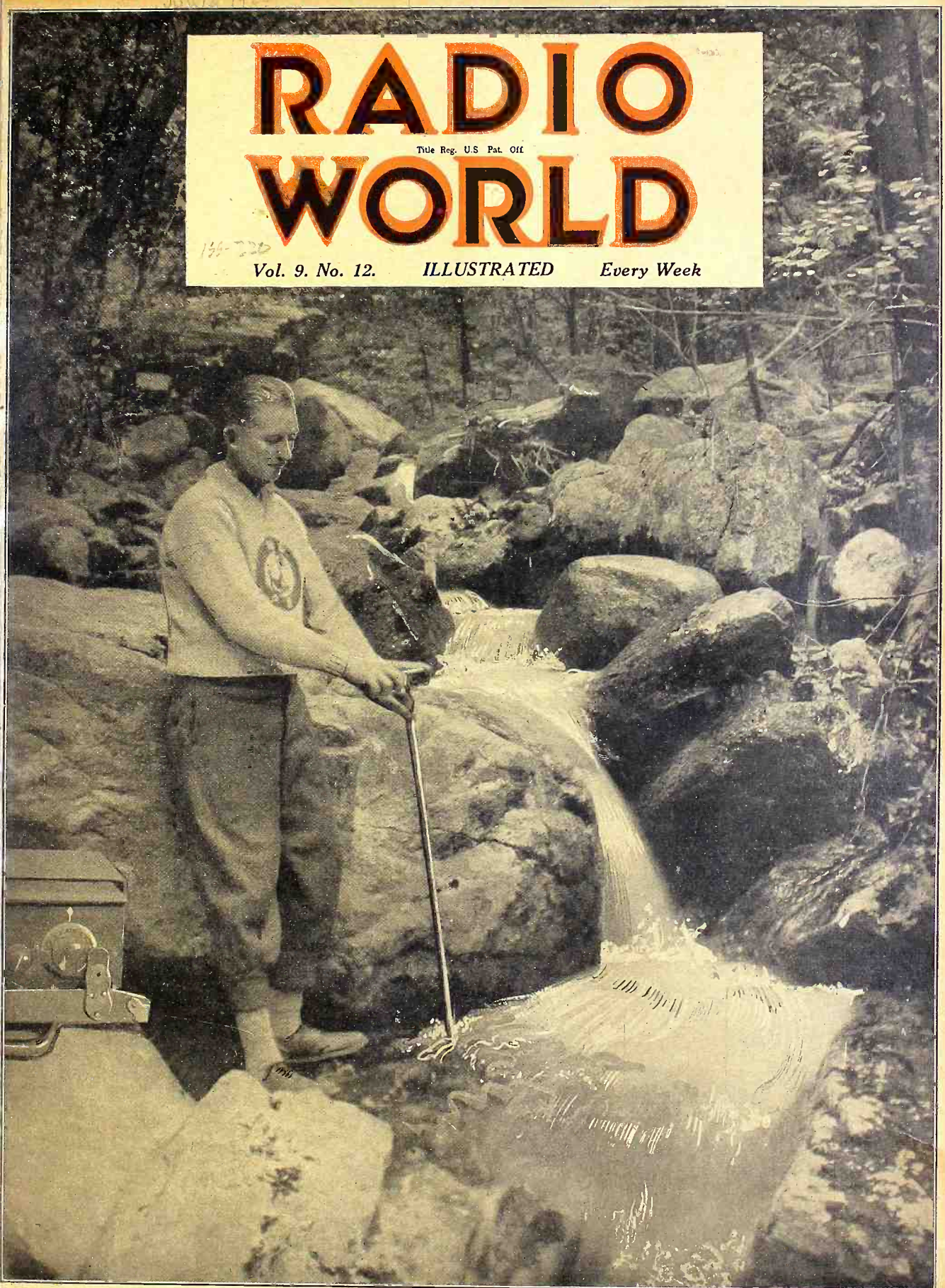

AN IRON ROD in a stream bed makes a good ground. See Pages 16 and 17.

The Newest Up-to-the-Minute Radio Set—It has Never Been on a Dealer's Shelf—Most Selective. A Wonderful DX Getter. Sold on a Guarantee of Satisfaction or Money Back.

Volume Control—Perfect Calibration—Rang 180-550

BST-6

B-for Beauty
S-for Selectivity
T-for Tone purity
6-its 6 tubes for distance

The BST-6. 2 Feet 4 Inches Long. 9 Inches Inside Depth. 8¾ Inches High.

THIS marvelous six-tube tuned radio frequency receiver is Self-Equalized and built of low-loss materials throughout. Its clear, rich tone of astonishing volume is a revelation. The circuit consists of two stages of tuned radio frequency, tube detector and three stages of balanced audio amplification. Air cooled rheostats and universal sockets are used.

Modified straight line frequency variable condensers are employed, insuring separation of the low wave length stations. PERFECT CALIBRATION—STATIONS ONCE TUNED IN CAN ALWAYS BE LOGGED AT THE SAME DIAL POINT.

The BST-6 works best with a 75 to 100 foot aerial, 6 volt "A" storage battery, two 45 volt "B" batteries, 4½ volt "C" battery, six 201-A tubes and any good loudspeaker.

LOG OF BST-6

Taken on a Fifteen-Foot Aerial in One-half Hour by Al. Kraus, 996 Aldus Street, New York City.

WSBC	10	WGY	50
WBBR	16	WMAK	51
WEBH	49	WMSG	11
WHT	55	WOC	85
WCCO	61	WFAA	78
WSB	66		

SELECTIVITY

I live within four blocks of WLWL, and since the opening of this station have had great difficulty in choking them off my old set. Even after employing a wave trap I could still hear WLWL around the entire dial and was told by several friends that living so near this powerful station it would be impossible to entirely cut them out with anything less than a super-het. It was a very agreeable surprise, therefore, when I installed my new BST-6, to find that while WLWL came in on 25 I could tune in WRNY on 21 and entirely cut out WLWL. ***This is certainly real selectivity.***—F. S. Clark, 350 West 55th Street, New York City.

Specifications

Bakelite Panel, Walnut Finish—
With Etch-O-Gravure and Gold Decorations—
Bakelite Sub-Base—
Kurz-Kasch Bakelite-Walnut Pointers; Gold-filled, to Match—
Kurz-Kasch Bakelite Gold-filled Rheostat Knobs—
Lubree Straight Line Frequency Condensers—
Special Coils; Double Silk Solenoids—
Shore Audio Transformers—
Caswell-Runyan Two-tone Walnut-Finished Cabinet.

Guarantee

Satisfaction or Money Back

Each receiver is tested and retested, boxed and inspected before leaving factory, and guaranteed to reach you direct in perfect condition. Workmanship throughout guaranteed the best. Assembled by experts.

Immediate Delivery

Direct from factory to you
No dealers' or middlemen's profits

$40.00

SAFETY FIRST!—Why buy obsolete models, or radio failures at department store "bargain sales" when a BST-6, the latest achievement in radio, can be bought direct from the factory with no department store profit added? Here is a real bargain, sold you with a guarantee of satisfaction or money back.

Send Check or P. O. Money Order to

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The Light Five Portable

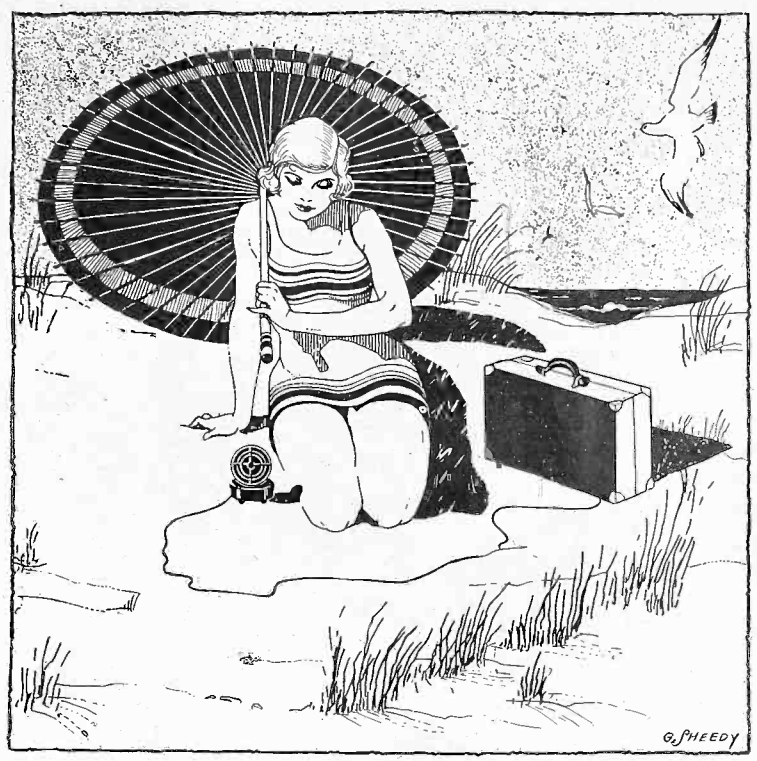
Strong Antenna Input is Obtained by Tuned Impedance, Conductively Coupled—Complete Set and Equipment Easy to Carry — Reel Used For Carrying Aerial—Economy Observed Strictly.

By Herman Bernard

Associate, Institute of Radio Engineers

AN economical portable receiver, of the 5-tube tuned radio frequency type, may be so constructed as to fit into a week-end bag. This sort of container is of the diminutive suitcase variety and readily purchaseable throughout the land. Thereby one of the main difficulties is solved, for the hunt for the proper case or cabinet for a portable is usually tiring. In any instance the set has to be built around the container.

The problem of the case being disposed of, there are two more kinks to be smoothed out. Next in line is volume, for it is notorious that when you get into the woods or by the mountainside or lakeside the input is weak, since the signal wave is partly dissipated, due to intervening shielding effects, absorption and distance itself.



THIS is Fig. A-1, you must agree.

Much Sensitivity Needed

Hence it is obvious that the same degree of selectivity is not required as if the set were to be used in the air-congested Metropolitan district, but the sensitivity must be greater. For this reason the antenna coupler used is of the conductive type, popular in the days of the single-circuit tuner. It is the most energetic form of antenna input that can be used, giving an original voltage three or four times that of the more prevalent systems of today.

The impedance tuned antenna circuit would not tune in the wave band, unless the tuning condenser were excessively bulky for a portable, at least .001 mfd., hence the tap switch is resorted to, whereby about one-third of the coil is short-circuited for the lower wavelengths. The tuning of the antenna circuit by C1, which is a .0005 mfd. straight line frequency condenser, is broad enough indeed to permit dispensing with a regulation dial. The combination of S1 and C1 therefore may be properly regarded as a volume control.

The second unsolved problem is the aerial and ground. An aerial on a reel is the solution, while the ground is "staked."

With the case selected, and the hookup

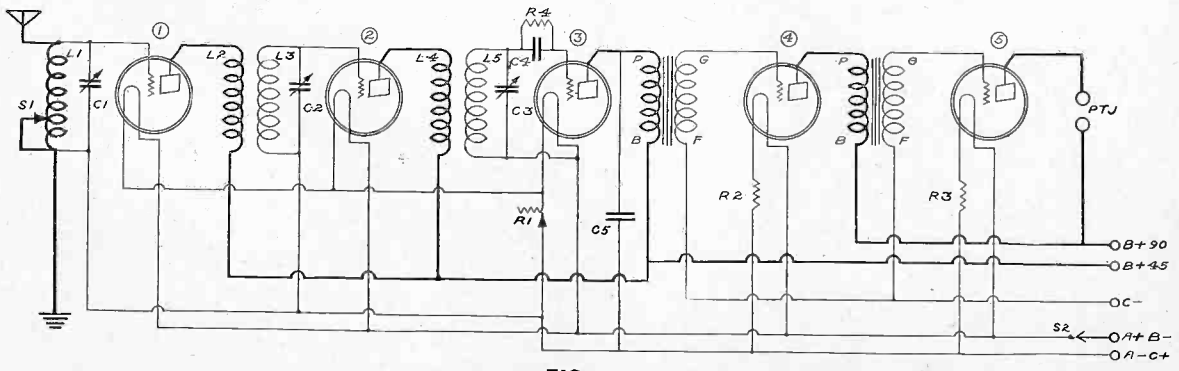
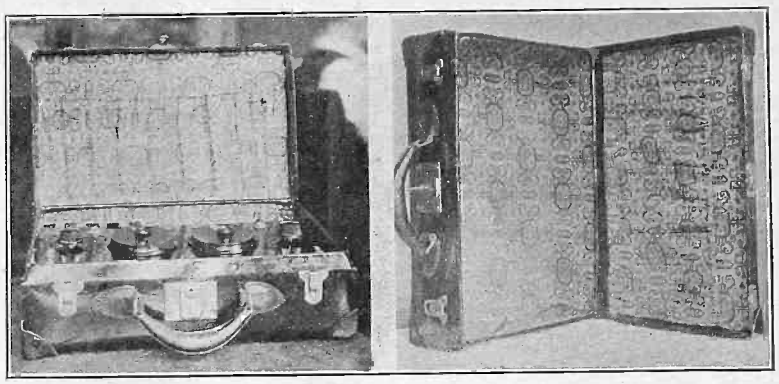


FIG. 1

The circuit diagram of the Light 5 Portable. A very strong input is obtained from the antenna ground circuit, so that volume is adequate even on weak signals. S1 is used for short-circuiting part of the antenna coil, to insure covering the wave band.

Week End Bag Is Cabinet

The Set Itself Is Easily Removable From the Diminutive Suitcase Type of Container — Weight Properly Disposed So Load Is Not Unbalanced—Loud Signals Characterize Set.



FIGS. 6 AND 7

The case open, with panel half exposed, and the case alone, standing upright.

a standard one slightly modified to obtain the needed volume, the only real construction task is to get into the container all the parts and equipment necessary to operate the set. This is no easy matter, from the viewpoint of sheer design, but once the necessary compression has been successfully accomplished, it is easy enough to follow the directions for capitalizing the situation.

The tubes used are of the 99 type, as these are best suitable for portables. One must decide for himself which type tube base he will use. If the old-style 199 bases are used, then the sockets must be the special ones that fit only such tubes. The only other type of base for 99 tubes is the X base, and this will not fit the old-style 99 sockets. If you have no tubes and no sockets, by all means get the X sockets, for these fit all X tubes, of whatever kind. If you have the old-style 99 tubes, then get the proper sockets, which are not the X type.

Need No Power Tube

There is absolutely no need for a power tube in the final audio stage, because the only advantage of a power tube is to avoid distortion due to overloading the grid. As has been explained, conditions on field and stream and at woodland pools positively preclude possibility of developing so much energy that there is overloading. Besides, a power tube (X120) draws .12 ampere, which is twice as much as the filament of the 199 draws, and it requires a negative grid bias of 22½ volts or somewhat less, and about 135 plate volts.

The A battery consists of four parallel-connected 4½-volt batteries (C battery type), while the B block comprises four series-connected 22½-volt B batteries of the midget size. Each C battery is 3x4x1¼", while each B battery is 2⅛x3⅜x2⅝", including the cardboard wrapper.

The carrying case measures 17x10¼", as you lift the lid and look into the interior, while the depth is 4⅝".

Housing Problems Solved

The row of batteries, consisting of four C batteries used as the A battery, one C battery used for biasing, and the four B batteries, is placed so that when the case is carried, the batteries rest at bottom. This is in line with the uncontroverted advisability of having the heaviest objects on bottom. By proper arrangement of the batteries enough room will be left to house a Tower midget speaker. By placing an end battery flush against the side of the case, enough room is left at the other end to insert the speaker, with slight tension. The idea, of course, is to have the speaker removable, so that it may be drawn as close as possible to the listeners, without moving the set, which may be resting in comfort on a tree stub, and without regrouping the listeners.

It is assumed that constructors of this portable, which is called the Light 5, because you don't have to break your back to in toting the set and accessories, will get a case of the same dimensions as the one I used. The dimensions are standard. The case is of fiber, with stiff oil cloth exterior, and should cost less than $4. Any one using any different size should not go in for anything smaller than the case I am discussing. Also accommodate panel, etc., to the different dimensions.

Panel Information

The front panel is a stock size, 7x18", cut down to 7x16¾". The 1¼" excess is cut off with a hacksaw. It is not easy to get a smooth cut with any hand saw, and constructors may prefer to have the stock panel cut down to size by some radio dealer or millwright.

Three pieces of wood should be included in your foundation appliances, one 3½x16½", to which the batteries are fastened, the others 3½x16⅜", to which the panel is bracketed.

Boards Very Serviceable

The boards previously referred to need not be more than ⅛" thick, although somewhat better security is afforded if ½" thickness is provided, since the danger of warping in damp weather is diminished.

These three boards are necessary for different reasons—the battery board is used for keeping the batteries from being scrambled, while the other boards afford a straight plane against which the panel may be bracketed. The fiber of the case is not stiff enough to prevent a slight angular dip of the panel, since it will give to the weight, and perhaps unevenly, while the boards afford strong support, and any tilting that results is most slight and entirely uniform, hence harmless.

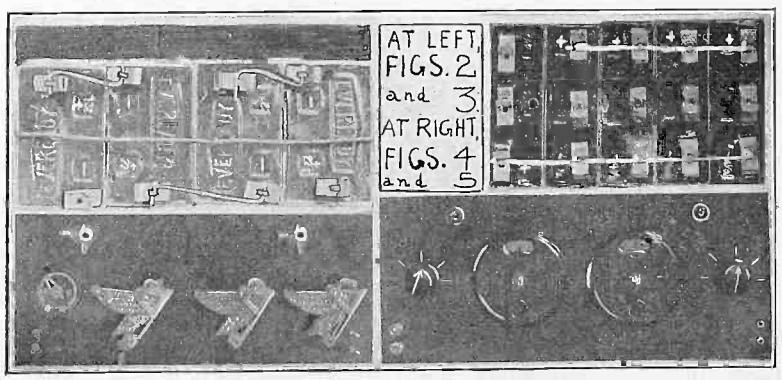
A subpanel is needed, and this may be of hard rubber, like the panel itself. The subpanel should be slightly smaller than the panel. If you get the second 7x18" panel, for cutting down to subpanel dimensions, and find that the saw labor is excessive for the long stretch, and it does tax the muscles, you may leave the 7" panel width as it is, following the original panel method, but cut down the width from 18" to 16". The subpanel is fastened to the boards by means of nuts on threaded shafting or with 3x4" brackets from the hardware store.

Doubly Useful Set

On the panel proper are mounted the rheostat, the three variable condensers, the two switches, the two binding posts (for aerial and ground) and the phone tip jacks. Besides, provision must be made for the holes through which the rods or brackets will be fastened. Dimensional data on all these points will be given textually.

The set, when completed, will prove

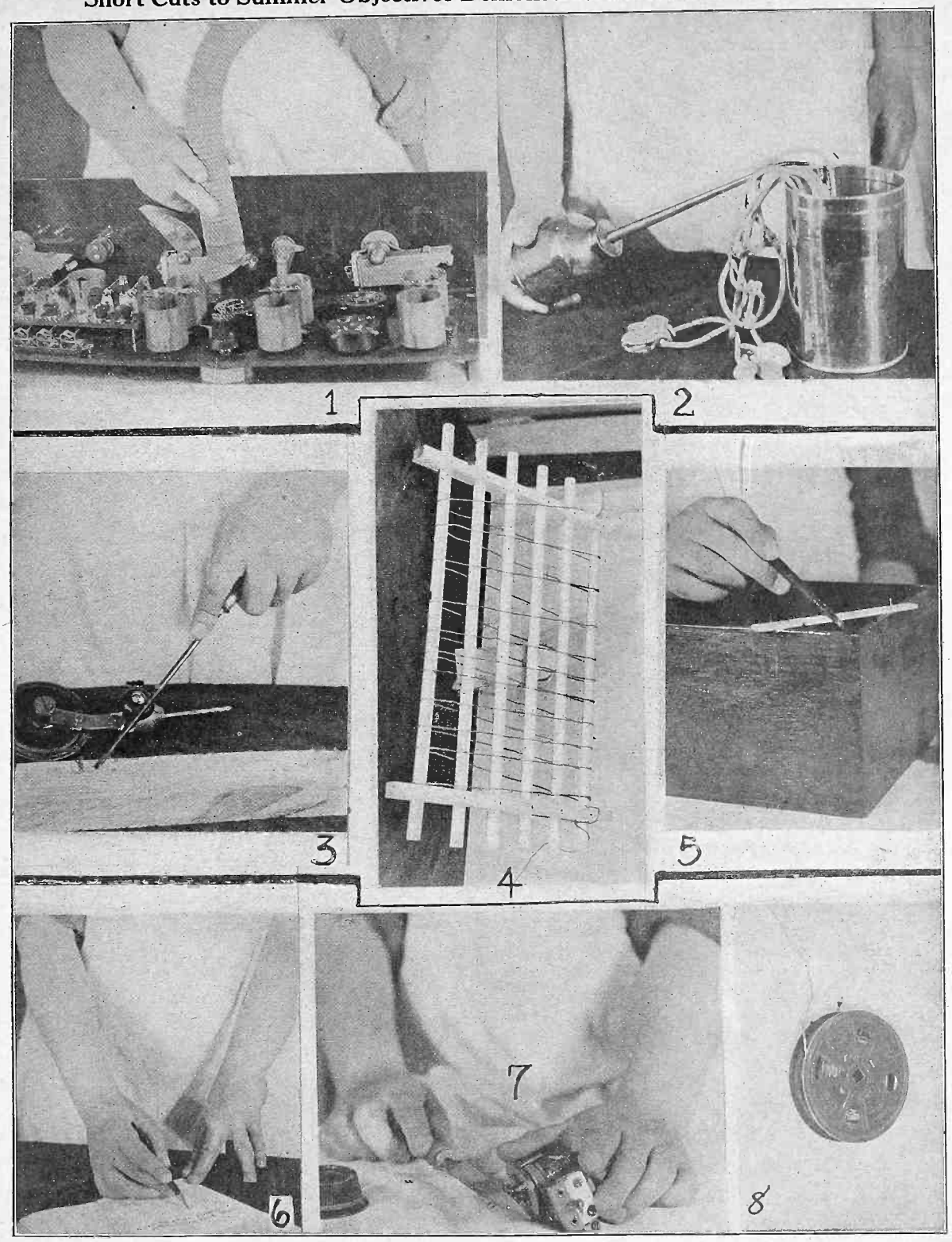
(*Continued on page 28*)



FIGS. 2, 3, 4 AND 5

Fig. 2 shows the B battery connections, including the relative positions of the minus and plus posts for inter-connection. Fig. 4 reveals the consolidated A and C battery block. Note the novel and effective manner of C battery connection, one long bus lead running through four A minus posts and the C plus post. Fig. 3 discloses the angle for mounting the condensers. Fig. 5 is the panel view, without threaded shaft holes.

Short Cuts to Summer Objectives Demonstrated Before the Lens



WHEN your set accumulates dust, hence fails to give utmost efficiency, why not apply the vacuum cleaner? (Fig. 1). This is a handy way of getting rid of those energy-absorbing particles. Rope for aerial uses has a habit of rotting. This is a great annoyance, especially at camp. A good plan is to oil the rope with heavy oil, allowing the oil to soak for a few days, then wiping it off with an old cloth. (Fig. 2). To prevent splitting a baseboard with a screw, first drill an undersized hole. (Fig. 3). A wooden sink rack, in an emergency, is a suitable form on which to wind an experimental loop. (Fig. 4). When making a cabinet, the builder always wants neat 90 degrees corners. These are easily accomplished by using a little stick, tacking it lightly to the edges of the case, and removing it when the glue has hardened. (Fig. 5). When wiring a set, following a published diagram, draw a red line wherever you have made the required connection. Missing red lines will show where you omitted a connection. (Fig. 6). Sometimes a condenser shaft will present such a slippery surface that a dial or knob will not take hold. By filing the shaft a little, that is making a "flat," the screw will take hold in a very firm manner. (Fig. 7). Aerial wire for portables may be carried on a reel. A Cine-Kodak reel is shown. (Fig. 8). *(Hayden)*

The Rogers-Schudt Receiver

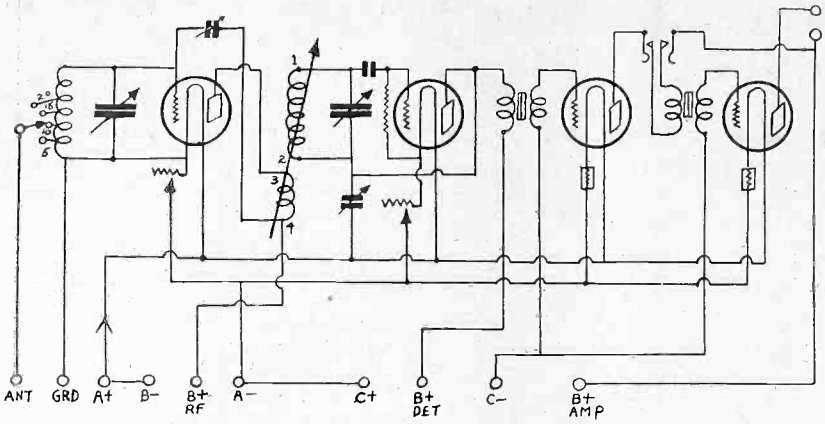


FIG. 1

Variable Primary on Interstage Coupler and Ultra-Audion Style of Detector Combined in Selective Set That Stresses Tone Quality.

By William A. Schudt, Jr.

(Technical Radio Editor of "The New York Telegram")

PART I.

MOST of the successful new things in radio have been attributed to accidents. When someone carelessly crossed a grid and a filament wire at some unheard-of point in a circuit, another startling discovery was immediately proclaimed.

It seems to have been quite the popular stunt to attribute new developments to chance. All have taken keen delight in denying that they actually set out to accomplish the specific effect that resulted.

Not so with the Rogers-Schudt!

This receiver was no accident.

My partner, Stuart Rogers, an intense student of radio for several years, built and put over many popular circuits.

He had his own idea of what a receiver should be and what it should do.

So did I.

Both of us wanted to put out something that was better, different—a set for the masses.

So it was that we decided to follow the footsteps of Burbank. We would cross our radio fruits and produce a set embodying the best features of all.

Several of the best automobiles are what are commonly known as assembled cars, having the motor of one make, the body of another, the transmission of another.

Man crossed the peach and the plum to make the most delicate and luscious of all fruits, the "opulent" nectarine. The Loganberry is a Burbank combination of the blackberry and raspberry.

As disciples of Burbank, we endeavored to amalgamate what to our minds were the outstanding circuits of the day —the Marcodyne and the Skyscraper.

In effect, what we sought was this—selectivity, quality, volume and sensitivity in that order.

We aimed to combine these outstanding qualities in a single set, having a minimum number of controls, and yet be tuned easily.

Two tuning controls was the first requisite. Loosely coupled radio frequency we counted upon for selectivity. Quality merely called for the proper values in transformers. That was easy—so we thought. For volume we depended upon a strong signal input, signal magnification and proper ratio audio transformers.

With these factors established, it was quite evident that sensitivity would automatically be taken care of.

The Variable Coupling

In the Marcodyne the radio listener had the most nearly perfect selectivity possible. Only variable coupling could hope to improve that. Consequently we devised a loosely coupled radio frequency transformer having a variable primary with ample turn ratio, especially on the primary, so as not to cut the side bands and cause distortion.

For the detector circuit we elected the Skyscraper, by virtue of its simplicity and its powerful signal magnification, obtained through use of the unique connection between grid and plate of the detector tube.

This particular plate kicker circuit, which was the feature of the Skyscraper, also has proven splendid for quality, which, with our choice of transformers, was found excellent. From then on we figured to supercede anything that had been tried out before.

We matched up every conceivable type of transformer and our ultimate choice was a Pacent Super Audioformer, 3-to-1 ratio, with a Thordarson R-200 of about 2½-to-1.

Proper Impedance

The impedance of the Pacent in the first stage is ideally suited to the constants of the circuit. It is surprising how the impedance of the first transformer affects the detector circuit.

As to the actual construction of the set itself there is nothing to confuse even the beginner. There are no crossed leads and the apparatus employed is standard throughout.

It is probably the ideal set for the person who lives in close proximity to a broadcast station, or one whose fetish is clear, undistorted reproduction of voice and music.

The Antenna Coupling

In addition the set employs what we consider a very sound method of antenna coupling—tapped, conductively coupled.

By this method maximum signal strength is impressed directly from the antenna upon the grid of the tube and the antenna inductance merely serves to tune in the wavelengths at resonance.

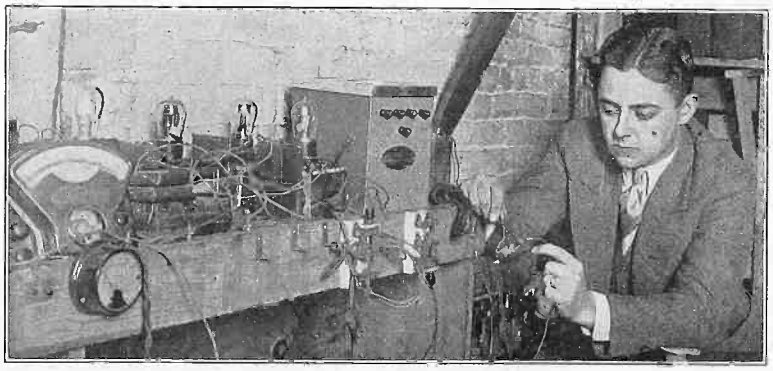
In other words we tap the antenna at any of four points along the antenna RF inductance.

With this tapping arrangement just enough turns are used, this being determined by the length of the antenna, to bring the two tuning dials into snychronism.

Between these two variables, i.e., the primary-secondary relationship of the RF coil and the optional number of turns on the antenna coil, all contingencies making

Proper Impedance of First Audio Transformer Makes for Excellent Results—Receiver Synthetically Designed, a la Burbank.

Mayo Gets 1,300 Volts From Eliminator



"THE TREND in radio is toward the elimination of batteries, using power drawn from the house current, with the aid of eliminators," says Rutledge Mayo (above), noted radio engineer. He believes that the radio receiver of the future will use the house wiring as an aerial as well. To prove the unlimited possibilities of this idea Mr. Mayo has constructed a B eliminator that produces 1,300 volts, with hum eliminated.

Why Hookup Was Chosen

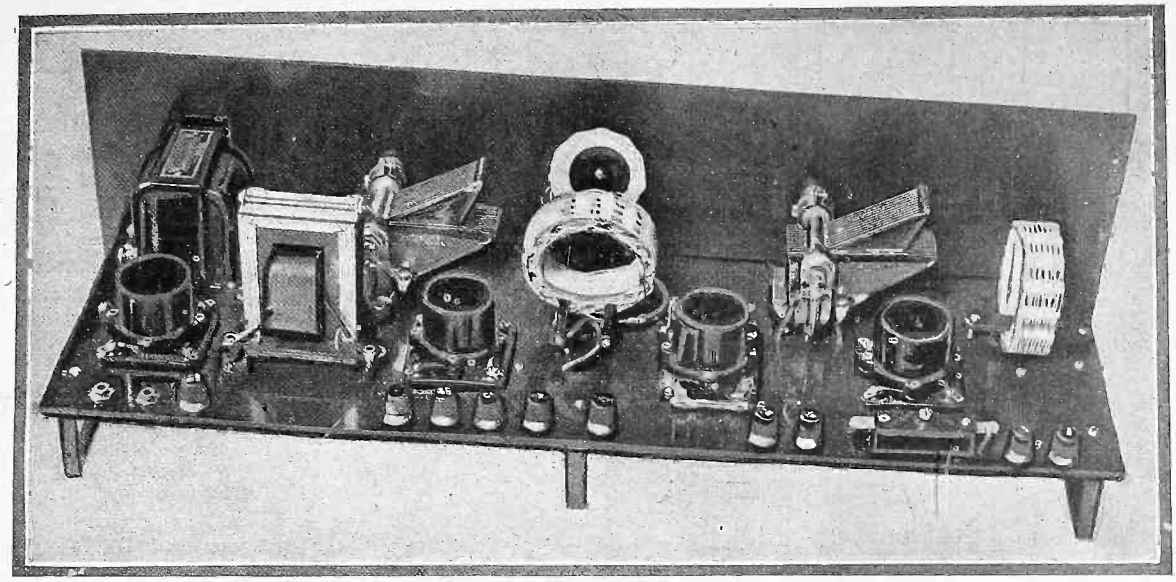


FIG. 3
Rear view of the Rogers-Schudt Receiver.

LIST OF PARTS

Rogers-Schudt coils, microcoupler and antenna inductor.
Two Hammarlund .0005 mfd. straight line frequency variable condensers.
Four Eby tube sockets.
One Thordarson type R200 audio transformers.
One Pacent super audioformer.
One Carter 4 point inductance switch for antenna coil.
One XL variodenser. Range, .0005 to .001 mfd.
Two Silver-Marshall venier dials.
Two Carter "Imp" rheostats, 30 ohms each.
One Yaxley double circuit jack.
Two phone tip jacks for mounting on sub panel.
Ten Eby binding posts.
One Hammarlund 9-plate midget neutralizing condenser.
One type 1A Amperite.
One type 112 Amperite.
One Yaxley battery switch.
One Aerovox 12-megohm grid leak.
One Aerovox .00025 mfd. grid condenser.
One sub panel 7x23". Insulating Co. of America.
One panel 7x24". Insulating Co. of America.
Three Garfield sub-panel brackets.
Two rolls of Celatsite (black).
[Three O1A tubes and one 112 power tube are recommended; also National Radio Co. blueprints.]

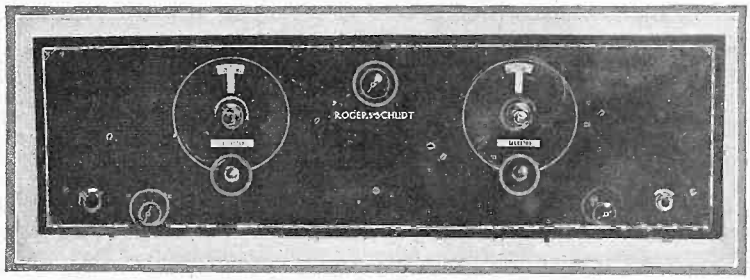


FIG. 2
The panel view of the receiver.

for or hindering selectivity are compensated for.

It is not compulsory that one use the exact list of parts given herewith, but it is advisable, since I am sure that no difficulty will be encountered with them.

Mr. Rogers and I have employed these specific parts and we know they work. The exception is in the case of the last stage of audio, where a higher ratio transformer may be tried if greater volume should be desired, though this is hardly conceivable.

The Rogers-Schudt microcoupler, which the detector input inductance has been named, might be appropriately called the heart of the circuit.

Its micrometer action and adjustment reveal to anyone operating the set just how valuable a variable inductance really is in this part of the circuit.

A Critical Point

A critical thing in the circuit is the compensating condenser connected from the plate side of the inductance to the filament. This should have a variable capacity ranging from .0001 to .001 mfd., and in rare instances where tubes oscillate, another condenser, but of fixed type, .001 mfd., will be necessary, shunted across the first unit. This bringing the total capacity up to .002 mfd.

This compensating condenser, when its capacity is increased, does not increase oscillation in the tube, but on the contrary retards it and helps to control the receiver.

The neutralizing condenser must have an unusually high capacity for neutralizing purposes in this circuit. A 9-plate midget Hammarlund unit was found highly suitable. Another type is shown in Fig. 3.

[Part II will be published next week, issue of June 19, and will give textual details on the construction of the Rogers-Schudt Receiver.]

Requests Are Effective; Change Big Programs, Too

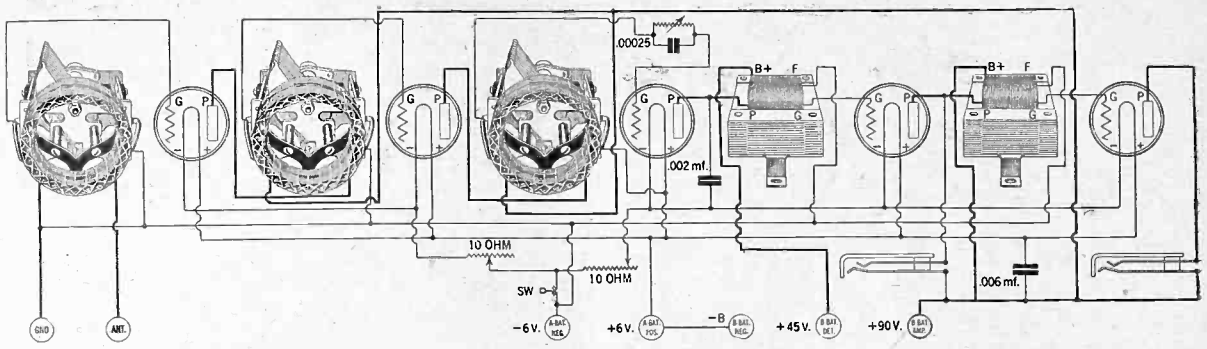
As an evidence that requests from listeners are heeded, promptly, the program for an Atwater Kent Hour was entirely revised. It was composed of all request numbers, including such favorites as "The Lost Chord," "Molly Brannigan," "At Dawning," "The Trumpeter," and "Now the Day Is Over," by Allen McQuhae and the "Blue Danube Waltz" by the Atwater Kent orchestra.

Subsequently, due to a request, the orchestra played "Irish Tunes From County Derry," by Percy Grainger

New Shock Absorbers Give Sets Air Cushions

Air cushions as shock absorbers for radio sets are among the most recent developments of radio engineers. They are supplied in sets of four and are made of a special grade of rubber securely vulcanized by a patented process and inflated without valves. It is claimed that the use of these cushions will eliminate vibrations, aid materially in undisturbed tuning, improve reception and reduce to a minimum microphonic noises. They insulate the set and prevent fine furniture from becoming scratched.

The Freshman Masterpiece



THE CIRCUIT DIAGRAM of the wiring of the receiver.

The following deals with the theory as well as the construction of the Freshman Masterpiece, and is published in response to requests from many readers.

By Albert W. Franklin

Chief Engineer, Chas. Freshman Co., Inc.

OF the various classifications of radio circuits, the tuned radio frequency circuits have been by far the most popular with manufacturers as well as with those fans who "build their own."

With all the different modifications of the tuned radio frequency circuits, it is not an easy matter to exercise a good choice, unless one knows the qualifications and outstanding features of each circuit.

To approach the subject from the correct angle, we must first take into consideration just what is required in a good 5-tube tuned radio frequency receiver.

Requirements of a Receiver

First, the circuit must be of such design that no matter at what positions the tuning dials may be, there will be no manifestation of what is commonly known as squealing or howling—noises that so often upset the peace and arouse the ire and consternation of the family and the visitors.

Second, maximum amplification must be obtained at all wavelengths, and not only at the lower wavelengths, as many of the ordinary variety of tuned radio frequency receivers afford.

Third, the quality of reproduction must be unblemished—true and harmonious tonal quality should be predominant, and all notes, overtones and harmonics should be present in the output of the loud speaker.

Fourth, the ease of tuning and the corresponding degree of selectivity or sharpness should be in accord with the idea that any member of the family, from the 6-year-old to grandfather, might be able to tune in any station without the slightest semblance of trouble.

Fifth, the general appearance, cost of upkeep and replacement should have a dominating effect upon the prospective purchaser or builder.

Circuit Comparison

In order to obtain maximum amplification—commonly called regeneration—in the radio frequency amplifier without having the circuit spill into oscillation and thus spoil the quality, several methods have been evolved by radio engineers and laboratory research workers.

One of the first methods to be employed was the use of the potentiometer as a stabilizing device, through which use the grids of the radio frequency tubes could readily be biassed with a potential gradient from minus six to plus six volts. In this way, the tuned radio frequency grids circuits could be controlled to a hair-breadth adjustment and distant signals could be tuned in after a fashion—and after an unusual amount of ticklish knob turning.

But the radio fan soon tired of the additional control which presented a complication of matters and longed for a receiver that needed no split-hair adjustment and which could be depended upon to give maximum amplification over the entire broadcast band without further and wholly unnecessary compensations either in tuning or amplification control.

The employment of resistances to act as damping impedances in the oscillatory circuits was then inaugurated, but here again a decided lack of volume and the manifestation of very broad tuning soon discouraged manufacturers and set builders from this practice.

Then someone thought that the use of a closely-coupled absorption circuit, consisting either of an inductance alone, an inductance in combination with a fixed or variable capacity, or an inductance and variable resistance, would greatly augment or enhance the effectiveness of the circuit. However, repeated experiments proved that these methods were rather inefficient and that something better, involving the use of no additional controls, was necessary to popularize tuned radio frequency amplification.

The reversed feedback circuits appeared shortly afterwards, as well as did the neutralized variety, but actual measurements showed that though the amplification curve of these types of receivers was of a high order at the high frequencies or low wave lengths, it was relatively poor at the low frequencies or high wavelengths. The reason for this was that the transformer-ratio of the tuned radio frequency transformer varied more or less proportionately with the wavelength, creating a condition of maximum sensitivity and amplification at the low wavelengths and affording no appreciable amplification at the higher wavelengths.

The engineering staff of the Chas. Freshman Co., in looking about for a practical solution to the problem, came upon the method which has proved of such tremendous success.

Foucault Eddy Current Method

The famous Frenchman, Foucault, in his experiments and investigations, came upon a phenomenon destined to prove to the radio fraternity that its value would be of untold and far-reaching benefit. Many months were spent by engineers in the Freshman laboratories in designing coils and condensers in a combination which would be satisfactory in every respect. It was only after weary and tedious experiments, often lasting for several days at a time, that the final circuit was evolved and presented to the public. Its reception has been a spontaneous one and one will find everywhere that the re-

LIST OF PARTS

Three tuned RF units, each consisting of one variable condenser, one RF coil, and one coil bracket. (Freshman Masterpiece kit).
Two audio transformers.
Two 10-ohm rheostats.
Two jacks.
One switch.
Five tube sockets.
One grid leak.
One grid condenser.
One horizontal or sub-panel.
One front panel.
Three condenser dials.
Two rheostat knobs.
Two .002 fixed condensers.
One .006 fixed condenser.
Nine binding posts.
All the necessary spaghetti and bus-bar.

THE PANEL VIEW of the set.

Eddy Currents Balance Set

ceiver does just what the manufacturers claim for it—gives maximum amplification over the entire band of broadcast wavelengths and affords perfect stabilization.

The construction of the Freshman Masterpiece Receiver is not a difficult task to undertake at home. By following the directions given, the job can be readily done with a minimum of effort and cost.

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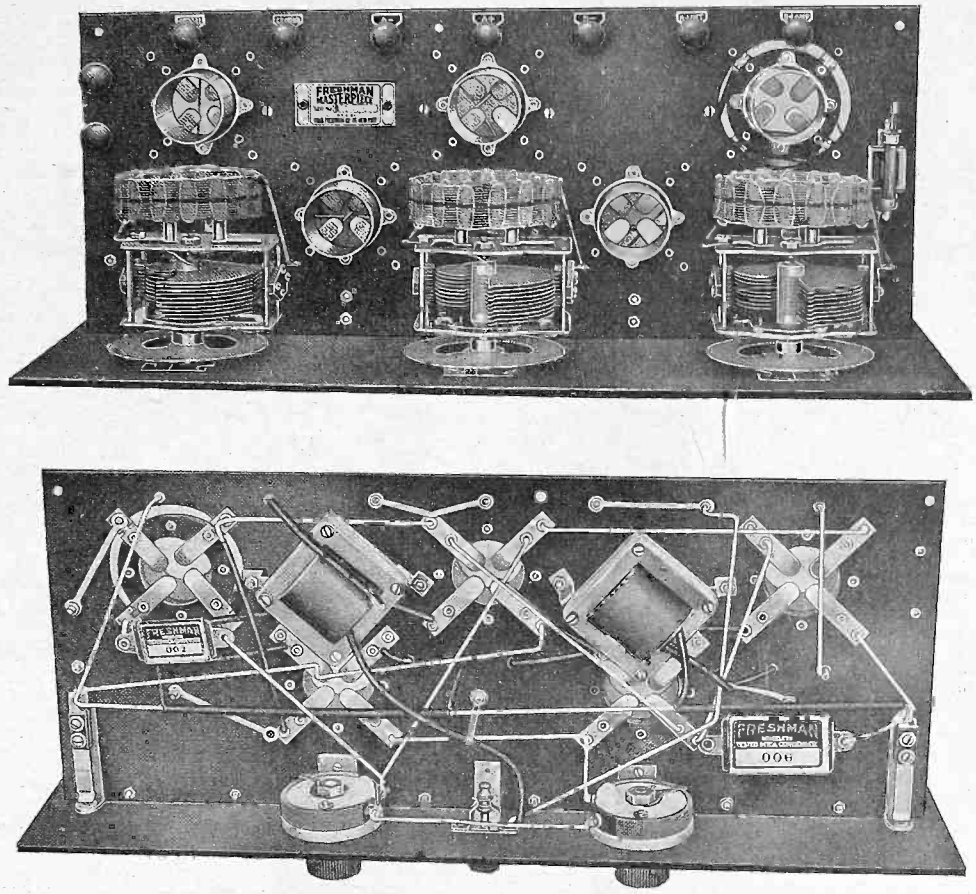
Safe procedure is to first drill all holes with about a No. 45 drill, thus assuring a good straight hole, as this small hole will act as a guide for the larger ones. Next drill all holes to their proper sizes, with the exception of the shaft holes, which should be about one-sixteenth of an inch larger than the shaft, allowing ample room for the shaft to turn freely in case the mounting screw holes are a bit off panel.



THE TOP and bottom views

Mount all necessary units on the panel, also the base-board. Lay out all sockets, binding post strip and transformers on the base-board with the idea in mind of short leads in wiring; and screw them down securely.

You are now ready for the wiring, in which great care should be taken to keep all grid leads away from the panel and all grid and plate wires well separated.

Place the set with the back facing towards you.

There are but two rheostats for controlling the filaments of all five tubes. One rheostat governs the two radio frequency tubes and the other the detector and the audio frequency tubes.

Connect one terminal of each rheostat together with a wire and then connect a wire from either one of these terminals which you have joined together to the battery switch. From the other terminal of the battery switch, connect a wire to the minus A binding post. Next join the F minus posts on the two radio frequency tube sockets together and then run a wire from one of them to one of th free terminals on the rheostat which is to govern the radio frequency tubes. Similarly join the F minus posts on the detector and two audio frequency tube sockets with a wire and continue to the free terminal on the rheostat which is to govern the audio and detector tubes. Next connect all the F plus terminals on the five vacuum tube sockets together and then bring a wire from one of the F plus socket terminals to the plus A binding post of the set.

Now join the right hand side of the secondary coils of the first and second radio frequency units and the F terminals of the secondaries of the first and second audio transformers and the left hand side of the primary coil of the first radio frequency unit together, and from this connection run a wire to the minus A binding post and thence to the ground binding post. Next connect the free end of the primary of the first radio frequency unit to the antenna binding post.

Connect a wire from the left hand side of the secondary coil of the first radio frequency unit to the grid terminal on the first radio frequency tube socket. Similarly connect a wire from the left hand terminal of the secondary of the second radio frequency unit to the grid terminal of the second radio frequency tube socket. Now connect a wire between the left sides of the primary coils of the second and third radio frequency units and extend this wire to the B plus binding post on the last audio frequency transformer. From this point run a wire to the B plus amplifier binding post on the set and in turn join this post with the bottom spring on the phone jack.

Connect a wire between the plate binding post of the first radio frequency tube socket and the free end of the primary winding of the second radio frequency coil. Likewise connect a wire between the plate terminal of the second radio frequency tube socket with the free end of the primary winding of the third radio frequency coil. Now bring a wire from the left hand side of the secondary winding of the third radio frequency to the grid condenser and from the other side of the grid condenser to the grid terminal of the detector tube socket. The right hand side of this secondary coil should then be connected to any wire leading to the plue A binding post of the set.

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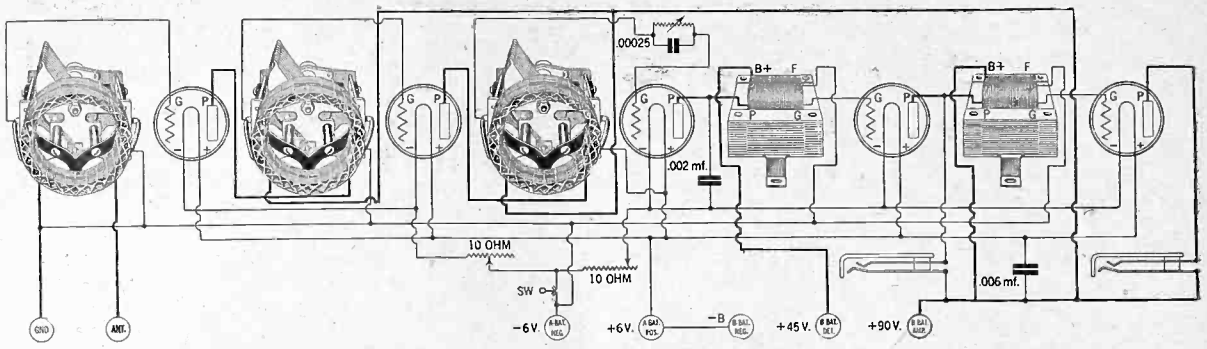
The Freshman Masterpiece



THE CIRCUIT DIAGRAM of the wiring of the receiver.

The following deals with the theory as well as the construction of the Freshman Masterpiece, and is published in response to requests from many readers.

By Albert W. Franklin

Chief Engineer, Chas. Freshman Co., Inc.

OF the various classifications of radio circuits, the tuned radio frequency circuits have been by far the most popular with manufacturers as well as with those fans who "build their own."

With all the different modifications of the tuned radio frequency circuits, it is not an easy matter to exercise a good choice, unless one knows the qualifications and outstanding features of each circuit.

To approach the subject from the correct angle, we must first take into consideration just what is required in a good 5-tube tuned radio frequency receiver.

Requirements of a Receiver

First, the circuit must be of such design that no matter at what positions the tuning dials may be, there will be no manifestation of what is commonly known as squealing or howling—noises that so often upset the peace and arouse the ire and consternation of the family and the visitors.

Second, maximum amplification must be obtained at all wavelengths, and not only at the lower wavelengths, as many of the ordinary variety of tuned radio frequency receivers afford.

Third, the quality of reproduction must be unblemished—true and harmonious tonal quality should be predominant, and all notes, overtones and harmonics should be present in the output of the loud speaker.

Fourth, the ease of tuning and the corresponding degree of selectivity or sharpness should be in accord with the idea that any member of the family, from the 6-year-old to grandfather, might be able to tune in any station without the slightest semblance of trouble.

Fifth, the general appearance, cost of upkeep and replacement should have a dominating effect upon the prospective purchaser or builder.

Circuit Comparison

In order to obtain maximum amplification—commonly called regeneration—in the radio frequency amplifier without having the circuit spill into oscillation and thus spoil the quality, several methods have been evolved by radio engineers and laboratory research workers.

One of the first methods to be employed was the use of the potentiometer as a stabilizing device, through which use the grids of the radio frequency tubes could readily be biassed with a potential gradient from minus six to plus six volts. In this way, the tuned radio frequency grids circuits could be controlled to a hair-breadth adjustment and distant signals could be tuned in after a fashion—and after an unusual amount of ticklish knob turning.

But the radio fan soon tired of the additional control which presented a complication of matters and longed for a receiver that needed no split-hair adjustment and which could be depended upon to give maximum amplification over the entire broadcast band without further and wholly unnecessary compensations either in tuning or amplification control.

The employment of resistances to act as damping impedances in the oscillatory circuits was then inaugurated, but here again a decided lack of volume and the manifestation of very broad tuning soon discouraged manufacturers and set builders from this practice.

Then someone thought that the use of a closely-coupled absorption circuit, consisting either of an inductance alone, an inductance in combination with a fixed or variable capacity, or an inductance and variable resistance, would greatly augment or enhance the effectiveness of the circuit. However, repeated experiments proved that these methods were rather inefficient and that something better, involving the use of no additional controls, was necessary to popularize tuned radio frequency amplification.

The reversed feedback circuits appeared shortly afterwards, as well as did the neutralized variety, but actual measurements showed that though the amplification curve of these types of receivers was of a high order at the high frequencies or low wave lengths, it was relatively poor at the low frequencies or high wavelengths. The reason for this was that the transformer-ratio of the tuned radio frequency transformer varied more or less proportionately with the wavelength, creating a condition of maximum sensitivity and amplification at the low wavelengths and affording no appreciable amplification at the higher wavelengths.

The engineering staff of the Chas. Freshman Co., in looking about for a practical solution to the problem, came upon the method which has proved of such tremendous success.

Foucault Eddy Current Method

The famous Frenchman, Foucault, in his experiments and investigations, came upon a phenomenon destined to prove to the radio fraternity that its value would be of untold and far-reaching benefit. Many months were spent by engineers in the Freshman laboratories in designing coils and condensers in a combination which would be satisfactory in every respect. It was only after weary and tedious experiments, often lasting for several days at a time, that the final circuit was evolved and presented to the public. Its reception has been a spontaneous one and one will find everywhere that the re-

LIST OF PARTS

Three tuned RF units, each consisting of one variable condenser, one RF coil, and one coil bracket. (Freshman Masterpiece kit).
Two audio transformers.
Two 10-ohm rheostats.
Two jacks.
One switch.
Five tube sockets.
One grid leak.
One grid condenser.
One horizontal or sub-panel.
One front panel.
Three condenser dials.
Two rheostat knobs.
Two .002 fixed condensers.
One .006 fixed condenser.
Nine binding posts.
All the necessary spaghetti and busbar.

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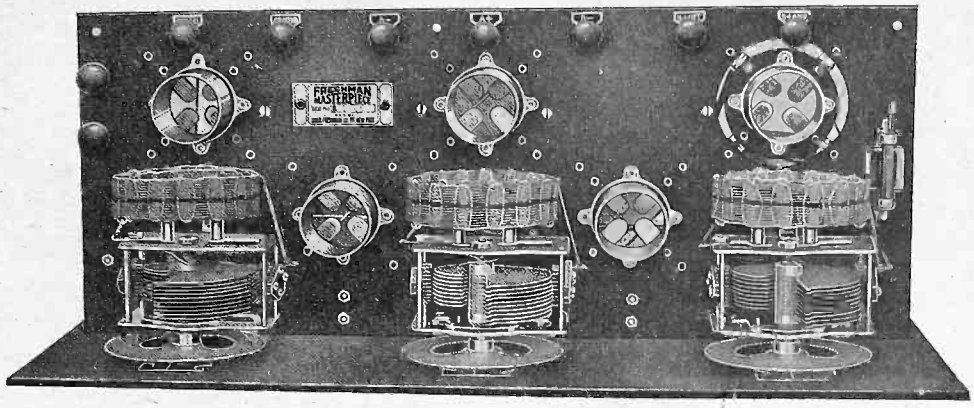

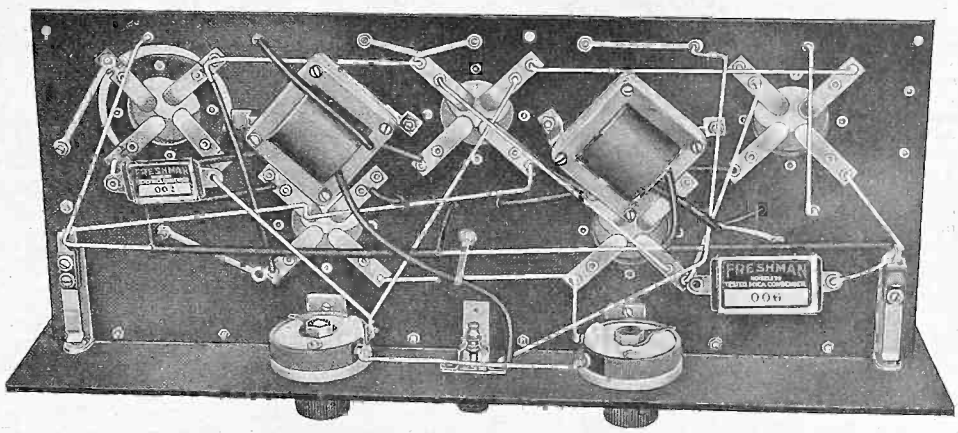

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Unbiased Facts on C Batteries

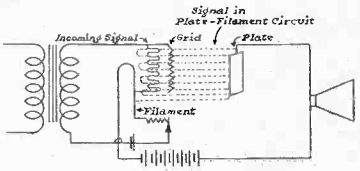


FIG. 1

Graphic representation of input and output signal, the grid-filament circuit being compared with the plate-filament circuit.

By John F. Rider

Member, Institute of Radio Engineers

DESPITE advice to the contrary, the C battery still is considered by the general run of fans to be a superficial adjunct of a receiver. The attitude assumed is that if one is available. it can be put to good use, but if none is on hand, nothing is lost. The present design of receivers is such that the use of a C battery is imperative, whereas in days gone by the C battery was not so essential. In "ye olden days" distortionless amplification was a secondary consideration. The paramount item simply was reception regardless of tonal output. The second reason is that the received volume was far less than that encountered today, due to use then of lower powered transmitters, operation at lower values of efficiency, and much less efficient reception.

The Power Question

However, the power of the broadcasting stations has been markedly increased. In addition with any one power rating, much greater efficiency is obtained, the consequence being that much greater power is put into the aerial, as the radiated wave is of greater intensity. With the use of the efficient receivers the output obtained is much greater than in days gone by. But the requisites for satisfactory reception have also undergone a change with the passage of time and now, the demand is for plenty of volume, but without any loss in the quality of the output. In substance, this is nothing more than a demand for plenty of volume with distortionless amplification. If one desires to comply with this demand, it is absolutely necessary to utilize a C battery, or any other method of obtaining the correct negative grid bias.

The demand for the C battery is also augmented by the new requisite of economical operation. The trend toward receivers of the 5 and 6-tube types led to the development of the .25 ampere filament, as that one may operate a receiver without necessitating recourse to a power house. The same is true of the B battery supply.

Current Drain Increase

With the advent of 5 and 6-tube receivers, the current drain imposed upon these batteries increased greatly, and the result was very short operating life for any one set of non-rechargeable batteries or a short operating life between charging periods for a rechargeable battery. But such battery life was found to be very unsatisfactory, and the necessity for greater economy brings to us to the need for the C battery. The C battery permits, first, better amplification by precluding tube overloading; second, greater amplification by permitting operation at the best point on the characteristic curve, and third, greater economy in the operating life of the receiver by virtue of its action upon the plate current drain of the tube and consequent reduction in the drain upon the B battery.

A Lesson in Economy

Herewith are given quantitative examples of the effect of negative grid bias upon the normal plate current drain of the tube. These values show the economy of using a grid bias. Reference to the exact values of grid bias as unnecessary, since it is assumed that when a bias is applied, it is the correct bias, dependent upon the type of tube used and the plate voltage applied.

If one takes into consideration the deleterious effects displayed by run-down plate batteries, it will be found highly advantageous to stave off this condition as long as possible. After the table given below has been digested, just bear the following in mind. A C battery unit of 4½ volts costs approximately 75 cents. If its insertion into the amplifier unit reduces the plate current drain to one-half

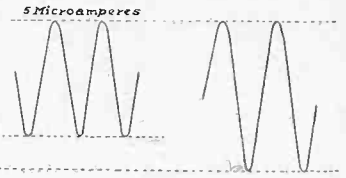


FIG. 2

Amplitude of a wave without C battery (A, at left) and with it (B), showing a 20% gain in voltage due to the C battery's effects.

of its original value, the B batteries will last twice as long with grid bias, as without the bias. Thus the investment of 75 cents in a C battery pays dividends of from 500 to 1,000%.

The Comparative Table

The accompanying table shows the total plate current drain of a 2-stage transformer coupled audio amplifier with various values of plate potential and C battery. The tubes are of the 201A type and the values are averages for several tubes. The DC resistance of the primary or plate circuit of each tube has been set so as to be an average for several of the more popular transformers. The exact values are immaterial, since they exert only a small effect upon the actual plate current drain, a variance of from 100 to 300 ohms being entirely negligible.

TABLE NO. 1

Applied Plate Voltage	Total Plate Current Drain No. C Battery	With C Battery 3 volts	With C Battery 4½ volts
130 volts	18 mils	13 mils	10.3 mils
108 volts	14 mils	8 mils	7 mils
85 volts	10 mils	6 mils	5 mils
65 volts	6.5 mils	3 mils	2.5 mils
40 volts	3.3 mils	No C Battery Used	

Assuming no gain other than economy, can any one give a reason why the C battery should be omitted?

Quality Increases

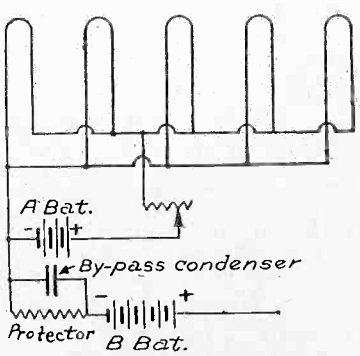
As to the action of the grid bias as an aid to better quality amplification, the evidence is just as convincing. The subject of distortion in amplifiers has been discussed at length in RADIO WORLD, with special stress upon the coupling devices utilized in the amplifier. A fact worth stressing is that distortion in the amplifier may be encountered in the tube as well as in the coupling unit. To bring this point to the fore, we will assume that the amplification in the coupling device is perfect and free of distortion, and consider the action of the tube and observe the function of the C battery.

In the first place, the total elimination of grid current is essential in each and every amplifier tube. The most important reasons are introduction of distortion in the amplifying property of the tube and the reduction of amplification due to the grid current flow. It is extremely important in the design of audio amplifiers to have the gridfilament impedance high, in fact as high as possible, consistent with the units used. By maintaining this factor at a high value, the maximum amplification is obtained with any one tube.

Effect of Grid Current

Now, when there is present in the grid-filament circuit any current flow, the first effect of this current is the reduction in

Resistance Protects Tubes From Blowouts



HOW to connect a device to protect tubes from blowout. Arrow indicates by-pass of protector.

A device for the protection of the filaments of the vacuum tubes in a multitube receiver can be very easily installed. It consists of a 100-ohm resistance in series between the negative lead of the B battery and the positive or negative lead of the A battery, this choice depending upon the normal connection of the negative B to the A battery.

For receivers whose total filament current drain is 1 ampere or more this protective resistance may be of the order of 100 ohms. For single tube receivers it should be 400 ohms, decreasing 100 ohms for the addition of each tube. It is located as shown in the wiring diagram. A bypass condenser of 0.5 mfd. should be connected across this protective resistance.

It is not only economical but excellent insurance to introduce one of these protectors, right at the batteries, if desired.

Advantages Are Three-Fold

the amplification obtainable with the tube, by virtue of a material voltage drop across the grid-filament circuit. This decrease in amplification is independent of distortion. That is, while the presence of a small amount of grid current, say 5 microamperes, is sufficient to cause a reduction in the amplifying power of the tube, by virtue of a reduction in the effective applied grid voltage, due to the drop across the grid filament circuit it does not necessarily signify that distortion will be present. If, however, the input is increased so that the tube is overloaded and a material increase in grid current is noted, both a drop in amplification and distortion of the signal will be encountered.

An example of the drop in amplification without any distortion is given in Fig. 2. This signal wave form is obtained by means of the arrangement shown in Fig. 3.

The original signal is generated by the audio oscillator at left on Fig. 3 and is passed into the amplifying tube via the potential control device P. The C battery for the amplifying tube is indicated in Fig. 3 by CB and the grid microammeter by GMA.

What the Switch Does

The output of the second tube is connected by means of a double pole double throw switch to a cathode ray oscillograph. By setting the switch to either position it is possible to connect the oscillograph, at will, to either the input of the tube or to the output. Thus it is possible to observe the signal wave form as fed into the amplifying tube and as obtained from the amplifying tube. Also the potential output as applied to the plates of the oscillograph tube may be calculated by noting the deflection and the application of certain formulas. Hence the image on the screen may be utilized to indicate two things: First, the wave shape and, second, the height of the amplitude or the voltage.

Referring again to Fig. 2, the output of the oscillator was adjusted to supply sufficient energy to the amplifying tube to cause a grid current, with normal plate and filament voltages, of 5 microamperes. No external grid bias was used. The only grid bias applied was that of the voltage drop across the filament. This is obtained by connecting the grid return to the negative side of the battery, with the filament control device in the negative lead. The signal wave form, marked A, in Fig. 2, was obtained under these conditions. Note the amplitude rather than the wave shape.

C Battery Introduced

Now, with the input from the audio oscillator constant, the external C battery is brought into action and the insertion of 2 volts external negative bias is sufficient to reduce the grid current to approximately ¼ of one microampere, for all practical purposes totally eliminating grid current. The resultant output wave form is B in Fig. 2. With very little change in wave shape, there was an increase in amplitude, fully 20%. So we see that the presence of only 5 microamperes grid current is sufficient to cause a reduction in the output of the amplifying tube. Now, this value of 5 microamperes is by no means large, especially when loud signals are being received, and the grid current in an unbiased transformer coupled audio amplifier is very much more. Very few unbiased audio amplifiers are affording the volume they

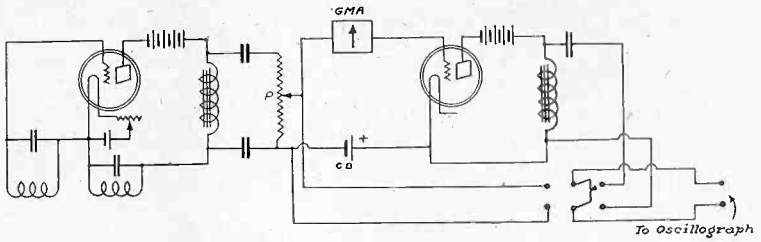


FIG. 3

The test circuit for comparing input and output, both as to wave form (distortion test) and amplitude (amplification efficiency as expressed in voltage).

really should. Hence the necessity for the correct "C" battery.

A greater increase of power as obtained from the audio oscillator and applied to the amplifying tube results in a flow of 7 microamperes (external C battery again omitted) and the output wave form shows signs of distortion (Fig. 4). This is evidenced by the flat peak on the positive half of the cycle (Fig. 4A), showing that this part of the wave is being chopped off due to the swing of the plate current around the bend on the grid voltage-plate current characteristic curve.

Wave Shape Made Normal

What would be the normal shape of these curves is indicated by the dotted lines. And as the applied grid voltage from the oscillator is increased this flat portion becomes broader and broader. But if we apply an external grid bias, from the C battery sufficient to cut the grid current down to 3 microamperes, the wave shape assumes its normal figure as indicated by curve B in Fig. 4, and we have eliminated the distortion, since the chopping off of a portion of signal wave in the audio circuit is a form of distortion. Of course the presence of even 3 microamperes is sufficient to cause a reduction in the total output, but we have determined that the flow of 7 microampres caused distortion, and that the insertion of 3 volts C battery eliminated this distortion. To adjust the amplifier for maximum output it is necessary to eliminate the remaining 3 microamperes grid current. Thus we see how the use of the C battery eliminates distortion due to overloading of the tube.

Tests Made Practical

It is necessary at this time to take up the matter of the difference between the tube characteristic and the combined tube

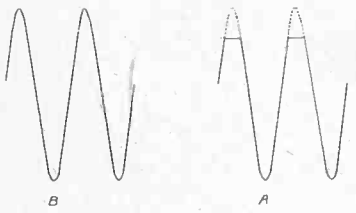


FIG. 4

The C battery affords an undistorted wave form (B), while grid current cuts off the peaks (A) when no C battery is used.

and associated equipment characteristic. It is customary in discussion of the function of the C battery to give illustrations of various tube characteristics, and in the majority of instances these characteristic curves are static curves (DC), the tube being free of input or output circuits. But the addition of a load to the tube plate circuit results in a change in the characteristic curve. To treat this consideration adequately would necessitate a long discussion. Hence it is deemed better to consider the action of the C battery under actual operating conditions, without the use of characteristic curves and the necessary discussions of the distortion introduced by the associated equipment and its effects upon the tube characteristic. It is for this reason that we observe only the effect of the C battery when the compiete circuit is in operation. We are definitely limited in the other equipment. A discourse upon the ideal unit to be used in the plate circuit is of no value, since we have certain equipment available and must do the best we can with these.

The Institute Medal Presented to Pickard

The medal of honor awarded yearly by the Institute of Radio Engineers was presented to Greenlief W. Pickard, Boston radio scientist, whose contributions to the art have been numerous and important. Pickard was among the early American investigators of radio phenomena, and it was he who first used crystal and natural minerals for rectification in receiving circuits. Although this was Pickard's outstanding contribution, his numerous investigations have marked him as one of the outstanding radio scientists of the world.

The committee of awards of the I. R. E. carefully points out that this particular medal is not given for any single contribution. It is given in recognition of long and valuable service to the art; it is given to veteran investigators who have obtained international recognition through their researches. Since the meeting terminated the institute's active season the officers made up an especially ambitious program. Mr. Pickard, the recipient of the honor award, presented a paper on the variation in signal strength as related to the variation in the earth's electro magnetic field. Prof. Jansky, a Western radio scientist spoke about college training for radio engineers. Still another especially interesting paper was read by Everett M. Curtis on safeguards for the radio inventor.

500,000 Watt Power Contemplated by WGY

Super-power, applied to radio broadcast transmitter operating on 50 kilowatts, is a misnomer, according to Harry Sadenwater, engineer in charge of broadcasting stations of the General Electric Company, at Schenectady, N. Y., Denver, Colo., and Oakland, Calif.

Mr. Sadenwater, in an address recently before the Radio Club of America, said that the use of the term super-power is misleading and inaccurate, for actually 50 kilowatts of power is often used in lighting a sign, and when one considers the large amount of service that a broadcast station is called upon to deliver to a large number of listeners, it seems ridiculous to call it super-power.

50,000 Watts Little

Discussion of super-power led many radio listeners to expect impossible results from 50 kilowatt transmission. Many feared to turn up their tubes lest the expected influx of power would destroy the tubes. Others expected that the increased volume would shatter their sets and cause a bedlam through the loud speakers. In reality, a ten fold increase of power from 5 to 50 kilowatts developed approximately three times the signal strength, according to Mr. Sadenwater. This is not a marked increase, because even a trained observer would have difficulty in detecting that a signal is any louder in a pair of headphones or a loud speaker until the signal intensity was doubled. The 50 kilowatt transmitter of WGY is five miles outside the city of Schenectady and many listeners who were able to get the signals of 5 kilowatt station in the city on a crystal receiver, using small indoor antennas, were unable to get the more distant transmission of ten times greater power.

The 5 Kilowatt Range

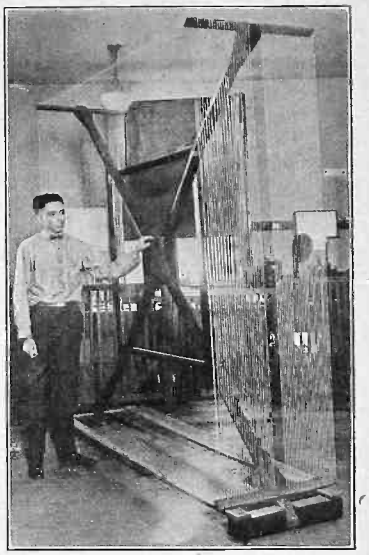
The Department of Commerce has estimated that the range of a 5 kilowatt station is approximately 30 miles for 90 per cent. service to the listeners. This means twenty-four hours' service every day of the year. Mr. Sadenwater believes this is a fair estimate, in view of his knowledge that there are places within 100 miles of the 50 kilowatt transmitter of WGY where satisfactory service cannot be received because of interference and strangely low signal levels.

Mr. Sadenwater believes that the next practical step forward is to increase again the power of the radio broadcast transmitters by a factor of ten. First the stations went from 500 watts to 5,000 watts. Now two 50,000 watt stations are providing more reliable service to their listeners. The next step to give any gain in volume to the broadcast listener should be 500,000 watts (500 kilowatts).

Cost Would Go Up a Lot

"Such an increase in power would markedly increase the cost of operating the station," said Mr. Sadenwater, "and we do not know, at this time, if such a step is economically practical. The 5 kilowatt station may be operated successfully using three UV207 tubes, but when we go to the 50 kilowatt transmitter 22 UV207 tubes are needed. The rate at which the maintenance cost increases is high. We are now working on the problem of replacing the eight radio frequency power amplifier tubes that are operated in parallel in the WGY 50 kilowatt transmitter with a larger type of tube and possibly, with this larger tube, it will be practical, from a maintenance expense standpoint, to increase the power to 500 kilowatts. Even then there is no justification for terming such power, super-power. The station will then be more nearly equal to its duty of supplying a signal level well above the noise level, over a reasonable range of approximately 250 miles. This range would make it worth while to provide the best programs in that a greatly increased number of people would listen to the reproduced program of ample signal strength without noise."

Loop Gets Europe



(Henry Miller)

M. S. STROCK, of the U. S. Bureau of Standards, is shown with the large coil which the Government uses in receiving signals from high powered stations in Europe and America, and with which it checks up their frequencies or wavelengths.

Amateur Heard Byrd

(Underwood & Underwood)

GEORGE W. LINN, amateur, operating Station 2CJE, at 151 West 231st Street, New York City, succeeded in establishing communication with Lieutenant Commander Richard E. Byrd at his Spitzbergen base, when the powerful Naval Station at Arlington was blanked by static. Linn, shown at his short wave set, relayed the Byrd message to the Navy Department.

Compass Loop Harnessed For Spotting Air Outlaws

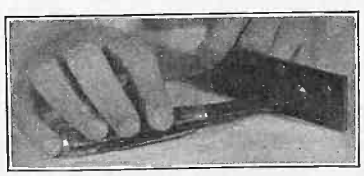
WASHINGTON.

Fitted out with a Kolster direction finder, similar to a radio compass aboard a ship, the Department of Commerce test car, with headquarters at Detroit, is all ready to spot unlicensed broadcasting stations. By means of the direction finder, S. W. Edwards, radio supervisor in charge, will be able to take hearings and very readily locate any offender operating a station without a permit.

This remarkable test car, of which there is only one in the United States, but of which it is hoped there may soon be more, is at present in Washington having its field strength apparatus calibrated at the Bureau of Standards. Although the territory of Supervisor Edwards covers Ohio, Michigan, practically all of New York state excepting New York City, Pennsylvania west of the Blue Ridge Mountains, and West Virginia, during the past seven months since he has had the test car he has hardly used the railroad trains in traveling. Not only has he been able to reach the broadcasting stations quicker, but he has been able to get to places where trains do not run.

During that time the car has covered 12,500 miles and saved $1,500 in railroad fare, according to Mr. Edwards, which is quite an item in view of the fact the car only cost $4,500. In addition to the inspection of radio stations and other routine work, he has received something like 7,000 interference complaints in less than five months. Notwithstanding this fact and that he must cover the better part of five states, he has but two radio inspectors assisting him. This number should be increased to at least five, which even then would provide but one for each state.

Knife Solves Problem



(Hayden)

A POCKET KNIFE may be used to enlarge a drilled hole if you have no drill for the desired size.

J. C. Lynch Elected President of B. C. A.

The newly incorporated Broadcasting Company of America has elected the following officers:

J. C. Lynch, President; W. E. Harkness, Vice-President and General Manager; F. S. Spring, Secretary and Treasurer; and G. F. McClelland, Manager of Broadcasting.

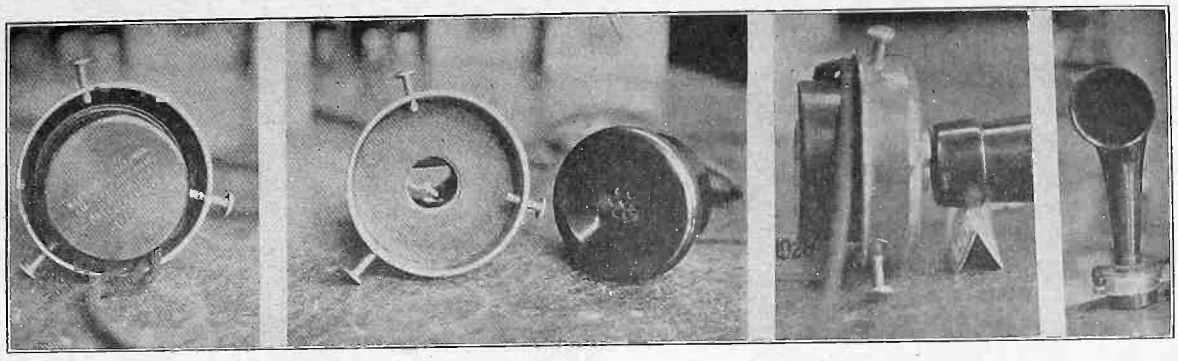
The Broadcasting Company consists of Stations WEAF, in New York; WCAP, in Washington, and allied stations of the American Telephone and Telegraph Company hook-up.

Radio Beacons for Sweden

Following in the footsteps of Uncle Sam, Sweden has in contemplation a chain of stations equipped with direction finding and submarine signaling apparatus along the coast, according to word from the Emergency Fleet Corporation.

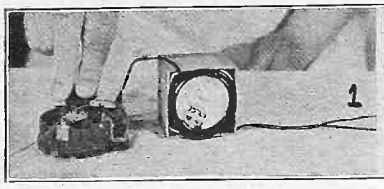
The Fladen lightship, now under construction at Helsinberg, will be the first of these stations.

How To Improvise a Speaker for a Portable Receiver



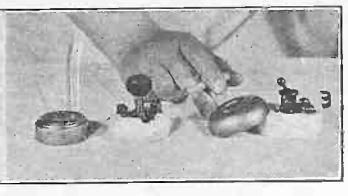
(*Radio World Staff Photos*)
WITH a phonograph clamp and a unit, all you need for a portable speaker is a small horn. Press the nozzle of the horn into the hole in the clamp. The result is shown at right.

An External Multiplier



Parallel Differences

Special Toggle Switch



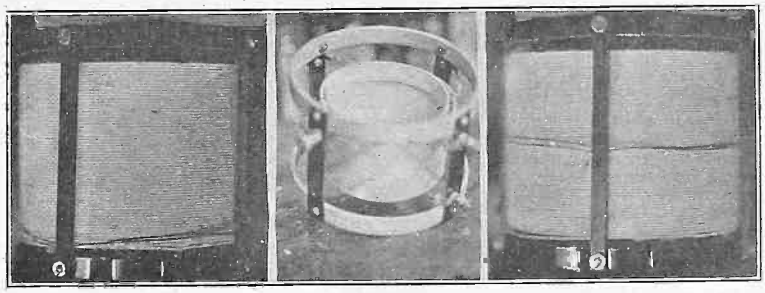
(*Hayden*)
FIG. 1 shows how a potentiometer may be connected in series with a voltmeter so that higher voltages may be registered. Use a battery of known high voltage to determine how the new scale reads. Fig. 2 illustrates the difference between coils in parallel (where the smaller inductance short circuits the other) and condensers in parallel (where the capacities are added). Fig. 3 shows the kind of toggle switch referred to when specified for B battery eliminators.

Oh, Boy, What Moosik!

(*Underwood & Underwood*)

IN a broadcast contest Norman Fausel won the title of champion boy harmonica player of Los Angeles. His eyes turned to Heaven, as if in supplication, Norman tootled the harmonica for all his lungs were worth, and they proved to be worth much.

Primary Position Affects Capacity Coupling



(*Radio World Staff Photos*)

IF the primary of a radio frequency transformer is located at the filament end of the secondary (photo at left), the capacity coupling is least. At right the primary is in the center of the secondary. The nearer it is to the grid end, the greater the capacity coupling, due to potential difference. Use a 1-turn primary in the aerial circuit and note changed condenser settings as the primary is moved. Center photo shows an internal primary to which the same rule applies.

Cushion Sockets Safeguard Portable from Knocks

If you're vacationing with a portable, take some spare tubes, carefully wrapped, and as many spare batteries as you can carry. By all means use spring cushion sockets as, despite all due care, a portable must necessarily get some hard knocks.

For our own outfit, just rounding into shape (you see, we are not going to be caught as others were) we are using a Thomas Box Type B-12 loop which, while not primarily designed for portable use is quite compact, and as quickly and easily assembled as any of the portable loops, bringing unusually good results.

The efficiency factor is an important one indeed, in a loop.

Good reception is to be had with a 6-tuber using a circuit embodying detector, three RF and two or three audio if properly designed and carefully built. For those who want to go further the Super is undoubtedly the best result-getter. It will overcome reception troubles ofttimes met in the country, insuperable to lesser circuits. Our own outfit is to be a Victoreen built with the new 171 Transformers matched to the characteristics of the 199 tubes. It is coming along nicely and we have gotten it down to handy proportions and real featherweight, our only problem now being the speaker. Last year we had a small cone speaker in the cover of the case and it worked very well. But this year we wanted to try something different and we are going to use the new Freshman speaker. It is small, sturdy and provides ample volume but we have not yet decided where to place it in the scheme of things, the original idea being to conceal it so that admiring auditors will seek in vain the source of delectable sound.

If you can't build your own buy a good factory-built outfit. Of course, you will have to look further for a good practical set of this kind than you will for a home receiver, good portables not being so readily available. But there are enough to give you a choice that will meet your needs. One that we tested recently, and which has just been placed on the market, is the Rambler Six, a good all-around portable of the factory-built type. The manufacturer also puts out a kit. But, whatever you do, get busy, for vacation time is near and what is vacation without a portable?—J. H. C.

Great Reception 10,000 Feet Above Sea

(*International Newsreel*)

RECEPTION conditions proved remarkable at Half Dome, 5,000 feet above the Yosemite Valley and 10,000 feet above sea level. Stations all over the United States were tuned in on a loop.

Broadcasting Paves Way For Girl to Star in Films

Three picture companies are bidding for the services of Ann Howe, unknown until radio asserted itself as an influence in making fame for a prospective screen actress. Don Meaney, pioneer in linking radio with the photo-play to exploit a personality for future honors in pictures, is now negotiating with the officials of the distributing and producing companies intrested in listing Ann Howe among the popular attractions sought for their forthcoming productions.

Meaney, who is well known in the picture industry through his prominent associations as a publicity director, representative of stars and production manager, is in New York following a cross-country tour of the most important broadcasting stations from San Francisco to the Atlantic Coast.

Started at KFI

He introduced Miss Howe to radio audiences from Station KFI in Los Angeles, where he conducted the Saturday Midnight Frolics, a regular feature of the station. The stunt which he evolved as a novelty in radio soon developed to such proportions that Meaney severed his connections with the Colleen Moore unit, for which he was production manager, and made a tour of the broadcasting stations with the assistance of the Associated Press.

Though Miss Howe has been seen by only a small portion of the picture people on the West Coast and her screen tests have been viewed by only a select few of the producers, she has become famous before millions of radio fans.

Meaney as Guest Announcer

In response to Meaney's request that radio fans assert themselves in creating a new screen star, he has received more than 50,000 communications declaring the interest and cooperation of these fans in the project. During three weeks he acted as guest announcer at the leading New York stations, including WEAF, WOR, WHN and the others.

The publicity resulting from the enterprise to have radio make a motion picture star soon attracted the notice of producer for Miss Howe's services even beoffer from a well-known comedy producer for Miss Howe's services even before he left Los Angeles on a tour which extended the fame of the youthful aspirant to screen honors.

Since his arrival in New York producers are said to have approached Meaney with propositions to sign Miss Howe for a series of screen performances, while others are said to be interested in making a place on their release schedules for an independently-produced picture with Miss Howe featured with a cast of well-known picture personalities.

Liberty Bell Echo Is Planned for July 5

Those in charge of the American Independence Week, June 28 to July 5, are contemplating vast radio cooperation for the "Liberty Bell echo," which is expected to be heard throughout the land. This will mark the Sesqui-Centennial of the Declaration of Independence and the Centennial of the death of Thomas Jefferson, who wrote the Declaration.

It is planned on July 5, with the aid of radio, to have a ceremonial all over the country which will be known as the "Echo of the Liberty Bell." At 11 minutes after 11 o'clock in the morning of that day a bell will be rung by the President of the United States in Washington.

At the same time, each governor and mayor, in their respective states and cities, will ring bells and the Mayor of Philadelphia will ring the Liberty Bell.

This will be the signal for the ringing of bells of schools and churches everywhere throughout the country as the echo of the Liberty Bell. This ceremony will be immediately followed by a salute to the American flag, and every man, woman and child will be afforded the opportunity to pronounce the official patriot's pledge of faith.

Chamber of Commerce To Have Its Own Studio

What is said to be the first broadcasting studio operated by a Chamber of Commerce will be opened on June 19 by the Chamber of Commerce of the Oranges and Maplewood when a three-hour special program will be broadcast with Thos. F. Burley, Jr., secretary-manager of the chamber, and chief announcer.

In view of the wealth of talent in the Oranges and Maplewood it is felt that the programs to be broadcast from the studio will be of the highest type and will reflect credit on the institution operating the studio and present these popular suburbs to the public in a most favorable light.

The Orange studio will be connected to station WAAM, of the I. R. Nelson Company in Newark, N. J., the Chamber programs coming to the public on the 263 meter wavelength of the Nelson station.

CHURCH GETS STATION

The Berachah Church of Philadelphia has taken over Station WRAX, at Gloucester, N. J. This is a 500-watt station and there will be no change in power nor of the wavelength, 280 meters.

Set Put on Wheelbarrow Entices Workers to Farms

EAST PITTSBURGH.

The home town of KDKA has solved a hard problem, that of getting field help for work on farms. A radio set on a wheelbarrow is the answer. A station is tuned in and the workers perform their tasks to the accompaniment of musical reception.

Daylight saving time has advanced the evening programs at the broadcasting stations, but the rural workers, refusing to move forward their clocks, are still in the fields when the radio announces "tea time music" or begins its symphonic concerts.

Here in Western Pennsylvania the sun is still high in the sky and it is but mid-afternoon on the farm when the Eastern stations begin their programs. Why should the music be lost? The farm lads placed the receiving set on the wheelbarrow, erected a temporary aerial, drove an iron pin in the soft ploughed earth for a ground and tuned in.

The craze for outdoor radio reception soon spread and cabinet sets are readily transferred from the houses to wheelbarrows, express wagons and dog carts and carried to the fields and gardens. Music keeps the boys at work, the farmers say, and the commuters, while tilling their gardens and flower pots, do not miss the programs to which they were accustomed during the Winter.

DETAILS OF WIRING THE DC B ELIMINATOR, Part II, by Lewis Winner, appeared in RADIO WORLD dated April 24. Sent on receipt of 15c, or start sub. with that issue. RADIO WORLD, 145 W. 45th St., N. Y. C.

Composer Seeks 40c for Charring of Beans

Harvey Enders, of St. Louis, who wrote the music for Vachel Lindsay's "Daniel," has filed a claim for forty cents against the "Eveready House," broadcast each Tuesday evening through station WEAF, New York, and its network of affiliated stations throughout the East and Middle West.

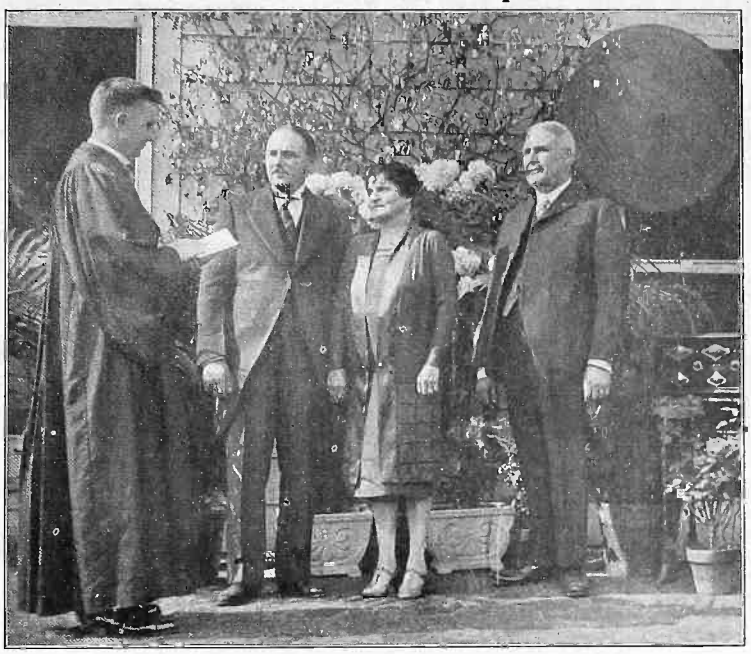
Added to the normal difference in time between New York and St. Louis, this daylight saving thing brought the "Eveready Hour" and the evening meal into keen competition in the Enders home. For a time Enders and Mrs. Enders entered into the spirit of this competition and made it a game. In each Tuesday evening's race, by agreement, Enders piloted the "Eveready Hour" while Mrs. Enders held the reins in the kitchen.

Then, one evening, Enders was seated at the dials and breezing along into the home stretch when a peculiar odor assailed his nostrils. He turned and saw that Mrs. Enders was leaning on the back of his chair. Somehow he gained the distinct impression that she had been in that position for some minutes. Both made a dash for the kitchen. A pot of beans on the stove was quietly going up in smoke—hideously malodorous smoke.

Mrs. Enders says it wasn't her fault. Enders wants forty cents for that charred pot of beans.

If a canary is moulting it will not sing, but if radio programs are played loud the bird will chirp. If the bird is nearly finished moulting its song will be more quickly restored.

March Broadcast for Nuptials



(Underwood & Underwood)

MENDELSSOHN'S WEDDING MARCH, broadcast from WAHG, Richmond Hill, N. Y., was received outside a church and served an excellent purpose for the marriage of Maybelle A. Burbridge (Prudence Penny of newspaper fame) to Leon C. Gray. The Rev. Dr. Eugene Flipsey performed the ceremony at Douglaston, L.I.

British Station Pays Up For Slandering Publisher

Following closely the radio slander suit brought in Oklahoma City, probably the first of its kind in the United States, England has had its initial litigation of that kind. However, the two cases differ considerably.

In Oklahoma City the sheriff sued a clergyman for alleged slanderous remarks. In the first instance, the position taken was that the radio station was in the same category with the telephone and could not be held liable for the slanderous remarks of two persons any more than a telephone company could. In other words, it was held to be a matter between the clergyman and the sheriff. Subsequently, it is understood another action was started by the sheriff.

In the English case, the trouble arose because of an alleged announcement on the air that a certain printing house could not supply copies of a book which listeners desired to buy, and as plenty of these books really were available at the time, the printer claimed to have suffered a financial loss.

Play Put in Book Form

It came about through preliminary announcements by the British Broadcasting Company of a presentation over the air of a play, "The White Chateau." The British Broadcasting Company, in London, with a view to increasing public interest in the event, which was scheduled for Armistice Day, 1925, arranged a competition in which listeners were invited to send essays expressing impressions of the play after the Broadcasting Company's performance.

So that they might qualify themselves for the composition, it was arranged that "The White Chateau" should be published in book form. In November, 1925, as recently, serious labor troubles existed and certain printers were affected. Owing to this difficulty the British Broadcasting Company in one of their announcements stated that because of the labor troubles copies of the books were not obtainable.

Ends With Golden Apologies

Admittedly it was wholly incorrect, the printing company being able to supply copies of the books, and it is said to have suffered actual loss in sales. Notwithstanding the fact that the British Broadcasting Company in three subsequent announcements endeavored to correct the false impression, the printing company went ahead with the suit.

It was finally settled, however, by the British Broadcasting Company formally apologizing, regretting the inaccuracy and agreeing to pay a certain sum of damages and cost. The expressions of regret were accepted by the plaintiffs and Lord Erleigh, appearing for the British Broadcasting Company, remarked, "I am glad so novel an action has been settled in so friendly a way."

Call Letter Changes

The call of KFVW, Airfan Radio Corporation, San Diego, was changed to KFSD.

The call of WCBQ, First Baptist Church, Nashville, was changed to WBAW.

The call of WGWY, Minneapolis, was changed to WDGW. The station is owned by Dr. Geo. W. Young.

The call of WHAV, Wilmington Elec. Spec. Co., Wilmington, Del., was changed to WDEL.

The call of WHBH, Culver Military Academy, Culver, Ind., was changed to WCMA.

The Williard Storage Battery Company now own and operate WEAR, Cleveland. The station was formerly owned by the Goodyear Tire and Rubber Co., Cleveland.

Four Stations Drop Out

Four stations were discontinued. They were:

WEBE, Roy W. Waller, Cambridge, Ohio, 234 meters.

WFBD, Gethsemane Baptist Church, Philadelphia, 234 meters.

WGBM, T. N. Saaty, Providence, R. I., 234 meters.

WWAD, Wright and Wright, Philadelphia, 250 meters.

New Chain Station Idea Has Separate Programs

Smaller stations of the country will soon combine with a chain of stations for countrywide broadcasting, said Norman Baker, of Muscatine, Iowa, president of the American Broadcasters Association. A hundred or more stations, as the plan is explained, will be linked together but will not be connected by wire. Each station will broadcast its own programs, and the advertiser using this style of advertising would be announced at the same hour from all stations in the chain simultaneously.

"We will cover the entire United States," Mr. Baker goes on, "and by broadcasting a different program from each station. The listeners will not become annoyed, because there will be no monopolizing of the dials."

PORTABLES RID OF OLD PROBLEMS

By Capt. P. V. O'Rourke

The collection agency is no longer a problem in portable receivers. Either one has a set that operates satisfactorily from a loop, even amid poor reception conditions, or one uses an aerial-ground system. The loop is more convenient, but it requires a more sensitive set, in other words, more radio frequency amplification.

Assuming that an aerial is to be used, it may consist of a stretch of wire wound on a reel. This wire is unwound, and the free end is attached to a nail or other point of security, at some location as high as is practical. Then the other end is fastened to regular insulator which is attached to some point still higher, and the aerial proper is continued down to the set, without separate leadin. The advantage of the higher location of the part of the antenna level nearer the set is that the leadin or equivalent gains the advantage of the higher radio potential. The pickup is stronger that way.

The Reel Aerial

How the reel wire is connected to the receiver is shown in Fig. 1, while Fig. 2 discloses the free end attached to a nail on a dead tree. There is an insulator at the free end of the aerial, the small eye-like object you see on the nail, so that leakage losses at this point are avoided. The reel may be such that when a contact plug is inserted in the central hole the connection is made to the reel automatically. The contact plug has flexible wire on it, and the connection made to the set in Fig. 1 is through this flexible wire.

If you are at a lake, as in Fig. 3, you may throw a wire screen overboard, and take a leadin connection from the screen to the aerial post of the set by means of a regular leadin. The screen is shown in Fig. 7 and happens to be bright copper insect wire, the very same screening as is used on doors, windows and porches at one's home. Of course, with such an aerial, which is lying on the bed of the lake, a ground connection must be used additionally, and this ground may be established by connecting to the frame of one's automobile, and thence to the ground post of the set. There is a ground connection

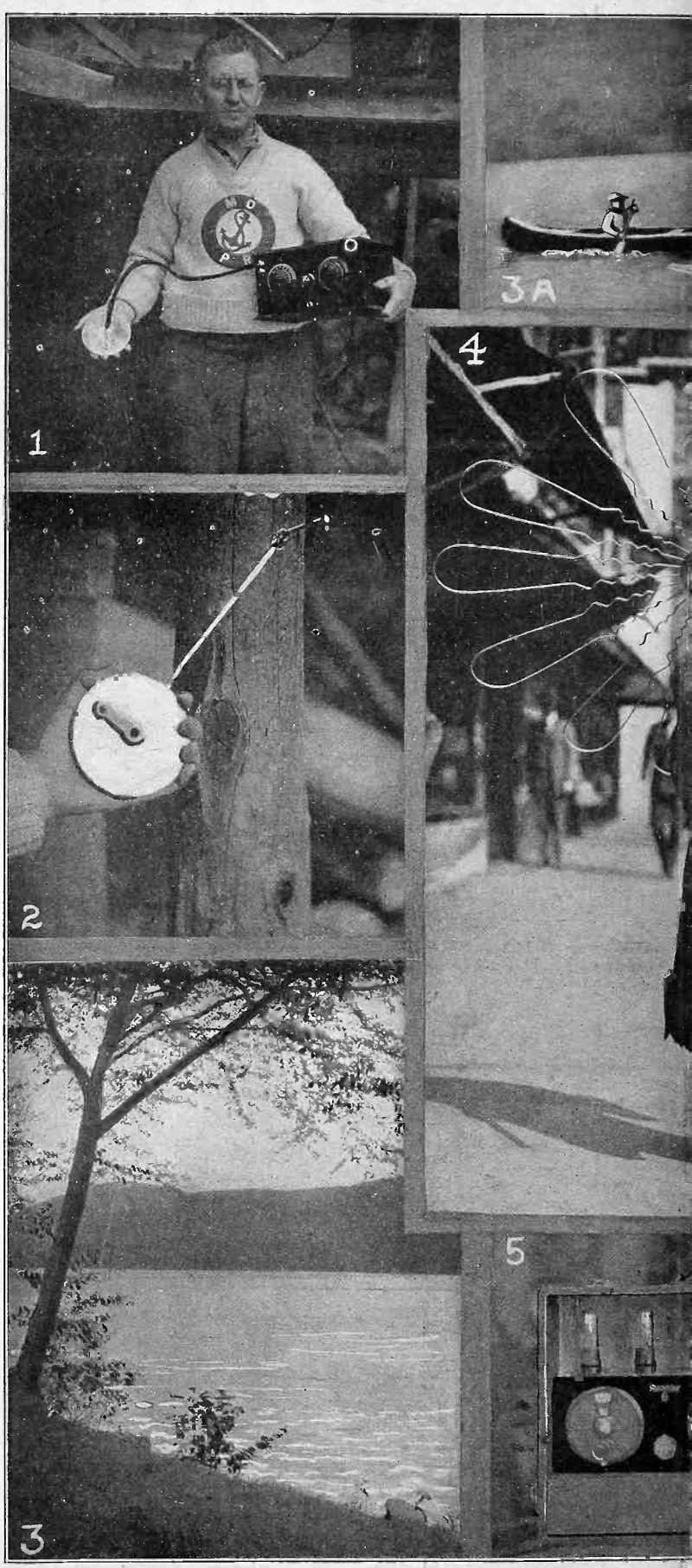
The Canoe Aerial

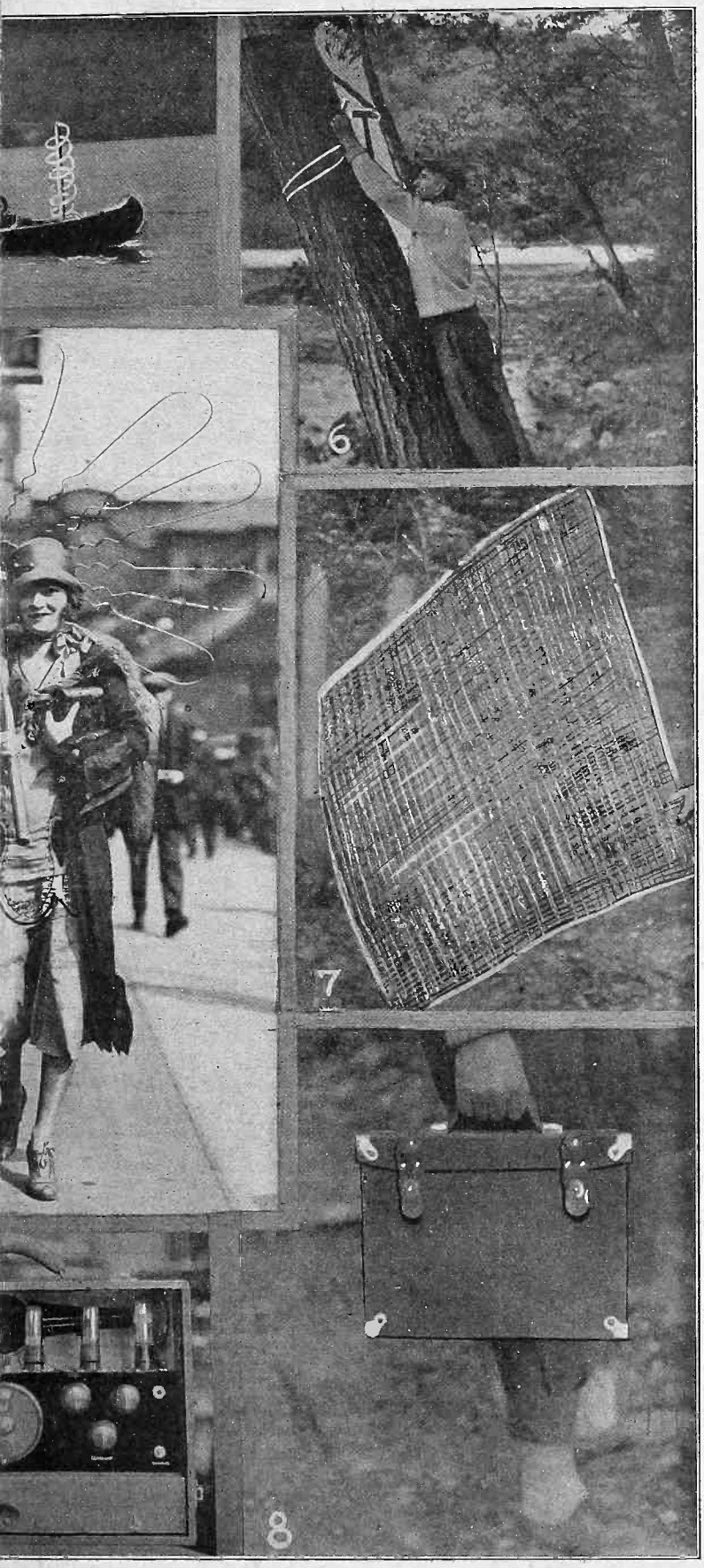
In a canoe an aerial may be provided in the manner shown in Fig. 3A. The wooden rod sticking upright in the bow of the canoe is 4½ feet high. There are four thinner parallel rods, invisible in the photograph, however, and the wire, which may be flexible lamp cord, is wound around as shown, and looped with twine at the points where it meets the exterior framework. This sort of pickup should be treated as an aerial, rather than as a loop, although of course it has some loop effect, too.

An umbrella-like aerial, different from the umbrella aerial with which radioists are familiar, is shown in Fig. 4. This is a commercial product.

A portable set that uses a loop is pictured in Fig. 5, while Fig. 6 shows a nail being driven into a tree trunk. The nail is connected to aerial post of the receiver, and a ground connection is used additionally. The nail may be regarded as the end of the aerial, since really the tree's leaves, branches and trunk are being used for pickup purposes.

A portable set need not take up much room nor make an uncomfortable burden. A small-sized container will do. (Fig. 8).





MY KINGDOM FOR SET, CRY ON VACATION

By James H. Carroll

To the true radio fan a vacation is not really a vacation unless he has his radio with him, in some form or other, to round out his portion of summer joys. Radio has become an essential part of our existence. It has passed the stage of being merely an incidental means of lightening the cares of life and has gradually achieved a place in our conscious scheme of things until its lack leaves a hiatus which nothing else can fill. To prove this cut out your set for an entire evening and notice what a blank is evident in this period of restful hours at the end of the day's labor.

Therefore, when one hikes away along the dream road into the bush, green fields, while the pulse thrills to the magic call of Nature and the ears are titillated with the songs of birds, there is yet something lacking, an old familiar left behind—you look around, yes, the old familiar shadow is there; yet the empty feeling remains; another look, ha! the old lunch basket is in evidence, its weight showing no depreciation in the commissary—what can it be?

The Fatal Omission

Finally the answer dawns—yes, we have no portable today; we neglected to build (or buy) our portable before we came away. Now, in the patois of the age, the whole vacation is "shot." Alack! of what avail the rod, the gun, the hikes, the fun? What boots it even if we have the ole camera along if we cannot take pictures of the whole gang reclining (in various graceful postures) by the crackling camp-fire listening to the dulcet strains from the Great White Way of Momus and jazz. We sure must miss the Record Boys every Thursday, the Happiness Boys on Friday, Goldy and Dusty on Tuesdays; now we cannot dance to George Olsen's "train" of Pennsylvania melodies nor Ernie's rollicking strains—what can fill the gap left by the Reading Railroad Revelers or Breyer's old-fashioned ice cream socials? (Gosh, we came out on the Reading, too; why didn't that remind us?) What shall we do without the Eveready Hour, Lopez and other old favorites, too numerous to mention?

What, ho! my kingdom for a portable!

Oh, to hear the baseball scores, news items or lectures out of the magic box, not to mention the useful talks of Herman Bernard on radio problems every Friday night (my, how we'll miss them).

"Well, next year it'll be different," is the vow. "Never again will we be caught this way."

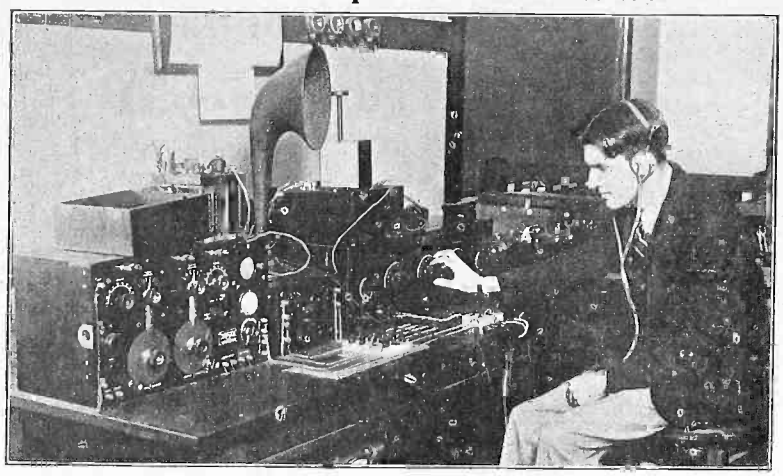
Stint Elsewhere

Go without something else, if you must, but don't omit the most essential joy-giver. Remember the rainy days which must eventuate and the dreary, dragging hours for which provision must be made.

Decide now on what you are going to build or what you are going to make. The best results can only be had with not less than five tubes. While it is true that an antenna can be quickly strung, a loop is more satisfactory to many, but requires more tubes.

The 199 tubes must be used because light-weight battery equipment is essential. A good plan is to build the battery outfit in a separate case all ready to plug into the portable.

Close Watch Kept on Stations' Waves



(*Henry Miller*)

R. H. LEE, of the U. S. Bureau of Standards, at Washington, is shown with the apparatus which the Government uses in checking broadcast stations to see that they are adhering to their assigned frequencies or wavelengths.

Dr. Cadman Extols Radio's Power for Good

Chicago

The Rev. S. Parkes Cadman told the Federal Council of Churches, of which he is president, that the radio is a great help to truth dissemination. He said:

"Properly used radio presents an amazingly wide field for reasonable propaganda of the great truths we hold in common.

"I have found it an immense help in reaching countless numbers of people who have no definite affiliations with the churches. They are not irreligious. Far from it. They are deeply moved by spiritual realities and are a very large group presenting a fascinating field for religious enterprise."

Stolen Radios Returned

Sets stolen from homes in Queens County, New York City, by Paul Hilton, "the radio burglar," were turned over to the owners, who had been without the sets for months. Since his arrest Hilton was convicted of killing a policeman and is in the death house at Sing Sing.

Free Speech Menaced by Stations, Says Thomas

Refused permission to broadcast from WEAF and WMCA, except when there was an opposing speaker, Norman Thomas spoke alone from WRNY, Hotel Roosevelt, New York City. Mr. Thomas is executive director of the League for Industrial Democracy.

Mr. Thomas said that those who control the radio possessed power of a degree denied to the mightiest priests and potentates in the days of old. Therefore, he said, they could regulate the information and misinformation on which the public acts.

With very rare exceptions, he said, radio had presented only the conservative side of social problems. "Minority viewpoints have been expressed very seldom and usually ineffectively," he declared.

Speaks For Radicals

"For one reason or another organized labor and various liberal and radical groups have never been able to get a license for a radio station, and have rarely been able to get hearings over established stations. Part of the difficulty lies in the high charge for broadcasting; part of the difficulty in direct censorship."

Discussing the granting of licenses, Mr. Thomas said that the Chicago Federation of Labor had been unable to get a station, although The Chicago Tribune-Liberty Magazine group had two stations. The Federation, he said, had opened at station without a license, appropriating a wavelength hitherto reserved for WEAF.

Cites Mellon's Broadcast

Regarding the rule that radio stations desired no controversial matter unless it was presented in the form of a debate, Mr. Thomas said that recently Secretary Mellon broadcast a speech from Atlantic City, parts of which were highly controversial.

"There seems to have grown up a curious and undemocratic notion in the broadcasting world that high public officials are sacrosanct, that what they say is not controversial, but that to answer it is," he continued. "We shall make no progress toward the improvement of the radio situation until, definitely, once and for all, public opinion, Government officials and station operators recognize that the radio is a public utility with all that that phrase implies."

Opposes Monopoly

He said that Senator Dill had introduced a bill which goes a long way in the direction of recognizing that radio is a public utility. He suggested that the provisions to prevent a monopoly be strengthened, and that it also provide an opportunity for aggrieved persons to complain. He explained that the bill sets up a commission of five, with power to prevent discrimination, monopoly and profiteering.

Mr. Thomas was introduced by Charles D. Isaacson, manager of the station, who said that while he did not agree with him, he felt that Mr. Thomas "right or wrong," had a right to express his views.

Say Speech Was "Soft"

Hugo Gernsback, editor of "Radio News," replied to Mr. Thomas's address in a brief speech. Mr. Thomas was informed that Mr. Gernsback would speak when he reached the station. He had not previously been notified of the last-minute plan of the station.

Marion K. Gilliam, director of the WMCA broadcasting studio, listened to Mr. Thomas's speech as broadcast from WRNY and said afterward that it was not the same speech which Mr. Thomas had submitted to WMCA. "Compared to the one he submitted to us, it was a milk and water speech," Mr. Gilliam said.

Plans are being made for Mr. Thomas to speak over WMCA as outlined, according to Mr. Gilliam, but not until such time as a "competent authority" can present the opposing viewpoint. Mr. Gilliam said that he expected to be able to announce an opposing speaker soon, and that Mr. Thomas would then have the privilege of broadcasting from WMCA.

Sesqui-Centennial Offers Great Music for Summer

WASHINGTON

Adding further to the best summer radio has ever known is a preliminary list of music attractions which will be broadcast from the Sesqui-Centennial at Philadelphia.

Secretary Wilbur has announced that the United States Marine Band will play at the Exposition during June. John Philip Sousa, its leader, will make a special trip to Philadelphia on Flag Day, June 14, to conduct the Marine Band in a rendition of "Flag Day March," which he composed and dedicated to the Day.

With the permission of Secretary of War Davis, the Army Band will play during September. It is also practically certain that the United States Navy Band will be detailed for a like period. Four bands will play daily in the music pavilion at the entrance of the "Glad Way." These will include Conway's Band, Creatore's Band, and many others.

The Philadelphia Orchestra is expected to give two concerts weekly throughout the entire Exposition, but as yet it has not been definitely announced whether they are to be broadcast. During the summer outstanding guest conductors will be engaged and during the last two weeks Leopold Stokowski, the organization's own conductor, will lead.

Nor will programs be confined to bands and orchestras, for the famous Bach Choir of Bethlehem, Pa., composed of 300 voices, will visit the Exposition. Likewise the Liederkranz Society of New York, including 125 voices and an orchestra of 85. Then there will appear a number of organizations such as the Sangerfest, by a group of German Choral Societies totaling 3,000 voices, Catholic Choirs Festival, "America" staged by the Philadelphia Music League, Knights of Columbus concert, and so on. Noted organists will give recitals on the $150,000 organ in the auditorium.

The National Federation of Music Clubs has arranged, in connection with the Sesqui-Centennial, for the selection of the eight most gifted young musicians in the United States. Those selected will be heard in a recital to be held in the exposition auditorium. The musicians will be chosen after State elimination tests.

Radio University

A FREE Question and Answer Department conducted by RADIO WORLD for its yearly subscribers only, by its staff of Experts. Address Radio University, RADIO WORLD, 145 West 45th St., N. Y. City.

When writing for information give your Radio University subscription number.

HAVING TRIED the 1-tube DX receiver described by Herman Bernard in the Oct. 24, 1925, issue of RADIO WORLD and obtained some really surprising results, using an indoor antenna, I am going to add a stage of radio frequency amplification and two stages of audio frequency amplification to this marvelously simple receiver. I understand the method of wiring up this set, but would like to get the coil data straightened out. I have two tubings, 3" in diameter; some No. 24 double cotton covered wire; two .0005 mfd. variable condensers; a .00025 and a .00035 mfd. variable condenser. The .0005 mfd. condensers are of the SLF type, while the .00035 and .00025 are of the SLW type. One of the latter is to be used for the plate circuit, while the former are to be used for shunting the secondaries of the RFT.—C. D. Uhley, 3952 Howley St., Pittsburgh, Pa.

The primaries will consist of 8 turns. The secondaries will consist of 45 turns. The secondary of the RFT, used in the detector circuit, is tapped at the 8th turn from the beginning of the coil. This means that it is tapped at the 8th turn from the point of connection to the rotary plates of both condensers, the tap being brought to the F plus post on the detector socket. This 8th turn tap is for the use of the .00025 mfd. variable condenser. Use the .00025 for the plate condenser.

* * *

THE FOLLOWING is a wiring description of my set. The antenna post is brought to one terminal of a .0005 mfd. fixed condenser. The other terminal of this condenser is brought to a terminal on a variometer and to a terminal of a .00025 mfd. grid condenser -2 megohm leak combination. The other terminal of this combination is brought to the grid post on the first socket. The other terminal on this variometer is brought to the ground post on a strip and to the F plus post. The plate post on this socket is brought to a terminal of another variometer. The other terminal of the variometer is brought to a terminal of a .002 mfd. fixed condenser and to a phone tip.

The other terminal of this fixed condenser is brought to the F plus post on this same socket. The other phone tip terminal is brought to the B plus 45-volt post. The phone tip, going to the plate variometer, is brought to one terminal of a fixed resistor, having a resistance of .1 megohms and to one terminal of a fixed condenser, having a capacity of .1 mfd. The other terminal of this resistor is brought to B plus 90-volt post. The other terminal of the fixed condenser is brought to a terminal of a .25 megohm resistor and to the grid post on the second socket. The other terminal of this last resistor is brought to the C minus post. The P post on this socket is brought to the B and F posts on a low ratio AFT connected in autotransformer fashion. The P post on this AFT is brought to one terminal of another .1 mfd. fixed condenser. The other terminal of this condenser is brought to the grid post on the last socket and to one terminal of .5 megohm fixed resistor. The other terminal of this resistor is brought to the C minus post. The G post on the AFT is brought to the B plus 90-volt post. The plate post on the last socket is brought to a phone tip (having nothing to do with other tips). The other phone tip is brought to the B plus 90-volt post. The filament of the detector tube is controlled by a rheostat, while the filaments of the two audio tubes are controlled by a single rheostat. The A minus is connected to the C plus. The B minus is connected to the A plus. The —99 type tubes are used. Loud speaker volume on local stations are obtainable with this set, with good quality. However, much of the time, when using the speaker, there is whistle of constant pitch and varying volume heard, which I find impossible to eliminate. Is there any remedy that may be used to do away with this noise? If so, how?—R. H. Bolton, 34 Merchants Row, Boston, Mass.

Yes. Instead of using a fixed resistance in the grid circuit of the last tube, use a 500,000-ohm variable resistance, connecting the resistance in series with the C minus and the blocking condenser terminals and the arm to the grid post on the last socket. In other words the resistance terminals are connected in the same way, the fixed resistance was connected, except that no direct connection is made to the grid of the tube, the arm being brought here. By varying this resistance, you will find that the whistle will be eliminated.

If you desire to experiment a bit further, you might try reversing the P and G connections. That is, instead of having the P post brought to the stopping condenser, bring it to the B plus post. Also, the resistor in the plate circuit of the detector circuit, may be changed to a 1 megohm type, as well as the values of the stopping condensers which might be changed. That is, you might try .25 or 1 mfd. fixed condensers.

* * *

IS IT necessary to use a 3½-to-1 ratio AFT in the 1926 Model Diamond of the Air? I have a General Radio 6-to-1 ratio type, which I wish to use in this set.—Roy Murphy, Becker, Minn.

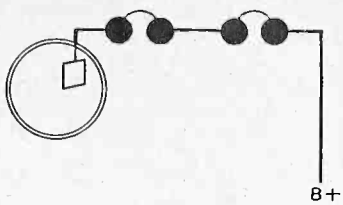
Use what you have.

* * *

I HAVE the following parts on hand, which I would like to incorporate into a 5-tube set, employing two stages of tuned radio frequency amplification, a non-regenerative detector and two stages of transformer coupled audio frequency amplification: one antenna coil, consisting of 68 turns, tapped at the 9th and 17th turns, the secondary being wound on a tubing, 3⅛" in diameter, while the primary is wound on a tubing 2¾" in diameter; two radio frequency coils, consisting of a 5-turn primary and a 70-turn secondary, wound in the same fashion as the antenna coil; three .00035 mfd. variable condensers; two audio frequency transformers, a .002 mfd. fixed condenser; a .005 mfd. fixed condenser and a .006 mfd. fixed condenser. The wiring directions of a set employing these parts would be very much appreciated. The radio and the detector tubes are to be controlled by one rheostat, while the two audio tubes are to be controlled by another rheostat.—Walter A. Robbins, 548 11th St., Brooklyn, N. Y.

The 9th turn tap on the antenna coil is brought to the antenna post. The end of this 9-turn winding is brought to the ground post, to the rotary plate post on one of the .00035 mfd. variable condensers and to the F minus on the strip. The other terminal of this winding, containing 68 turns is brought to the grid post on the first socket. It is also brought to the stationary plate post of the variable condenser. The plate post on this socket is brought to the beginning of the primary winding of one of the RFT. The end of this winding is brought to the B plus 67½-volt post on a strip or to a lead marked 67½ volts on a cable. The beginning of the secondary winding of this same RFT is brought to the rotary plate connection of the second variable condenser and to the A minus post. The end of this winding is brought to the grid post on the second socket and to the stationary plate connection on the variable condenser. The beginning of the primary winding of the last RFT is brought to the plate post on the second socket, while the end of this winding is brought to the same connection, as the end of the primary winding, of the first RFT, e.g., 67½ volts. The beginning of the secondary winding of the second RFT is brought to the rotary plate connection of the variable condenser. The end of this winding is brought to the stationary plate connection of the condenser and to one terminal of the .00025 mfd. grid condenser -2 megohm grid leak combination. The other terminal of this combination is brought to the grid post on the third socket. The beginning of this secondary winding is also brought to the F plus post on the same socket. The plate post on this socket is brought to the P post on the first AFT and to one terminal of the .002 mfd. fixed condenser. The other terminal of this condenser is brought to the A minus post or lead. The B plus post on this AFT is brought to the B plus 45-volt lead or post. The G post on this AFT is brought to the grid post on the fourth socket. The F minus post on this AFT is connected to the F minus post on the other or last AFT. The P post on this AFT is brought to the P post on the fourth socket. The B plus post is connected to the B plus 90-volt post or lead. The G post of this AFT is brought to the grid post on the last socket. The P post on this socket is brought to the top terminal of a single circuit jack. The bottom terminal of this jack is brought to the B plus 90-volt lead or post. The three F minus posts on the RF and detector sockets, are connected together. They then are brought to the terminal connected with the resistance wire of one of the 6-ohm rheostats. The terminal connected with the arm of this rheostat is connected to the A minus post. The two F minus posts of the audio tubes are connected together and then to the terminal connected with the resistance wire of the rheostat. The other terminal of this rheostat, connected with the arm, is brought to the A minus post. All the F plus posts of the sockets are connected together and thence to a terminal of a filament switch. The other terminal of this switch is connected to the A plus B minus post or lead. Although the receiver is wired, so that the filament of the RF and the detector tubes are controlled by a single rheostat, the results will not be as satisfactory as those obtained, if a separate rheostat was used filaments of the two RF tubes and a separate rheostat for the filament of the detector tube. A 4.5 volt C battery should be used. The C plus is connected to the A minus post. The —01A tubes should be used in this set. This set will be simple to tune.

Multiple Phone Hookup



IF TWO or more pairs of phones or speakers are connected to a set they should be in series (as above), and not in parallel. Otherwise volume declines considerably.

A THOUGHT FOR THE WEEK

IN other years Arctic explorers got a more or less seaworthy sailing vessel, a hardened crew, and plenty of canned goods, and started out on the long adventure, sometimes requiring years. Nowadays the explorer gets an airship, a band of expert mechanicians, a few barrels of gasoline—and radio. And not the least of these is radio.

RADIO WORLD

REG. U.S. PAT. OFF.

The Link Connecting Radio Fan Dealer, Jobber Distributor and Manufacturer

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

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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.

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1 Page, 7¼"x11"	462 lines	$300.00
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¼ Page, 4½" D. C.	115 lines	75.00
¼ Page, 3¾"x11"	154 lines	100.00
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JUNE 12, 1926

INTERESTING FACTS

A New York radio physical director said that someone in the class punched so hard that he punched a hole in the imaginary punching bag.

Several leading comedians are quoted as deploring the lack of good humor over the radio. Possibly many of the old time comedians are out of date and don't know how to be funny over the air.

Uncle Joe Cannon, 92 years old, at his home in Illinois, has severed all contact with public life excepting to tune in Washington on the radio occasionally.

A noted watchmaker declares we will soon be carrying watches run by radio and set hourly by electric waves from the Naval Observatory.

A Prime Requisite

DID you ever hear of an oak desk being transparent? No, indeed. Yet you know that office workers sit at their desks these days, for at least a few moments during imaginative spells, and, looking down on the desk, see instead wave and stream, flower and foliage. And amid these fancied views of nature are some coils of wire, a knob or two, and some dials.

The factory worker at his lathe sees in the turning thereof the revolutions of a "kicker" on a canoe. The shipping clerk, sheets of wrapping paper in hand, imagines he is handling sails. The executive is moved similarly to thoughts of the great outdoors, only more concealedly, as befits his dignified office. For the vacation season is at hand, when we are about to be lifted from the thralldom that the first law of nature inflicts, to mountain, lake or shore.

And who can say that he or she has prepared well for a vacation, unless included in the list of necessities there is a magic music box that culls programs from the waves that silently traverse ground and sky, and leave no day or night without its full variety of audible entertainment?

Much Rancor, No Progress

THE music fee controversy has been washed through the Congressional machine, leaving no public doubt that both sides showed too much animus and too little desire for peace. The American Society of Composers, Authors and Publishers seemed to have singled out WEAF for special attention, as if caring less about what other stations would have to pay than about inflicting a painful maximum on WEAF. And that station in turn threw itself upon the good judgment of Congress, but wanted all stations treated alike, if they were in a like class, for instance, use the same power output. Anything that any other station of like power could afford to pay, WEAF could afford to pay. Hence Congress, in the absence of fairness of either side, was presented with another dilemma, heightened by tangled evidence and unravelled recrimination.

It would have been better had bitterness and personalities been omitted, and a business-like attitude taken by both parties. But the society was altogether too exacting and blood-thirsty, and the leaders of the stations' side, while less exacting by far, showed every indication of being less interested in effecting a settlement than in reaping revenge.

Such a sorry plight falls into feeble hands when it reaches Congress, for the lawmakers have a hard enough time enacting solutions when there is an agreed state of facts, without being asked to solve a much-befuddled situation on the basis of duly recorded bickering. The harangue of neither side stirred the public much, not even the sensationally incredible cry of the stations that they were in danger of shutting down, due to exorbitant exactions by the society. That was only another example of how far from sanity the ugly dispute had been dragged.

Tried and True Hookups

THE novelty hookup is at its end. While only a couple of years ago freak hookups were hailed with delight, nowadays the public takes very kindly toward the established circuits, and looks for improvement rather in the design or engineering applied to the orthodox.

In the recent past radio editors would reject a manuscript because there was "nothing new in that circuit," while today they are more likely to reject it because it is too dangerously new! The lesson of victimization by the circuit trickster has been learned by all hands, and that is merely another sign that the industry is getting on a sounder basis. Trickery, by engineers in the design of circuits, is at an end, but in trade channels of radio there still is considerable trickery. In time the unworthy will be eradicated here, as elsewhere, likewise the unfit, and when that day dawns the best bosoms in radio will heave a sigh of high relief.

British Words in Radio Differ from Those We Use

If someone took a look at your set and then asked: "How are your dull emitters working?", you might be inclined to think that he was taking a slam at you or the product of your brain or pocketbook. But not so, if the inquirer comes from Merrie England, for this is just a snappy way of asking how the dry cell tubes are getting along. In radio—beg pardon, wireless—the terminology is quite different across the pond.

"Most fans and dealers in this country know that in England what we call a radio tube is called a valve," said R. M. Klein, General Manager for Fada Radio, in discussing the changes made necessary in trade literature by reason of the differences. "But other terms are not so generally known on this side."

Mr. Klein pointed out that in England a socket becomes a valve holder. Storage battery tubes are called bright emitters. Radio frequency amplification is known as high frequency amplification and audio frequency amplification is called low frequency amplification. Coil mounting is a coil holder. A storage battery is an accumulator. Accessories and parts are classed together as "components" in England.

The word "wireless" had been most generally used rather than "radio" until the advent of firms with American connections, and the accepted differentiation of a few years ago in this country between the two terms does not exist.

"Radio industry" and "wireless industry" appear to be used interchangeably in the trade press and in conversation, as are all other combinations involving separately these two words "radio" and "wireless."

Such terms as high tension and low tension (H. T. and L. T.) accumulators would prove baffling to American fans and even the set builders are "different." They are called "constructors." As all know, the talking machine is called the gramophone over there, so the attachments used in radio for the tone arm become "gramophone attachments."

But if outside a shop in England is the sign "Wireless Shop," or "Wireless Department" in a store, rather than "radio," as a rule, the American radio fan will find more recognizable names than those of the nature referred to above. For condensers are condensers, even in England, transformers are transformers, dials are dials, and so on through most of the list.

Microphone Is Presses of Farm Radio Daily

Undertaking to operate a 500-watt station, centrally located in that State, the California Farm Bureau broadcasts a "publication", known as the "Evening Radio News." It is put on the air every night excepting Sunday and consists of 20-minutes of general and agricultural news, detailed weather and market reports, a ten minute period of farm topic discussions and a period known as "The Mail Bag." The managing editor of this unique undertaking is Fred J. Hart, of Salinas, Calif.

48 Federal Executives Have to Do With Radio

That radio has a far greater field of usefulness than simply entertainment is confirmed by the latest issue of the Government radio directory. No less than 48 Federal executives are concerned in radio administration.

Those branches of the service which radio touches in one form or another are the State Department, Coast Guard, Signal Corps, Department of Justice, Post Office Department, Naval Communications Service, Navy Bureau of Engineering, Naval Research Laboratory, and Naval Hydrographic Office, also Bureau of Mines, Bureau of Agricultural Economics, Weather Bureau, Forest Service, Radio Division of the Department of Commerce, Bureau of Standards, Bureau of Lighthouses, Radio Division of the Patent Office, and the Shipping Board.

An up-to-date list of supervisors of radio and their addresses are also given in the directory. A copy of the directory may be obtained by addressing the Secretary of the Interdepartment Radio Advisory Committee, Room 509, Department of Commerce, Washington, D. C.

Acme Electric Gets Trade Mark Rights

The Acme Electric and Manufacturing Company, of Cleveland, manufacturers of battery charging equipment for ten years and one of the largest manufacturers of charging apparatus and allied equipment, has received from the Uuited States Patent Office the official notification for the registration of the trade mark "Acme" for motor-generator sets, battery chargers, etc.

These products are now in service all over the world, and the engineers of this company are continually making exhaustive tests on new products which the company intends to launch on the market.

Makes Light 6 Portable

The Orator Radio Corporation, of No. 1717 Broadway, is manufacturing a portable receiver. Orator portable light six has the following characteristics: Six tube set (three stages of radio frequency) has compartments for "A" and "B" batteries, loud speaker and loop (everything self-contained), one tuning dial, built-in speaker, loop enclosed in the door; over-all dimensions, 18x18x4½.

COMING EVENTS

SEPT. 5 to 11—Los Angeles Radio Show, Ambassador Auditorium. Radio Trades Association, Los Angeles.

SEPT. 10 to 17—National Radio Exposition, Grand Central Palace, New York City. American Radio Exposition Co., 1560 Broadway, New York City.

SEPT. 13 to 18—Third Radio World's Fair, Madison Square Garden, New York City. G. Clayton Irwin, manager, Times Bldg., N. Y. City.

SEPT. 25 to OCT. 2—Pittsburgh Radio Show. H. R. Eleyet, cars "Pittsburgh Press."

OCT. 11 to 17—Fifth Annual Chicago Radio Show, Coliseum, Chicago, Ill. G. Clayton Irwin, manager, Times Bldg., N. Y. City.

OCT. 25 to 30—Second Annual Indianapolis Radio Exposition of the Central States, State Fair Grounds, Indianapolis, Indiana. Management of Indianapolis Radio Exposition Corp., 1,407 Merchants Bank Bldg.

OCT. 30 to NOV. 6—Cleveland Radio Industries Exposition, Public Auditorium, Cleveland, O. G. B. Bodenhoff, manager, 511 Guarantee Title Bldg., Cleveland, O.

Direct to Dealer Plan Discarded by Trinity

Photo by Empire Flashlight Co.

DINNER of the Beacon Radio Manufacturing Company, at which E. J. Totten, sales manager, announced the discarding of direct-to-dealer sales, in favor of utilizing jobbers.

The direct to dealer distribution of the Trinity radio receivers has been abandoned in favor of territorial distribution through jobbers. E. J. Totten, sales manager of the Beacon Radio Manufacturing Co., makers of the receivers, disclosed the change of policy at a supper at the Williamsburgh Club, Brooklyn. An inspection of the plants of the Pilot Electric Manufacturing Co., of which the Beacon company is the broadcast receiver division, preceded the meal. The plants are at 323 Berry Street and 109 Broadway, Brooklyn.

Radio editors and advertising men were guests at the inspection and supper. The toastmaster at the festive board was Arthur Rosenberg, president of the Arthur Rosenberg Advertising Agency and editor of the Radio Advertiser's Data Book.

Reason for Change

Mr. Totten said:

"This change is being made after a most extensive survey of the radio situation throughout the United States. It has been the purpose of this company to give the public the finest type of radio receiver at the lowest possible price. Our manufacturing facilities make this possible, as we possess the largest radio parts plant in the world, making everything ourselves, including the cabinets.

"We assumed that the direct dealer representation would enable us to keep the price down to rock bottom by the elimination of the jobber's percentage.

"Investigation of this contention shows it to be erroneous. There is not the slightest doubt in our minds that we can serve the public better using the facilities of great jobbing organizations at various points of the United States through which to obtain our dealer distribution. With our resources it is possible to introduce the slight percentage that the jobbers' cooperation calls for and still have the list price lower than that quoted for others in the class of Trinity.

Fills a Real Need

"We have found through our investigation that the jobber in radio fills a very important gap and actually reduces the manufacturer's overhead. The high-class jobber organization of today is well equipped to handle the problems of the dealer by direct and intimate contact. With such helpful, personal guidance the dealer need not engage regularly with a distant factory in correspondence. This eliminates the need of the manufacturer maintaining a nation-wide service organization, jumping from town to town to handle the most trivial details.

"We have found that the maintenance of local or factory representatives and service men would necessitate our list prices being greater than would be necessary if we were selling through jobbers.

"We are choosing our territorial distributors with the greatest care and they are all of a high type which guarantees the maintenance of the policies of the house, and the intense and earnest cooperation in preventing merchandise from getting into the hands of unworthy dealers. We believe the high class jobber is as much interested as the manufacturer in cleaning up the 'gyp' dealer and placing radio business on a stable basis.

Jobbers Discriminate

"On the other hand, these jobbers are choosing the manufacturers whom they will represent. Many of these have been hit hard in the past year by carrying lines which were insufficiently backed or which were the products of new concerns that died with the failure of their stock market ventures. I am glad to say that the Beacon Company represents permanency in radio. It is financially strong and is dependent on no outside source of supplies.

"Our line at present includes a 5-tube compact at $50; a 6-tube Table Cabinet Model at $75 and a 6-tube Bio-Phonic Console at $150. We will shortly make public certain great improvements in these sets which will make them the absolute leaders in the field."

After I. Goldberg was introduced to the gathering, which numbered about 75, Mr. Rosenberg called upon Hugo Gernsbach, editor of "Radio News;" Curtis Wessel, editor of "The Talking Machine Weekly;" Arthur Mac Attammany, editor of "Radio Retailer and Jobber;" Lee Robinson of "The Talking Machiue World;" Arthur Sinsheimer, radio editor of "The Dry Goods Economist and Hardware Age;" M. B. Sleeper, editor of "Radio Engineering;" Gaybert Little, editor of "Radio Merchandising;" and Irwin Bib Tolins, general manager of the Arthur Rosenberg Company.

Toward the close of the evening, Laurence Cockaday, technical editor of "Popular Radio," and A. B. DeLacy, of the same publication, arrived after driving all the way from Springfield, Mass., to be present. Mr. Cockaday addressed the gathering.

REDELL JOINS KURZ-KASCH

John M. Redell announces his connection with Kurz-Kasch Co., well known moulders of bakelite, of Dayton, O. He will make his headquarters in Chicago, at 608 South Dearborn street.

Single Show for New York Discussed by Promoters

Efforts are being made to hold one radio show in New York in September instead of two shows as originally planned, the one at Madison Square Garden to be known as the Radio World's Fair and the other at the Grand Central Palace called the National Radio Exposition.

Accredited committees of the Radio Manufacturers' Association, sponsors of the Radio World's Fair, and the National Radio Exhibition Corporation, promoters of the show at the Grand Central Palace, have been holding private meetings in an effort to consolidate the shows, according to a statement issued by Eric Palmer, representative of the consolidation committee.

"A harmonious discussion took place at the Hotel Commodore," said Mr. Palmer. "It was hoped that it would be possible to achieve the unanimously desired object of creating one show for New York, but no definite conclusions were reached. There are many obstacles, however, which must be overcome, such as refunding payments made by exhibitors booked for the Grand Central Exposition and there are contracts for the lease of the Grand Central Palace and other commitments which must be taken care of.

"The commitments are such that they do not make the plan for one show impossible, but they are of such a nature that conferences must be held to ascertain whether or not the project can be carried out this year."

Paul Klugh, President of the National Association of Broadcasters, who attended the meeting at the Hotel Commodore, when asked about the consolidation of the two shows said: "It is the only thing to do. It is wrong to compel the manufacturers to go into two shows, both held at the same time in the same city a few blocks apart. Radio is too new an industry to be burdened with the cost of two shows."

COMPLETE LIST OF BROADCASTING STATIONS appeared in RADIO WORLD dated June 6. 15c per copy or start sub. with that issue. RADIO WORLD, 145 W. 45th St., N. Y. C.

NEW PATENTS

WASHINGTON.

The following radio patents were granted:

1,586,140. Receiver for Radio and Telephone Apparatus. Ralph W. S. Bonnetta, Washington, D. C. Filed Dec. 9, 1924.

1,568,060. Means for Guarding Against the Unauthorized Receiving of Radio Communications. Raymond Bainton, Greeley, Colo. Filed July 18, 1922.

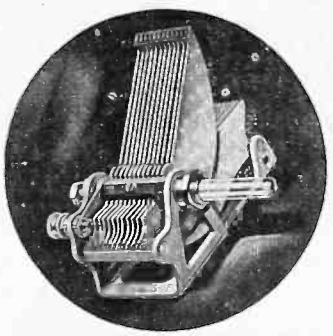
1,585,766. Thermionic Converter. Lewis W. Chubb, Edgewood Park, Pa., assignor to Westinghouse Elec. & Mfg. Co. Filed May 15, 1917.

1,585,878. Thermionic Valve. Harry O. Rugh, Chicago, Ill. Filed Nov. 15, 1922.

1,585,650. Arc Generator. George H. Clark, Brooklyn, N. Y., assignor to the Radio Corporation of America. Filed June 27, 1922.

1,586,419. Multicontact Crystal Detector. Wilson S. Freesland, Norfolk, Va. Filed Oct. 2, 1922.

1,586,498. Condenser. Sydney K. Wilson, Philadelphia, Pa. Filed Jan. 26, 1925.



Freshman Masterpiece Wiring Directions, with Last Lead Connected

(*Concluded from page 9*)

nect the G terminal on the second audio transformer to the grid terminal on the second audio amplifier socket.

Finally make the following connections: From the plate binding post on the last audio amplifier tube socket to the upper spring of the loud speaker jack; from the lower spring of the loud speaker jack to the B plus amplifier binding post of the set and to one terminal of the .006 condenser; from the other terminal of the .006 condenser to the minus B binding post of the set and to the plus A binding post of the set; from the upper spring of the phone jack to the plate terminal on the first audio frequency tube socket.

The wiring is now completed. Check back on each step by going over each wire on the wiring diagram with a red or blue pencil after you have convinced yourself of its being in the correct place. After finishing this check-up, a glance at the diagram will show whether all wires have been connected or not.

First connect the storage battery to the binding posts marked A+ and A—. See that the tubes light when pulling out the filament switch, after which connect the B battery leads to their respective binding posts. Then connect the aerial and ground to the set, and it is ready for operation.

Radioed Pictures Put Fashions on Hourly Basis

WASHINGTON.

Doubtless when listeners read that a commercial trans-Atlantic wireless picture service had been inaugurated they wondered who, besides newspapers, would pay real money for having pictures flashed across the ocean. It is just possible the wireless picture people may have asked themselves the same question. If so, they didn't have to wait long for an answer.

Hardly had the system been hooked up than a bank check was shot across from London to New York. This was really in the nature of an experiment but it suggested a field of commercial usefulness heretofore hardly though of. Right on top of that came advertising men, who began flashing newspaper ads back and forth, which, with the aid of aëroplanes, appeared the same day they were sent in newspapers of New York, Chicago, Philadelphia, London and Paris.

Paris Fashions by Radio

One of these was the advertisement of an English tobacco concern but considerably more significant and again opening up an entirely new field of commercial utility was when the Paris branch of a New York department store wirelessed from London to this country, a picture of the very latest French hat. Thus was begun a new era of the bringing of Parisian fashions to our shores.

It is well known that the airplane and cable heretofore had freely been pressed into service in order that milady might have the very latest from Paris but the wireless pictures seem just to have been made for that sort of service.

Enter the Advergram

And quick to seize upon the advantage, Joseph H. Appel, of New York, advertising manager of the store which flashed across the advertisement which contained the picture of the Parisian hat, promptly applied for a copyright on the word "advergram," which he used to describe the picture.

Mr. Appel said that he could see tremendous possibilities in the use of transoceanic photoradiograms by advertisers with world-wide distribution. He agreed that today advertising must keep up with the news. And when an advertiser of such things as fashions, which change rapidly, cannot advertise his wares quickly, he frequently finds that his message is out of date before it can be gotten to prospective buyers.

Pictures at $50 Each

Thus, it would seem that at least one lucrative field has been opened up to the commercial photo radiogram. And there may be others. At any rate, according to reliable advices from New York, between 25 and 50 pictures are being filed every day now between New York and London.

The service between London and New York is reported to be slightly slower owing to atmospheric conditions but if they only manage to send a total of 75 a day it would mean, at the present rate of $50 a picture, about $3,750 a day, which to the lay mind wouldn't appear to be such a bad beginning.

BATTERY MAKERS TO MEET

The annual meeting of the National Battery Manufacturers' Association will be held on June 25 and 26 at the Roosevelt Hotel in New York City.

FILL OUT AND MAIL NOW

SUBSCRIPTION BLANK

RADIO WORLD

RADIO WORLD 145 *West 45th Street, New York City (Just East of Broadway)*

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 for Foreign Postage; 50c for Canadian Postage.

Proper Rheostat Choice Simplified by Formula

Unfortunately the laws governing resistance, current and voltage in ordinary direct current circuits are unknown to the majority of radio fans, and the choice of rheostats for control of the filament circuit is somewhat of an enigma, often resulting in the incorrect choice and keen disappointment.

If some of the rules given herewith are followed, the selection of the correct rheostat will be greatly facilitated.

1. Take the voltage value of the source (the battery). Subtract the filament terminal voltage (the voltage applied to the filament terminals as specified by the tube manufacturer). Divide the remainder by the value of the current consumed by the individual tube filament. The quotient is the minimum value of resistance in ohms, required for the rheostat. It is advisable to add several ohms to this figure, to compensate for battery voltage fluctuations and to afford somewhat greater control of the filament brilliancy.

2. Make certain that the resistance wire will carry the required current. (Two tubes draw twice the current of one, etc.)

3. If one tube requires a certain resistance value for the control of the filament, two similar tubes will require half the resistance, etc., but the rheostat resistance wire must carry twice the current.

Descriptive Travel Broadcast by Chain

A new series of descriptive travel narratives with musical background is being broadcast by WJZ, WRC and WGY at 10 p. m. on Tuesday nights. The initial three travelogues will be given by the Director of the American Institute of Educational Travel under the auspices of Thomas Cook & Son. The next one is "Shopping in Europe," June 15. The series will be concluded with two short trips in the Western Hemisphere, the first to Bermuda, on June 22, and the other to Costa Rica, on June 29. The travelogue to Bermuda will take up the question of the best way to spend a vacation of a week or ten days while the trip to Costa Rica will cover a vacation of three weeks and will describe the Caribbean Cruise on a steamer of the Great White Fleet to the land of the banana.

WPG Ties Up With Two Gimbel Stations

Beginning June 12 with the summer opening of the Steel Pier, Atlantic City, WPG will furnish programs by long distance wires to WIP, Gimbel Brothers, Philadelphia, and WGBS, Gimbel Brothers, New York, which means that World Play Ground activity will be brought to thousands of extra listeners.

Small tube and crystal set owners will be able to enjoy the programs of the chain of stations. Symphonic orchestras, concert ensembles, bands, dance syncopators, choral societies, minstrel shows, leading soloists and novelty studio programs from WPG's sixteen controls, including the attractions from the four famous ocean piers will be sent through the world by this increased summer activity.

MORE LIVESTOCK NEWS

The Department of Agriculture intends to enlist the aid of additional broadcasting stations in an extension of the livestock market news service. Cities under consideration are Pittsburgh, Buffalo, Cleveland, Cincinnati, St. Joseph and Indianapolis.

BST-6 HIGHBOY

A better Highboy or radio could not be bought for even double the money

A Radio Highboy of unequaled value

The HIGHBOY is of genuine walnut-plywood designed by master craftsmen, beautifully finished in a rich two-tone. Dimensions 45¼x25¼ x14¼. A piece of furniture that will last a lifetime, gladden the eye and bring joy and refinement to the home.

Equipped with the famous BST-6, a six-tube tuned radio frequency receiver of astonishing volume; of clear, rich, beautiful tone. The circuit consists of two stages of tuned radio frequency, tube detector and three steps of balanced audio.

The concealed built-in loud speaker occupies the entire top of the HIGHBOY, overcoming entirely that tinny metallic sound of many of the old horn loud speakers and in its stead giving forth that rich sympathetic tone of the old violin of long seasoned wood.

Beneath the radio itself is the two-door compartment with ample room to fully conceal the A, B and C batteries.

Direct from factory to you

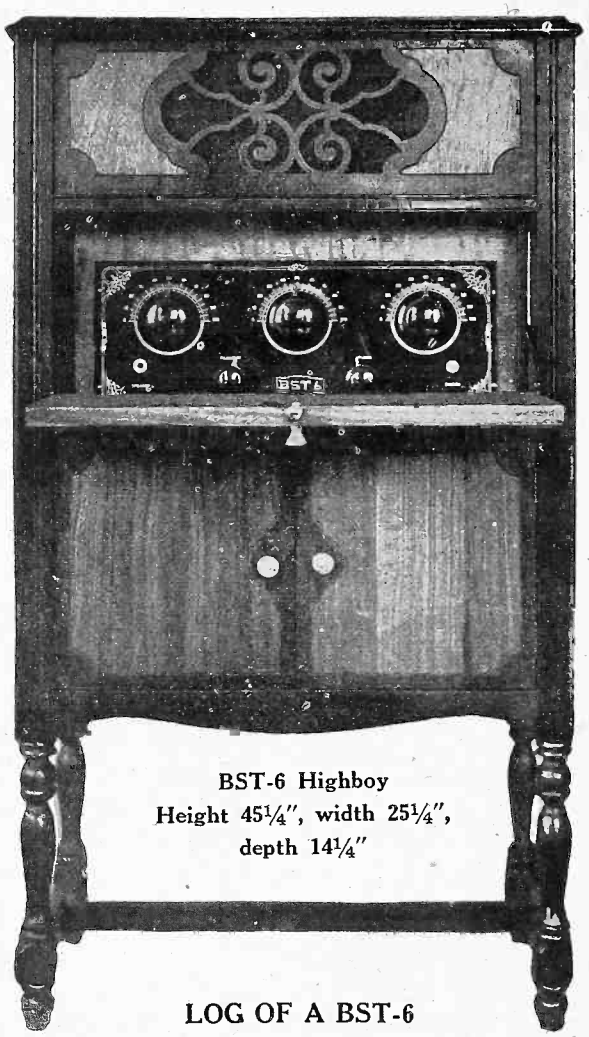
$85.00 Includes the BST-6 Receiver Installed in Highboy Period Cabinet, as illustrated and loud speaker. F.O.B. New York.

Guarantee

Each HIGHBOY is carefully examined so we know that the wood, carving, finish and trimmings are flawless and in perfect condition. It is packed by experts in a separate, specially-built, padded, wooden packing case, so that it must reach you in perfect condition.

The radio and loud speaker are tested and inspected for workmanship, volume, tone and distance reception, so you will receive as nearly as is humanly possible a perfect radio in this BST-6 Highboy.

IMMEDIATE DELIVERY



BST-6 Highboy
Height 45¼", width 25¼", depth 14¼"

LOG OF A BST-6

Taken on a Fifteen Foot Aerial in One-half Hour by Al. Kraus, 996 Aldus Street, New York City.

WSBC	10	WGY	50
WBBR	16	WMAK	51
WEBH	49	WMSG	11
WHT	55	WOC	85
WCCO	61	WFAA	78
WSB	66		

Send Check or P. O. Money Order to

COLUMBIA PRINT, Radio Division

143 WEST 45th ST. NEW YORK CITY

RADIO WORLD Guarantees the Responsibility of This Advertiser

Fans Express Delight At Fenway Results

From the batch of letters received by RADIO WORLD, in which fans who built the Fenway set praise it highly, the following two were selected as characteristic:

RESULTS EDITOR:

Received the Fenway blueprints some time ago and have been building a Fenway when I could spare the time. I built the first four tube and want to say that it is the best 4-tube set I have ever heard. I have put together a lot 4 and 5-tube sets but for downright clear radio reception it has them all beat. I could not get the exact coupler Leo Fenway used but wound an old General Radio coupler I had and it does its stuff.

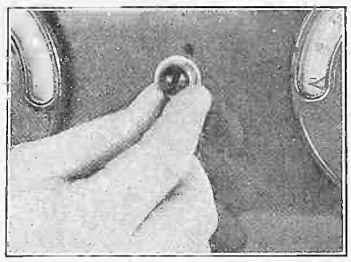
C. MCQUERRY,
care Postal Telegraph Co.,
Reno, Nev.

RESULTS EDITOR:

Having completed the Fenway set, the 4-tube TRF receiver and the 9-tube Super-Heterodyne, all in one, as designed and described by Leo Fenway, I want to express my admiration of his engineering skill. What beautiful tone quality the set has on either 4 or 9 tubes! And what DX on the 4 tube alone, not to emphasize cross-continent reception on the 9! This is indeed everyman's laboratory set.

BERT REINITZ,
127-A Clarkson Avenue,
Brooklyn, N. Y.

Ruby Light Switch Beautifies a Panel



A RUBY LIGHT SWITCH is an ornament to any set. Turn the ruby to turn on the set, and a red light glows. Press the ruby and the light goes out, turning off the tubes.

Government Publishes New Distance Table

Listeners in, especially those striving for DX records, may be glad to know that the Department of Commerce has just issued a table showing the airline distances between five leading broadcast centres of the country. It is published by the Government Printing Office and sells for five cents.

If you live in or near Chicago and want to know how far away a station in Los Angeles is you simply find Chicago on the left side of the table, run your finger over to the column under Los Angeles and read 1,741 miles, or vice versa.

In sending for the table address Superintendent of Documents, Government Printing Office, Washington, D. C.

How to Connect Meters With an Eye to Safety

The popularity of indicating instruments in various parts of receivers to indicate current of any magnitude is increasing daily. It is not unusual to observe in a home-made receiver two or three panel meters. Voltmeters especially are being favored. One cannot deny that such units enhance the appearance of a well-appointed panel.

When locating ammeters or all instruments registering current, the exact value being immaterial, it is essential that the meter be in series in the line. Placing a current indicating device across a line when the meter is not designed for that purpose will result in an instantaneous burnout, due to the direct shorting of the line with the low-resistance winding of the current indicating meter. There are in use ammeters which are connected directly across storage batteries to indicate the current flowing during the short circuit, but these high reading ammeters.

Burnouts, however, are caused not only by incorrectly locating an ammeter, but also by excessive current flow, even when the meter is correctly located. In other words if a milliammeter with a full scale reading of 100 milliamperes is placed into a circuit through which is flowing a current of 1 ampere, the winding of the milliammeter will burn out.

It is possible to utilize the ammeter across the line if the potential across the line is very small, since it requires a certain value of potential across the ammeter to actuate the pointer of the instrument. Hence the ammeter may be utilized to indicate potential, providing the potential to be determined is sufficiently small. It will be found that the majority of ammeters can be calibrated to register millivolts, that is, thousandths of one volt. This small value of potential, however, is very seldom measured by the radio fan or constructor, and very few ammeters are calibrated in millivolts. So for all purposes it is better if the fan ignores the fact that ammeters may be used to indicate voltage.

Practical Television

"Practical television simply boils down to the very rapid transmission of light dots and a synchronizing mechanism. Suppose we want to transmit a moving picture of an object, say two inches square. We have to transmit at least ten complete pictures of it every second, and by the most conservative estimate this requires the transmission of about 25,000 light dots a second. This is what my mechanism does. For my light at the receiving end I use a glow lamp, and for my synchronizing mechanism I move the spot of light across the screen by means of a slot and a rotating spiral." C. J. P.

RADIO WORLD'S QUICK-ACTION CLASSIFIED ADS.

10 CENTS A WORD. 10 WORDS MINIMUM. CASH WITH ORDER

BUILD YOUR OWN "B" ELIMINATOR FROM OUR PLANS. Thousands in use. Satisfaction guaranteed. Drawings and instructions $1.00. Radio Equipment Co., 408 W. 11th Ave., Mitchell, S. D.

PATENTS—Write for free Guide Books and "Record of Invention Blank" before disclosing inventions. Send model or sketch of your invention for our Inspection and Instructions Free. Terms reasonable. Radio, Chemical, Mechanical, Electrical and Trademark experts. Victor J. Evans Co., 924 Ninth, Washington, D. C.

THE 5-TUBE SUPER HETERODYNE SET, by Jasper Jellicoe, appeared in RADIO WORLD dated April 17. Sent on receipt of 15c. RADIO WORLD, 145 W. 45th St., N. Y. C.

CONSTRUCTION OF RADIO PHONE AND TELEGRAPH RECEIVERS by M. B. Sleeper, sent on receipt of 75c. The Columbia Print, 145 W. 45th St., N. Y. C.

DESIGN DATA FOR RADIO TRANSMITTERS AND RECEIVERS by M. B. Sleeper, sent on receipt of 75c. The Columbia Print, 145 W. 45th St., N. Y. C.

THE GREAT AID OF BY-PASS CONDENSERS, by John F. Rider, appeared in RADIO WORLD dated May 8. Sent on receipt of 15c, or start sub. with that number. RADIO WORLD, 145 W. 45th St., N. Y. C.

CASH PAID FOR Dental Gold, False Teeth, Discarded Jewelry, Diamonds, Platinum. Mail, Florida Gold Refining Co., 21 Adams, Jacksonville, Fla.

SELL AND INSTALL RADIO SETS. With a $25 capital we can put you in the radio business and show you how to earn a hundred or two a week. For full details write Columbia Print, Radio Division, 143 West 45th St., New York City.

THE BERNARD PORTABLE SUPER-HETERODYNE appeared in RADIO WORLD dated April 3, 10, 17 and 24. Sent on receipt of 60c, or start your subscription with April 3 issue. RADIO WORLD, 145 West 45th St., N. Y. City.

WIRELESS IN THE HOME by Lee deForest, sent on receipt of 15c. The Columbia Print 145 W. 45th St., N. Y. C.

HERMAN BERNARD, managing editor of RADIO WORLD, broadcasts every Friday at 7 p. m., from WGBS, Gimbel Bros., N. Y. City-315.6 meters. He discusses "What's Your Radio Problem?" Listen in!

A BUILT-IN SPEAKER SET, by Herbert E. Hayden, POWERTONE IN OPERATION, by Capt. P. V. O'Rourke, THE NOVICE'S NOOK, by James B. Scully, appeared in RADIO WORLD dated May 22. Sent on recipt of 15c, or start sub. with that number. RADIO WORLD, 145 W. 45th St., N. Y. C.

SALESMEN OR AGENTS WANTED
MANUFACTURER WITH A SUCCESSFUL LOCAL RECORD wants salesmen, full or part time, city or country. Manufacturer desires national distribution of article of proven merit, unconditional guarantee, big money, interesting work. Write Highland Machine Co., Sales Dept. 3, 462 Penn. Ave., N. W. Washington, D. C.

TABLE FOR CONVERSION OF FREQUENCIES AND METERS appeared in RADIO WORLD dated May 1, 1925. Sent on receipt of 15c, or start your sub. with that number. RADIO WORLD, 145 W. 45th St., N. Y. C.

THE NEW 1-DIAL POWERTONE SET, by Capt. P. V. O'Rourke, appeared in RADIO WORLD dated April 17. Sent on receipt of 15c, or start sub. with that number. RADIO WORLD 145 W. 45th St., N. Y. C.

CONFESSIONS OF A SUPER BUG, by James H. Carroll, appeared in RADIO WORLD dated May 22, 15c per copy, or start sub. with that number. RADIO WORLD, 145 W. 45th St., N. Y. C.

COMPLETE LIST OF BROADCASTING STATIONS appeared in RADIO WORLD dated June 6. Sent on receipt of 15c, or start sub. with that number. RADIO WORLD, 145 W. 45th St., N. Y. C.

TEAR OFF AND MAIL TODAY

8 Week's Trial Subscription, $1.00

KEEP ABREAST OF THE LATEST RADIO DEVELOPMENTS

RADIO WORLD
145 WEST 45th ST. NEW YORK CITY

The Light 5 Portable Simple and Economical

(*Concluded from page 4*)

highly satisfactory as a portable, since it is efficient, weighs little and is easy to tune. Also, by a slight change, it is excellent in cities.

The antenna tuning, in Fig. 1, equivalent to volume control, is so much of a relic that a word or two will have to be said about it, but the trick is easily learnt, and after that the sailing is smooth. The antenna has to be carried in the case, and a reel antenna therefore is placed inside the pocket of the lid. It has more than 125 feet of copper ribbon wire on it. This makes it too heavy for support by the muslin lining of which the pocket is contrived, hence the reel is secured to the lid, preferably with a bolt and a wing nut. The same system may be used in securing the panel to the subpanel, since wing nuts afford tight joints and are quickly removable. Any portable should be so constructed that "the works" may be removed immediately for trouble shooting.

How to Avoid Trouble

To minimize trouble on the road, where it is indeed awkward to remedy it, solder all joints with extreme care. You should solder where you never before thought of soldering, for instance, even the contacts to the batteries, for in jogging along you may work a joint loose and run into a variety of consequent troubles. Your car may hit a bump in the road that will make you regret you did not solder as advised.

(*Part II next week*)

LIST OF PARTS

Three Bruno Condensers, .0005 mfd.
Two Bruno vernier dials.
One 30-ohm rheostat.
One knob for ¼" shaft to match rheostat.
One .0025 Aerovox grid condenser with 5 megleak.
Three Bruno Light 5 coils.
Two phone tip jacks.
Three binding posts.
Flexible wire, insulated.
One Aerovox .001 mfd. fixed.
Two 6-to-1 Thordarson transformers.
Five UX sockets.
Two 4v-99 Amperites.
Set of tags for battery leads.
Two switches.
Panel, subpanel.

FEWER STATION APPLICANTS

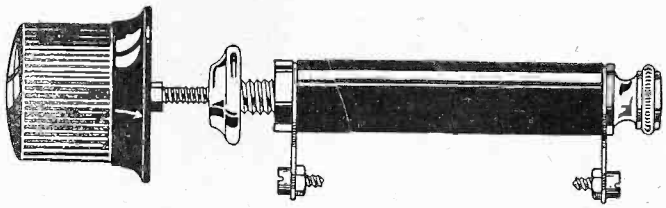
Although the list of applicants has grown to 621, there were only six in a recent week, as follows:

Fox River Valley Radio Supply Co., Neenah, Wis.; Musical Art Conservatory, St. Louis; Dunkers Inn, Nevis, N. Y.; U. S. Military Academy, West Point; Paradise Ranch, Cloverdale, Calif., and J. R. Gonalflo, Johnson City, N. Y.

GET RADIO WORLD ON YOUR VACATION

Be sure to take RADIO WORLD along with you on your vacation, or read it while you are at your summer home So that you will not miss a copy, send $1.50 for three months subscription and RADIO WORLD will be sent to you all summer. RADIO WORLD, 145 W. 45th St., N. Y. C.

MORE POWER!
NO EXTRA TUBES!



The Bretwood Variable Grid Leak

(Bretwood, Ltd., Sole Patentees and Owners)

Guaranteed Precision Range ¼ to 10 Megohms

Brings in More Distant Stations — Affords Greater Volume — Improves Tone Quality! Fits Any Set, Panel or Baseboard. Price, $1.50

"IT DOES THE TRICK"

"Nothing Better"

The North American Bretwood Co.

For some time I have seen in the Radio World your advertisement of the Bretwood Grid Leak, as well as some of your testimonials, and I decided to try one of the leaks at the first opportunity, which presented itself last night.

I own a 5-tube factory built set. During the last three days I could not get a sound out of it due to what I thought was a terrific spell of static, but which was caused by a defective grid leak. The noise was indeed so terrible that rather than hear such a racket I turned off the set and went to bed.

To-day, as luck would want it, I happened into a store and saw a Bretwood Variable Grid Leak on display. I decided to try it immediately. The results were absolutely gratifying. Other sets in the neighborhood are not getting anything at all, while I have brought in a great number of stations with speaker volume, with a socket aerial. I must say for the benefit of those who have not tried your grid leak that there is nothing better in this line.

ALFONSO FABRIS ARCE,
4116 Ave. R, Galveston, Tex.

The North American Bretwood Co.

Telephone, BRYant 0559

145 West 45th Street, N. Y. City

Sole Distributors for United States

North American Bretwood Co., 145 West 45th St., N. Y. City.

Gentlemen: Enclosed find $1.50. Send me at once one Bretwood Variable Grid Leak on 5-day money-back guarantee.

NAME .....

ADDRESS .....

CITY ..... STATE .....

Inquiries Solicited from the Trade

SPECIAL SUBSCRIPTION OFFER!

This handsome VALET Auto-Strop Razor FREE— with every five months' subscription to "Radio News" or "Science and Invention" or "Amazing Stories"

Think of it—you can have a beautiful, compact, regulation size AUTO-STROP Razor—FREE. Ideal for your motor trips. Strop to sharpen Blades goes with set.

In order to acquaint the readers of this magazine with these great publications, we are making, for a limited time, a special reduced rate and are also giving FREE one complete VALET Auto-Strop Razor.

For only $1 (Regular Newsstand price $1.25) you can obtain any one of these magazines for five months and also, one FREE Razor—

This shaving outfit consists of a highly polished, nickel-plated, self-stropping Razor; one blade, leather strop especially prepared. The razor case is of metal, finished in maroon, crystalized effect. Lined throughout with velvet, harmonizing with the pleasing color scheme of the entire package.

The only razor in the world that sharpens its own blades.

RADIO NEWS is the largest radio magazine published. It is the outstanding authority in the radio field, carrying more new developments, more hook-ups and more news than any other radio magazine.

RADIO NEWS has been radio's greatest magazine since the very beginning of radio broadcasting.

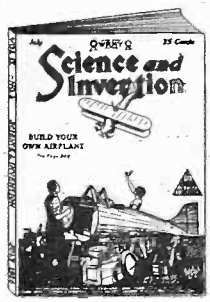
Every day, in all corners of our busy world, Scientists are at work on new Inventions, developing marvelous machines for the progress of the world or compounding strange chemicals for many uses. All these things are shown in the novel magazine "SCIENCE & INVENTION."

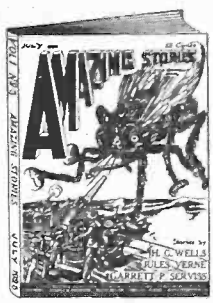
There is also a big Radio Section to "SCIENCE & INVENTION" for beginners.

Marvelous, Amazing Stories by great men such as Jules Verne, H. G. Wells, etc., appear in this new magazine AMAZING STORIES every issue.

Stories of flying into space at dazzling speed on a comet; Mesmerizing the dead, remarkable situations of all kinds. Tremendously interesting—yet instructive.

Keeps you in touch with the writings of the men with the greatest imaginations in the world.





EXPERIMENTER PUBLISHING CO., Inc.,
53 Park Place, New York, N. Y.

Gentlemen: Enclosed find $1 for 5 Months' Subscription to ☐ RADIO NEWS or ☐ SCIENCE and INVENTION, ☐ AMAZING STORIES and 1 Free Auto-Strop Razor advertised above.

NAME .....

ADDRESS .....

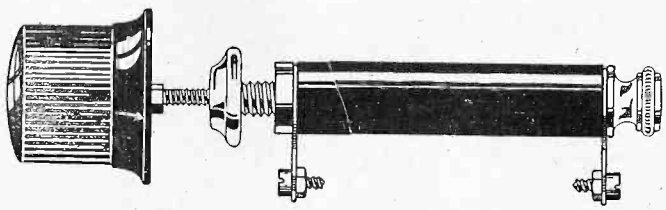
CITY, STATE .....

CHECK MAGAZINE DESIRED AND MAIL COUPON TODAY.

The coupon on this page is for your convenience, clip it today and pin a $1 bill, money order, or check to it. Fill out the Coupon with your complete name and address NOW.

EXPERIMENTER PUBLISHING CO., Inc.
53 Park Place New York, N. Y.

MORE POWER!
NO EXTRA TUBES!



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The North American Bretwood Co.

For some time I have seen in the Radio World your advertisement of the Bretwood Grid Leak, as well as some of your testimonials, and I decided to try one of the leaks at the first opportunity, which presented itself last night.

I own a 5-tube factory built set. During the last three days I could not get a sound out of it due to what I thought was a terrific spell of static, but which was caused by a defective grid leak. The noise was indeed so terrible that rather than hear such a racket I turned off the set and went to bed.

To-day, as luck would want it, I happened into a store and saw a Bretwood Variable Grid Leak on display. I decided to try it immediately. The results were absolutely gratifying. Other sets in the neighborhood are not getting anything at all, while I have brought in a great number of stations with speaker volume, with a socket aerial. I must say for the benefit of those who have not tried your grid leak that there is nothing better in this line.

ALFONSO FABRIS ARCE,
4116 Ave. R, Galveston, Tex.

The North American Bretwood Co.

Telephone, BRYant 0559

145 West 45th Street, N. Y. City

Sole Distributors for United States

North American Bretwood Co., 145 West 45th St., N. Y. City.

Gentlemen: Enclosed find $1.50. Send me at once one Bretwood Variable Grid Leak on 5-day money-back guarantee.

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Inquiries Solicited from the Trade

SPECIAL SUBSCRIPTION OFFER!

This handsome VALET Auto-Strop Razor FREE—with every five months' subscription to "Radio News" or "Science and Invention" or "Amazing Stories"

Think of it—you can have a beautiful, compact, regulation size AUTO-STROP Razor—FREE. Ideal for your motor trips. Strop to sharpen Blades goes with set.

In order to acquaint the readers of this magazine with these great publications, we are making, for a limited time, a special reduced rate and are also giving FREE one complete VALET Auto-Strop Razor.

For only $1 (Regular Newsstand price $1.25) you can obtain any one of these magazines for five months and also, one FREE Razor—

This shaving outfit consists of a highly polished, nickel-plated, self-stropping Razor; one blade, leather strop especially prepared. The razor case is of metal, finished in maroon, crystalized effect. Lined throughout with velvet, harmonizing with the pleasing color scheme of the entire package.

The only razor in the world that sharpens its own blades.

RADIO NEWS is the largest radio magazine published. It is the outstanding authority in the radio field, carrying more new developments, more hook-ups and more news than any other radio magazine.

RADIO NEWS has been radio's greatest magazine since the very beginning of radio broadcasting.

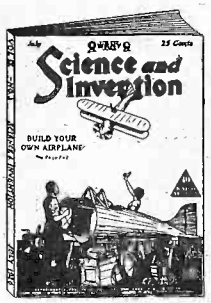
Every day, in all corners of our busy world, Scientists are at work on new Inventions, developing marvelous machines for the progress of the world or compounding strange chemicals for many uses. All these things are shown in the novel magazine "SCIENCE & INVENTION."

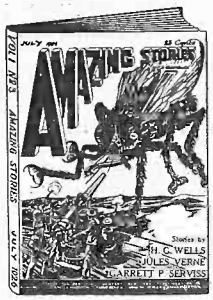
There is also a big Radio Section to "SCIENCE & INVENTION" for beginners.

Marvelous, Amazing Stories by great men such as Jules Verne, H. G. Wells, etc., appear in this new magazine AMAZING STORIES every issue.

Stories of flying into space at dazzling speed on a comet; Mesmerizing the dead, remarkable situations of all kinds. Tremendously interesting—yet instructive.

Keeps you in touch with the writings of the men with the greatest imaginations in the world.





EXPERIMENTER PUBLISHING CO., Inc.,
53 Park Place, New York, N. Y.

Gentlemen: Enclosed find $1 for 5 Months' Subscription to ☐ RADIO NEWS or ☐ SCIENCE and INVENTION, ☐ AMAZING STORIES and 1 Free Auto-Strop Razor advertised above.

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The coupon on this page is for your convenience, clip it today and pin a $1 bill, money order, or check to it. Fill out the Coupon with your complete name and address NOW.

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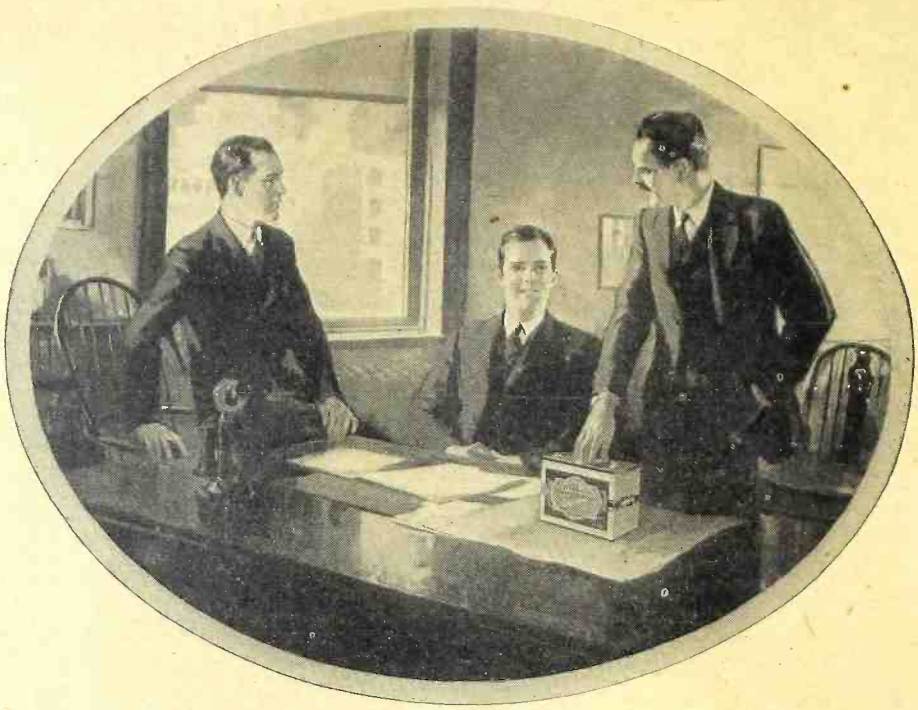

"I've just had a lesson in radio economy, and, believe me, it's illuminating"

"I WENT into my radio dealer's this noon for a couple of Eveready 'B' Batteries and said, 'Tom, give me a pair of Eveready 45-volt "B" Batteries No. 772's.'

" 'How many tubes in your set, Jim?' he asked.

" 'Five,' I answered.

" 'Then what you want is a pair of Eveready Layerbilt No. 486's.'

" 'Why?' I asked.

" 'Because the Eveready 772's are meant for sets having one to three tubes. With average use of the set, and used with a "C" battery*, they should last a year or longer. But on a five-tube set, with average use and with a "C" battery, they will only last about four months. Anyone with a four or five tube set should buy a pair of Eveready Layerbilts No. 486. Used with a "C" battery they should last eight months or longer.'

" 'Yes, but the 772's cost only $3.75 each,' I said, 'and the Layerbilt $5.50. There's some difference.'

" 'Well, figure it out for yourself,' said Tom. 'Two sets of 772's should last you about eight months, and will cost you $15. One set of Eveready Layerbilts should last about eight months, and will cost you only $11.' "

The simple rules for this satisfaction and economy are:

On 1 to 3 tubes—Use Eveready No. 772.
On 4 or more tubes—Use the Heavy Duty "B" Batteries, either No. 770, or the even longer-lived Eveready Layerbilt No. 486.
On all but single tube sets—Use a "C" battery.

When following these rules, the No. 772, on 1 to 3 tube sets, will last for a year or more; and the Heavy Duties, on sets of 4 or more tubes, for eight months or longer.

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

LEFT—*No. 486, for 4, 5 or more tubes.* $5.50.

RIGHT—*Eveready Dry Cell Radio "A" Battery, 1½ volts.*

EVEREADY
Radio Batteries
—they last longer

*NOTE: A "C" battery greatly increases the life of your "B" batteries and gives a quality of reception unobtainable without it. Radio sets may easily be changed by any competent radio service man to permit the use of a "C" Battery.

Manufactured and guaranteed by

NATIONAL CARBON COMPANY, Inc.
New York San Francisco
Canadian National Carbon Co., Limited
Toronto, Ontario

Tuesday night means Eveready Hour—8 P. M., Eastern Standard Time, through the following stations:

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