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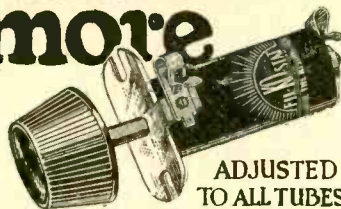
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RADIO WORLD

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The New "Superdyne" Four-Tube Receiver

A Circuit Which Closely Approximates the Ideal

By R. L. Dougherty

THE aim of most experimenters and amateurs is to get distant stations and signals clear and loud with a minimum of apparatus and tubes. Various "super" principles have been advanced, but they fall short of the mark set by the amateur as regards perfect reception. However, there subsequently appears the solution of every problem, and this problem seems to have been satisfactorily solved, at least for the time being.

It goes without saying that in order to get distance with a minimum of controls and a maximum of clearness, some form of radio-frequency must be used. Heretofore radio-frequency circuits as used by fans had the habit of oscillating every time the set was tuned to exact resonance.

taking, and full credit for the improvement goes to Robert S. Miner, who worked with Mr. Tuska of the C. D. Tuska Radio Company in perfecting the circuit and its operation. The first valid excuse any radio-frequency has for not working properly is the tubes. The American tubes, with the exception of the UV199 or C299, are strictly non-radio-frequency tubes. The reason for this is the manner in which they are constructed. The leads for the plate and grid are brought out of the base close together, leading to a capacity in the plate and grid leads of the tube which tends to make it oscillate when all the circuits are tuned to resonance. However, in the above named tube (UV199) this is to a great extent eliminated by bringing the leads out

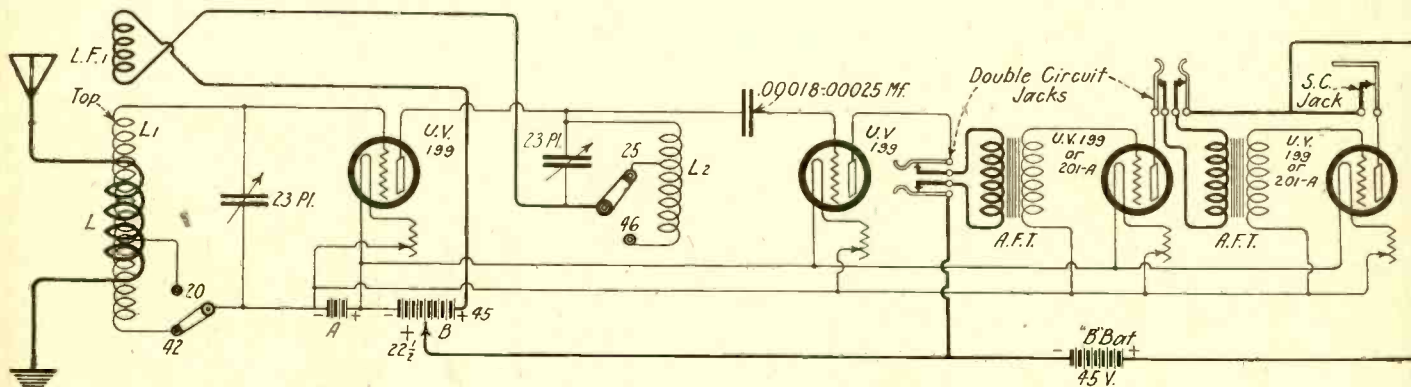


Diagram of the new "Superdyne" receiver using four tubes. Special coils and inductances must be wound as specified. L—Four turns of 22DSC wire wound over secondary. L1—Secondary coil 42 turns of No. 22DSC wound on 4" former, tapped at 20th and last turn. L2—Impedance coil. 46 turns of No. 22DSC wire wound on 4" tube, tapped at 25th and 46th turn. LF1—Tickler or stabilizer coil. 36 turns of No. 22DSC wound on 3 1/2" rotor. The condensers and tubes are all marked. It is of utmost importance that these constants be adhered to, and that the connections are reversed in the tickler, to produce negative feedback.

This, of course, was an undesirable attribute of the ordinary radio-frequency receiver.

It was sought to use some form of tuned impedance radio-frequency and at the same time preserve a stability that would allow the receiver to be tuned to perfect resonance without allowing it to "spill over." This finally was done in a very simple manner, using apparatus that can easily be made by the amateur. Like most things of its sort, when it is accomplished it looks so simple that the experimenter will wonder why no one thought of it before. It almost seems so simple that it should have been perfectly obvious to anyone understanding the principles of regeneration and feedback and the cause of tube oscillation.

However simple it may be, it was a stupendous under-

standing from the furthest distance possible (opposite sides of the base), and making the nibs of the connections very small. It might also be stated that the entire advantage of this tube is lost the moment it is used with an adapter. Therefore if it is intended to use this circuit, prepare to use UV199 sockets and tubes also, without tinkering with adapters.

Another point where the common radio-frequency circuit using a transformer is at a disadvantage as to real work is the fact that its construction is of such a nature that if it is to work with any degree of success its curve must resemble almost a straight line over all frequencies. This makes the average transformer-coupled circuit broad in tuning with the possible exception of one very narrow

band of frequencies which are small and do not give the user a great choice of stations. For that particular reason a circuit was sought which would combine the tuned-impedance sensitiveness with the selectivity and freedom from the capacity feedback that is most surely wanted by every listener. This brought forward any number of minor difficulties which made what now appears simple extremely troublesome to overcome.

In actual practice, this new receiver as finally developed has been tested against many of the standard circuits such as the ordinary regenerative four-tube receiver, a six-tube standard radio-frequency Signal Corps receiver with heterodyne, and an eight-tube super-heterodyne. In the first two the new "superdyne" gave results far superior both as to audibility tests and on regular work. On the latter, the super-heterodyne, it gave results which showed that the super-heterodyne was but little superior, all things being equal. Contrasting the fact that the super used eight tubes, and this being taken as a basis, the new circuit showed that one of its most surprising features was its wonderful volume on four tubes.

In all the tests this circuit showed that but for the fact that the super used twice the number of tubes, the new circuit was superior. Furthermore, it was much easier of manipulation once the knack of the thing was found.

Without wishing to alarm the amateur desiring to build this new set, certain warnings must be given. It is absolutely necessary that good tubes be used, and the sockets used with them must be of the highest grade of manufacture. Fresh B batteries must be used. It is stated by the inventor that one cell of B battery at fault has been found to stop the proper working of the circuit. I wish to emphasize this statement and also to say that in an experimental set tested it was found absolutely necessary to solder the B battery connections. As a final test, a freshly charged storage B battery, with dipped soldered lugs, was used and the results, while superior to those of the dry battery, do not show that it is absolutely necessary to use a storage B battery.

Needless to say, the best possible apparatus must be used. In purchasing condensers buy only the type that you know through experience and authoritative hearsay are the best. In the matter of transformers for the audio-frequency circuits purchase good ones of medium ratio, not the high ratio. Get good panel material and work it

carefully, following the panel layout to be given as a model in the next issue of RADIO WORLD. The manner in which this panel is laid out is important, as leads must be short.

The set will not function correctly if the plate and grid leads are close together or parallel each other. It is an easy matter considering the manner in which the apparatus is laid out to bring the grid and plate leads in from right angles and as far apart as possible.

As to the principle involved in this receiver, it is briefly as follows: The energy is fed back to the resonant grid circuit, but in the reverse or negative manner. When this part of the circuit is tuned to resonance, the circuit is given just enough negative feed-back to counteract any positive capacity feed-back which may be present in the tube circuit. This prevents any chance of oscillation of the tube or circuit, and it is then possible to get positive resonance in the grid and plate circuits. This, coupled with the fact that the impedance in the plate circuit is at its maximum, will produce the highest plate voltage impulse, which naturally means loud signals, clear as crystal and free from all frying or hissing noises.

It will be necessary for the amateur building this set to make certain parts (the coils) and the following constants have been determined as correct: SECONDARY COIL (L1) 42 turns of No. 22 DSC Wire on a 4" OD formica tube. Tap at the 20th and last turn. PRIMARY COIL (L) four turns of same size wire wound directly over secondary, centered and spaced $\frac{1}{4}$ " apart. TICKLER COIL (LF1) 18 turns of No. 22 DSC wire one each side of a $3\frac{5}{8}$ " rotor ball, 36 turns in all. PLATE IMPEDANCE COIL (L2) 46 turns of No. 22 DSC wire wound on a formica tube, 4" OD. Tap at the 25th and 46th turn. Variable condensers in grid and plate circuits 23 plate U. S. Tool condensers. (These were used successfully in the test set.)

These are the parts that the amateur will of necessity have to build for himself, as no particular company at this time is making them in these exact values.

(This is the first article describing this interesting and highly efficient receiver. Next week another chapter will follow dealing with panel layout and design, the placing of apparatus and the method of wiring certain parts of the circuit.)

Smoke Consumers Cause Radio Interference

RADIO fans have complained about practically every kind of interference, but lately a new form of electrical emissions making local radio reception difficult has been called to the attention of the radio officials of the Department of Commerce. Complaints against plants using the Cottrell electrical smoke precipitation system have come from fans in Pennsylvania, Arizona and Montana.

Several letters received state that the factories using this high-frequency method of consuming and purifying smoke cause electrical disturbances similar to radio waves, which interfere with regular radio messages and broadcasting within a radius of about 20 miles. A very noticeable hum is sent out into the atmosphere by the precipitation. There is no law against interference from this sort of inadvertent transmission, and the Department of Commerce has merely called the attention of the offending plants to the disturbance they were creating.

Steps taken by a company to prevent the hum in their Arizona plant have been satisfactory, it is said,

and other plant owners have expressed a willingness to clear the air for the radio fans. A method of grounding or shielding the electric equipment is understood to be under investigation.

The plants using this form of smoke consumer are benefiting all their territory, since they are clearing the air of injurious and poisonous gases.

Avoid Trouble!

ACASE came up in a western circuit court recently between two neighbors. It concerned the erection of an antenna over one man's property. The defendant claimed that he saw no harm in running his wire over the corner of the other man's house, but the court claimed that he was guilty of trespass, made him take it down, pay the court costs, and an additional fine besides. Before you erect an antenna, where it must cross other people's property, make sure that the party you are going to trespass upon is willing --and have him say so in writing.

The Radio Woman

IT would be a good idea for some of the big companies which sell or make radio sets to start a couple of good live salesmen who did not misrepresent anything to sell their goods to farmers. There are plenty of ranches or farms, and a demonstration would no doubt sell a set for the first salesman that tackled the "job" and saw the prospect. We sell vacuum cleaners by solicitation. Why not radio, which is even more popular and necessary? You can clean with a broom, but you can't hear the programs without a radio set.

* * *

Love your neighbors, and Heaven help you if you should forget to invite them to your house every evening for that radio entertainment. Such slights are not to be thought of. You can leave out the tea and cakes if it becomes too monotonous every evening, but don't forget that others as well as yourself like to hear the latest in jazz, opera, or sporting events.

Radio with your meals is all well and good, but I can cite one instance where it is a disadvantage. Louis comes home from school at 12 o'clock for his lunch and if there is any radio at that hour he will have one eye on his food and his two ears on the set and forget all about returning to school for the afternoon session. His mother certainly has the hardest time with that child. And that isn't all. In the afternoon, instead of playing around in the street and getting some fresh air before doing his school homework, he stays indoors and fusses around that set.

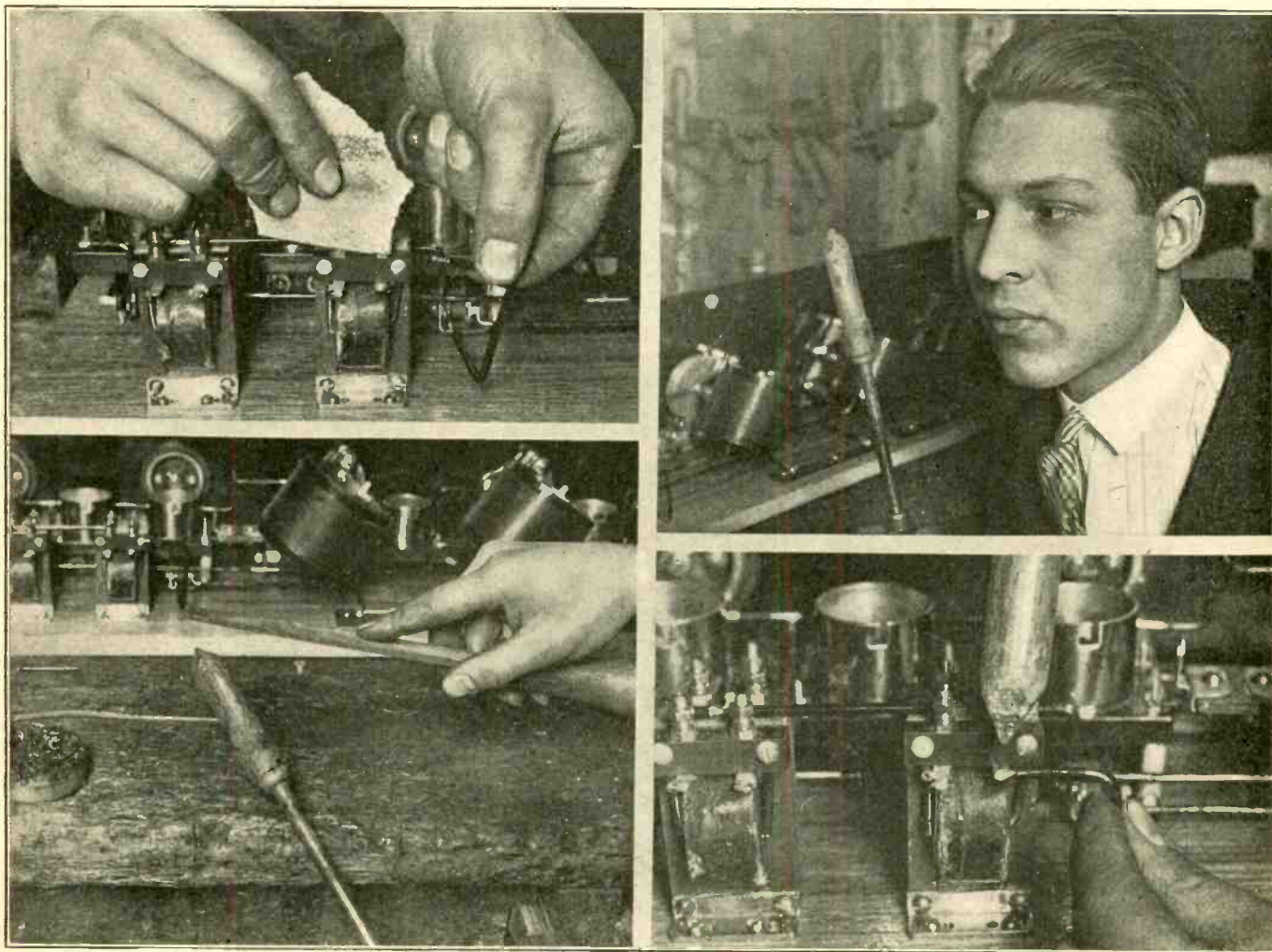
* * *

Give radio presents this Christmas—no one ever exchanges them—they don't have a chance to.

* * *

A friend of mine tells me that the first week he had his set he was suffering from the disease known as "radio ears," but now that he has had his set about six months his ears are quite normal. In other words, he is very busy and doesn't have so much time for listening in.

A Graphic Lesson in Soldering



(C. Kadel and Herbert)

Many fans have trouble getting the proper joints in soldering a receiver. These illustrations show the correct manner of making a good soldered joint in a receiver. The first thing to do is to make sure that the surfaces you are going to join are clean. This is accomplished by sandpapering them until they shine. The next thing is to make sure that the surface of your iron is clean and well tinned. Use a file while the iron is cold and file the surface bright. Then heat it, and by applying a little flux to the surface of the iron, and at the same time rubbing solder over the tip, the solder will flow on its surface making a nicely tinned point. The next thing is to determine whether your iron is hot enough. This is done by holding the iron five inches away from your face. If you can then feel the heat, the iron is hot and ready for the next step which is illustrated below. A little flux is spread over both surfaces of the parts to be soldered, a small amount of solder is picked up by the point and applied to the location. The iron is held there until the solder actually flows in and around the joint. The result is a perfectly soldered and good electrical connection.

President Coolidge's Message to Congress Radioed to Millions

PRESIDENT COOLIDGE delivered in person his annual message to Congress on December 6. It was transmitted to the Potomac Telephone Company, Washington, D. C.; WJAR, Outlet Company, Providence, R. I.; WDAF, Kansas City Star, Kansas

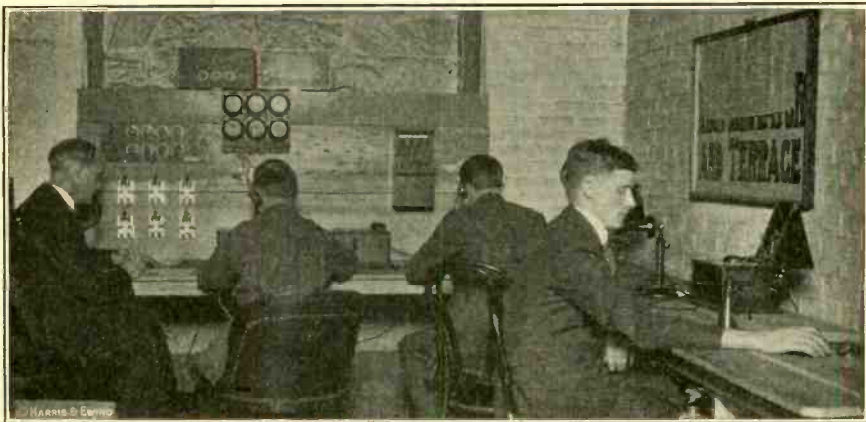
City, Mo.; KSD, St. Louis Post-Dispatch, St. Louis, Mo., and WFAA, Dallas News, Dallas, Tex., operated jointly for this occasion by the Fort Worth Star and the Dallas News.

The transmission was excellent and amateur fans all over the country reported clear reception of the President's words. Great crowds in the big cities stood outside radio stores to listen.

In his message President Coolidge used these words:

"Revision is needed of the laws regulating radio interference."

It thus seems certain that Secretary Hoover will have the President's support of the new bill which is now being prepared by Representative White and the Department of Commerce.



Switchboard and control apparatus in the basement of the Capitol used to pick up the President's speech and relay it to the broadcasting stations.

people of the United States by radio and was heard by the largest audience who ever listened to the voice of a Chief Executive. There is no way closely to estimate the number of listeners-in, but a good guess is that several millions heard the President's words. Voice amplifiers were set up on the steps of the Capitol and a large local audience heard the address.

This was the first occasion on which microphones for use in broadcasting have been installed in Congress and the first time that a President's message to Congress has been broadcast by radio. It was announced that President Coolidge would broadcast a eulogy of President Harding from the White House on the evening of December 10. It also is probable that the President will broadcast a number of speeches during the coming political campaign.

An interesting incident of the President's address to Congress on December 6 was that the speech was preserved by means of the pallophotophone and may be again broadcast by radio whenever desired.

The Chesapeake & Potomac Telephone Company of Washington, D. C., installed the special apparatus necessary in the Capitol and spent several days in advance of the event in testing it out, as well as the connecting telephone lines.

Six high-power radio stations were used to broadcast the address. They were: WEA, American Telephone & Telegraph Company, New York City; WCAP, Chesapeake &



Putting up the horns which were connected with the public address system. The crowds before the Capitol could thus hear every word of the President's message.

Secretary Hoover Again Urges Government Radio Policy and Laws

By Carl H. Butman

WASHINGTON, D. C.—Reiterating his plea for radio legislation made last year, Secretary of Commerce Hoover explains the present radio situation in his annual report and urges Congress to designate someone to handle radio regulation.

"The rapid growth of radio communication makes necessary an affirmative declaration by Congress of a governmental policy in accordance with which the art is to be conducted, and the empowering of some agency to carry that policy into effect," the secretary states. "This can only be done through an officer with discretionary powers and under the regulations which will be made by him in conformity with the general terms of the law," he adds, commending the matter to the attention of Congress.

Work of revising and simplifying the White Bill, which passed the House last session, is known to be under way, and Secretary Hoover believes no opposition will be found on the Hill when the new bill is presented. While he is not seeking extra work required in the bill for his department, radio regulation, of course, is now under his direction, and it is known that Mr. Hoover is greatly interested in its development.

The report states that facilities for the enforcement of the present law are wholly inadequate. There are some 25,000 stations now sending radio messages within our country or along our coasts. The law requires the inspection of all these stations, and if this inspection is to be sufficiently efficient to accomplish results in the character of equipment and prevention of interference it must be performed with reasonable frequency. To inspect these 25,000 stations the department now has a total of 29 men, all that can be employed within the limit of the appropriation. Manifestly, under such a condition, effective inspection is impossible.

"To perform satisfactorily the constantly increasing duties in this branch of the service it is essential that a larger appropriation be provided," Mr. Hoover points out. "Such work as the inspection of ship stations for the safety of life, the inspection of broadcasting stations to prevent interference and permit simultaneous operation, and the inspection of amateur stations to prevent interference with the broadcast listeners and with commercial and ship stations are some of the important duties which should not be neglected."

In order to secure the most successful and extended use of radio in the future, legislative action along lines recommended to Congress last year is essential, the report continues. It is becoming more difficult each year to apply the existing law of 1912 to services which not only did not exist but were not contemplated. For the purpose of considering what could be done from an administrative point of view to lessen the amount of interference in radio broadcasting, the Secretary of Commerce called a second radio conference, which met in Washington on March 20 last. As far as practicable, the recommendations offered by the conferees have been put into operation with encouraging prospects of resulting in considerable improvement, especially in the elimination of interference.

Of the many services performed by radio, unquestionably the marine service is the most valuable, where it is employed as a life-saving device to summon aid in the event of an accident at sea. The radio inspectors of the Department of Commerce are required to give first consideration to the inspection of radio installations on American and foreign vessels clearing from our ports. During

the fiscal year 1923, there were 11,298 such clearances and 6,936 inspections, as compared with 10,240 clearances and 6,071 inspections in 1922. The number of inspections should be increased, it is shown, but to do this additional men are needed at ports not now covered.

Radio broadcasting continues to hold the interest of the public in this country, and is to a limited extent gaining recognition in other countries. The United States had 573 broadcasting stations on June 30 as compared with 382 a year ago. In foreign countries there are 61, Canada having 30 of these.

The permanency of this means of disseminating to the public news, entertainment and instruction seems assured, according to officials. It is not unreasonable to expect a continuation of the rapid growth of broadcasting stations, improved apparatus, greater care in providing high-class programs, and closer supervision by the radio inspection service. Minimizing the interference should, however, guarantee a continued growth in the audience.

There is no abatement in amateur activity, according to the secretary's report. The number of licensed amateur transmitting stations increased from 15,504 in 1922 to 16,570 on June 30, 1923. Serious effort is being made by the amateurs to improve their apparatus so as to reduce interference and increase the efficiency of their stations. Annually these experimenters conduct trans-Atlantic tests with European amateurs. The last test was in December, 1922, when 315 were successful in getting their signals across to Great Britain, France and Switzerland.

"Few realize the importance of our amateur auxiliary communication system which can be put into immediate operation and temporarily provide a means for dispatching trains, giving flood warnings, and transmitting emergency messages to and from sections temporarily deprived of wire facilities," it is stated.

Radio communication is assuming a place of the first importance in the electrical field, and naturally a large part of the time of the Bureau of Standards Electrical Division has been devoted to radio subjects. The bureau is endeavoring to aid in the commercial standardization of radio equipment, a progressive step of great importance and for which an excellent opportunity exists in this field owing to the newness of the entire subject. Progress has been made in the development of precise frequency measurements and other investigations connected with the reduction of radio interference. The work on electron tubes and insulating materials will have a most important industrial application. Estimates of expenses for radio work at the bureau next year call for \$81,040, an increase of \$15,000 over the 1923 appropriations.

Why Waste Time?

SOME people construct sets and permit their pocketbooks to dictate the purchase of apparatus. This is especially true regarding condensers. This piece of apparatus is probably the most maligned of any as far as manufacture goes. If, after you purchase a cheap condenser and find that it has a short-circuit in it, consider the money spent as an experience and go out and buy a good one, even if you have to spend two or three times as much. You can't rely upon it, and it is useless to try and fix it, because it is more than probable that it is low in efficiency anyway.

Something New In Single Tube Loop Receivers

By Walt. S. Thompson, Jr., E. E.

THE trend of modern receivers seems to be towards sets which do not require the user to build an antenna. On the other hand, the antenna is popular because of the signal strength which it makes possible. With a single tube set an antenna was at one time considered indispensable, so that the popularity of the one-tube set contributed materially to the popularity of the antenna.

This popularity of the one-tube set and the decided advantages of the loop receiver, set experimenters to work trying to develop a one-tube loop receiver. Some of the evolutions thus brought about have many advantages and some have many disadvantages. In general it can be said that the chief disadvantages are: Lack of selectivity, poor receiving range and weak signal strength. The receiver herein described was designed to eliminate these disadvantages as far as possible.

The receiver shown in the diagram uses a so-called "grounded-loop" for picking up signals. This grounding of the loop very decidedly increases the signal strength and receiving range, placing this receiver on a par with most of the single tube sets, using a single wire antenna. To get the best results the wire from the set to the ground should be as long as possible as the signal strength seems to be proportioned to this length. It should be noted that the ground tap on the loop is at the middle point; that is, half way between the two terminals.

By thus grounding the middle point of the tuning inductance the set as a whole is kept at a potential above that of the ground. This gives rise to body capacity effects which must be eliminated by shielding. If the set is to be mounted in a cabinet, it would be well to line the inside of it with sheet metal, such as brass, copper or aluminum, or with tin or lead foil. If the instruments are not enclosed, shielding of the panel will be sufficient.

Again referring to the diagram, it will be noted that there are two tuning units, the condensers C_1 and C_2 .

As each of these brings a circuit into resonance with the incoming wave, it is apparent that this arrangement makes the set very selective. Neither control is very critical, but the combination of the two is very selective. By attaching the dials correctly these two condensers can be made to have approximately the same setting when a station is being received, thus making the tuning simplicity itself.

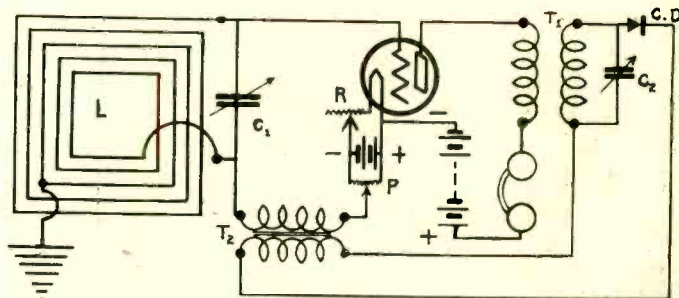
One of the faults of a radio-frequency amplifier is its tendency to oscillate when radio waves of high frequency are being received. Two methods of preventing oscillations have been incorporated in this reflex circuit. The first, that of making it possible to give the grid a positive bias, necessitates the use of the potentiometer marked P in the diagram. This method is very common, although it has the disadvantage of causing distortion and hence should be resorted to only when necessary. The second method is an application of the principle used in the four-circuit tuner; that is, coupling a resonance circuit to one of the tube circuits so that enough energy will be absorbed by it to prevent the tube from oscillating. This resonance circuit is also the tuned detector circuit as shown by the diagram. When this is properly

tuned the potentiometer P can be used to give the grid a proper negative bias and thus improve the quality of reception.

The apparatus necessary for the construction of this set is as follows: One receiving loop (12 turns on frame 2'x2'); two condensers (capacitance of 400 mmf.); one potentiometer (non-inductive, resistance of 400 ohms); one rheostat; one vacuum tube (amplifier); one vacuum tube socket; one audio-frequency transformer (4 to 1 turn ratio); one radio-frequency transformer (T_1); one crystal detector (synthetic); one composition panel; binding posts, connecting wire, dials, etc.

The loop receiver may be any standard make having an inductance sufficient to give the desired frequency range (wave length range) although a tap for the ground connection must be made as previously explained.

The radio-frequency transformer designated as T_1 in the diagram can be made as follows: Wind 50 turns of No. 24 D.C.C. wire on a bakelite tube 3" in diameter and 2" long for the secondary coil. The primary, con-



A single tube loop set of unusual design. The grounded tap of the loop aids greatly in selectivity, making the tuning sharp when the set is properly operated.

sisting of 30 turns, is wound over the secondary, being separated from it by a layer of empire cloth about 1" wide. Both ends of both windings should be provided with terminals to facilitate the wiring of the set.

Any hard tube will give satisfactory results, although the use of the UV201A or C201A is recommended. The A battery and B battery voltage will, of course, be governed by the tube used. In general the B battery voltage should be as high as can be used without causing distortion. This voltage is usually specified by the maker of the tube.

The turn ratio of the audio-frequency transformer used should not be greater than five to one, a ratio of four to one being found to be the most satisfactory.

After all the necessary apparatus has been obtained the writer recommends that the parts be temporarily connected and the set as a whole tested before mounting it on a panel. In this way any defective material can be found and the builder will learn peculiarities of the set which will help him in laying out the panel and in wiring the set permanently.

When first attempting to receive with this circuit, the following procedure will be found most convenient: Connect the loop, batteries, phones and insert the tube. Adjust the rheostat R to give proper filament brilliancy

(Concluded on page 14)

RADIOGRAMS

WORLD NEWS HAPPENINGS BRIEFLY
PHRASED FOR OUR BUSY READERS

It now seems that wireless apparatus has almost reached perfection. Last week the bagpipes were broadcast, and it is felt that, if receiving sets will stand that, they will stand anything.—Punch.

* * *

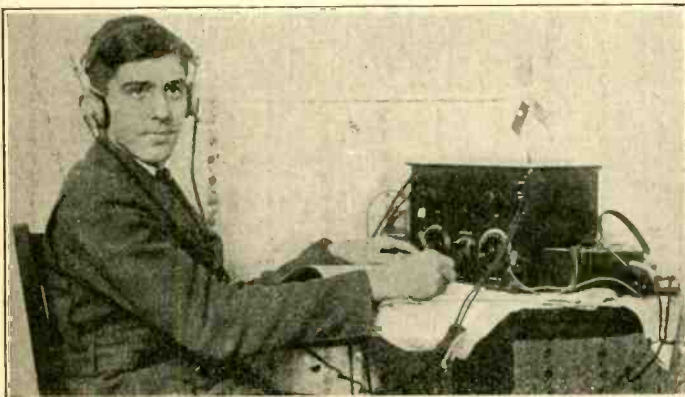
Venezuela is planning a complete reorganization of its government-owned wireless telegraph system, and has employed Fritz van der Woude, a Dutch electrical engineer, to effect the improvements. The latest and most complete equipment will be installed at all the stations, it is stated, in an effort to improve communication at home and with foreign countries.

* * *

Captain Orton P. Jackson, U. S. N., has reported to Secretary Denby as Director of Naval Communications, taking the place recently vacated by Rear Admiral Ziegemeier, now in command at the Navy Yard at Norfolk, Va. Commander Bingham, who has been acting director for several months, will remain as assistant director. Formerly Captain Jackson was in command of the battleship "Mississippi."

* * *

The Bible Service Bureau, Cincinnati, Ohio, has been organized to give to the world daily a message from the Word of God by radio broadcasting. The bureau has nothing for sale. Its work is entirely free from commercialism and is non-sectarian. More than 2,000 newspapers are now carrying a Bible selection at the head of their editorial columns. The radio broadcasting stations have been asked to place this service on their programs.



(C. Keystone View)

Everett L. Battey, Wollaston, Mass., and his Greene one tube receiver that enabled him to pick up English broadcasters. When he announced that his bat was in the ring for the English stations the family laughed at him, but tuning up on his WD11 and fiddling with the dials brought them right home to him, and then he had the laugh on the folks. Speaks well for Battey as an efficient constructor, when he can get a single tube dry cell set to pick up signals from across the waters of the Atlantic.

Likening radio to the "angel of the everlasting gospel," the Rev. Dr. J. Lewis Hartsock told his congregation in St. Andrew's Methodist Episcopal Church, New York City, that it was the way of getting the "unchurched." Dr. Hartsock broadcast a sermon recently, and said he had received letters from all parts of the country since "in grateful recognition of this beautiful ministry."

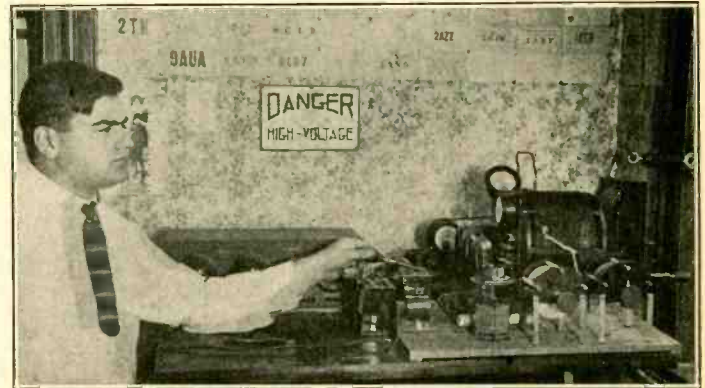
* * *

There are 420 vacancies in the Navy Radio Service, according to a recent survey of the enlisted personnel handling wireless work. The numbers of men on duty are as follows: Radio Gunners, 12; Chief Radio men, 485; First Class, 397; Second Class, 506; and Third Class, 1,074. The vacancies all occur in the three upper grades. There are 48 vacancies in Chief's rating; 539 in First Class; and 379 in Second. This leaves a surplus in the Third Class of 546 men, many of whom will be promoted, it is understood.

* * *

A few days ago an elderly, plainly dressed woman stopped in front of a radio dealer's store in Hartford, Conn., and gazed at the queer assortment of apparatus and parts displayed in the window. Through the open door the announcer at a nearby broadcast station could be heard talking via a professional loud speaker.

"I wonder if they would mind if I stepped inside?" she said turning to one of the bystanders. "I have never heard a radio." He shook his head smiling and escorted her to the counter where she stood for many minutes listening in open-mouthed wonder.



(C. Foto Topics)

Perry O. Briggs, Station 1BQF, Hartford, Conn., member of the A. R. R. L., who has a wall literally plastered up with cards from the fellows that he has worked. Twos, threes, fours, fives, sixes, eights and nines are all regularly heard from whenever he "opens up." He uses three 50-watt bottles, with a special DH circuit, and when he steps on it, he steps out for real. A Grebe CR "13", the favorite of the short wave boys, is used for receiving.

Marconi Focusses Radio Waves for Directional Sending

SIGNOR MARCONI told the Associated Press in London on December 4 that within the next few weeks he planned to begin tests between London and New York of his system of projecting radio waves in a desired direction.

In these new experiments with radio activity the inventor is applying to radio waves the principle that man applied to light beams when first he put a reflector in his lamps and lanterns to prevent the rays spreading in all directions and to concentrate them in the line desired.

"You see that lamp there," said Signor Marconi, pointing to the electric light over the desk in his office in the

Strand. "Its light rays spread all over the room in every direction, but if you put a reflector behind it the rays shoot only in one direction. That's what we are doing with radio rays. Our experiment is putting a reflector behind them. Heretofore we have been unable to keep radio rays from going through a reflector, but now we finally have got a sort of screen which stops them."

The phrase "sort of screen" was as far as the inventor would go in describing his new appliance, which is erected behind and at the sides of the wireless sending apparatus. So far, he said, he had been able to keep the waves within a radius of two or three

degrees dissemination, instead of the usual 360 degrees.

Under the new system the radio rays would spread but slightly from their point of origin. Thus, if London was sending to New York, stations in Connecticut would perhaps be able to listen in. But, in the words of Signor Marconi, "Spain couldn't, nor could Sweden."

Less power will be required to send radio waves in one direction and therefore transmission costs will be lessened.

Signor Marconi said he contemplated making a trip to the United States during the winter, to note recent radio progress.

Transatlantic Amateur Radio Tests

DURING National Radio Week this year, all the English radio efforts were headed toward getting across successfully. Last year the A. R. R. L. demonstrated the fact that they could easily talk across the water, but that was as much due to the high standard of the English receivers employing several stages of radio-frequency as it was to the American transmitters.

This year, however, they determined to break even, and

tube regenerator, and stations as far west as Chicago report hearing things that sounded like "British calls."

Besides the broadcasting programs that "got across" there are several amateur men on both sides of the water who carried on through the late hours in the morning, and eventually got across on a two-way basis. F. H. Schnell, traffic manager of the Eastern district A. R. R. L., actually got a message from 8AB, Nice, France, the station of Leon De Loy, the French amateur who in last year's test copied most all the American stations that got across. 8AB is to France what 1AW is to America—"the daddy of the amateurs, and of all relay work." The French transmitter used a wave of 100 meters, and Schnell used a special receiver which worked from 95 to 113 meters. The

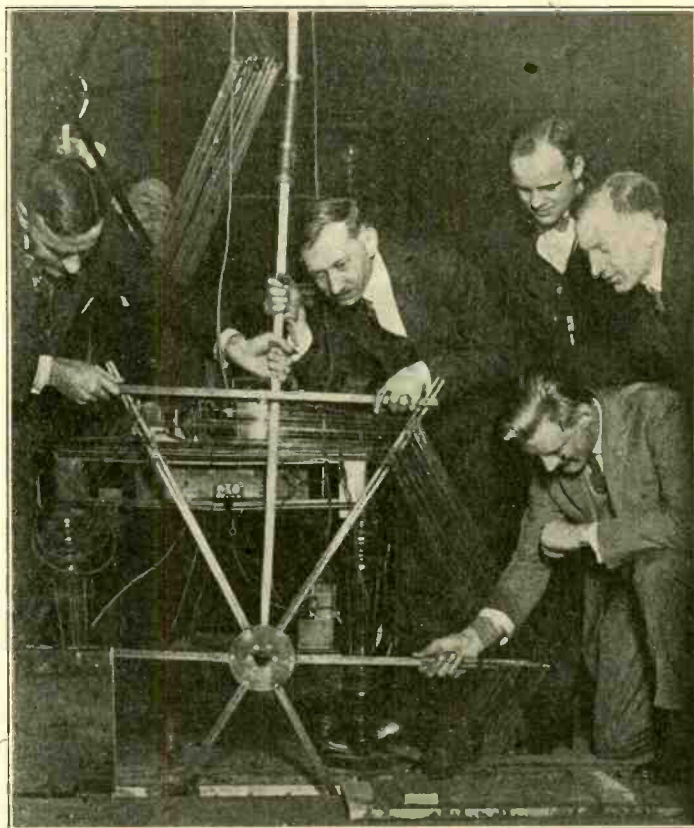


(C. Foto Topics)

Hiram Percy Maxim, President of the A.R.R.L., who caught the first "Hello, America" heard in this country during the recent tests, at his station 1AW, Hartford, Connecticut. Mr. Maxim is the father of the American Radio Relay League, a bear at the key and an authority on all amateur work. He is here shown in his "shack" with the two receivers that he used to accomplish the work. The top one is a three-tube regenerative circuit, made by C. D. Tuska. The lower one is similar to that being used by Donald Mix of WNP, being a special regenerator.

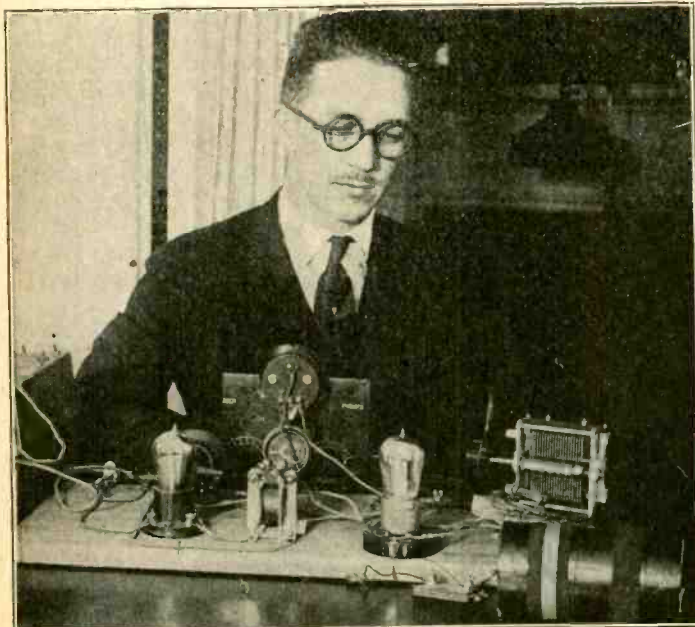
get across both ways and show the people that two-way transmission and reception across the water was possible.

In the first test, several American stations copied English broadcasting stations. One listener, Everett L. Battey



(C. Underwood and Underwood)

An experiment was carried out at the home of Dr. J. Harris Rogers, discoverer of underground and undersea radio reception, during the National Radio Week International Tests, to determine if a new circuit being tested out by Dr. Rogers with his new loop would work. The programs were plainly heard while the loop for the receiver was located down a well shaft. The tests were carried out at the Hyattsville, Md., home of Dr. Rogers and many noted and well-known radio experts were present at the tests. Photo shows the special loop being lowered into the ground before the tests. The new Rogers loop was used.



(C. Foto Topics)

F. H. Schnell, the death of spark boys, the champion of CW and a bunch of other titles, but at the same time Eastern District traffic manager of the A.R.R.L., and the apparatus with which he received French 8AB. It is a specially constructed short wave regenerative receiver with a wave length range of 95 to 113 meters. It uses two tubes, one a detector, the other an amplifier. The receiver as it is laid out is for experimental purposes only, work on those short wave lengths being an uncommon procedure these days.

of Wollaston, Mass., using a one-tube Greene circuit receiver, succeeded in hearing the announcement from a British station. Charles H. M. White, Consulting Engineer, picked up the programs in Allston, Mass., on a two-

fact that the amateurs and broadcasters of both countries can and did get across successfully on comparatively low waves and little power shows that for the present time success in distance work does not lie in the power of the transmitter so much as it does in perfecting circuits that are of extremely fine and sharp tuning with minimum apparatus and controls. Sets that have multitudinous controls and six and eight tubes are hard to tune, and before they are tuned the station has signed off. One and two tube sets, if correctly designed and the proper attention paid to little details, are capable of marvelous work in the hands of the people that understand them. Of course, that does not say that the transmitters should be disregarded entirely, but as long as a sharp wave is radiated and the power put into the antenna is conserved and not allowed to perform unnecessary work, the distance that can be covered thereafter lies mainly in the expertness of the receiving operator and the efficiency of his receiver.

U. S. S. "Colorado" Sends and Receives Simultaneously

By Carl H. Butman

THE battleship "Colorado" has just accomplished what radio engineers have said was impossible a few years ago—her radio personnel has succeeded in receiving messages on five different wave lengths while her transmitter was sending dispatches across the continent on another wave length.

This was accomplished by means of a special high-power tube transmitter designed and built by the Western Electric Company for the Navy, and the use of special aerials for the receiving sets. Naturally the transmitter is an exceptional one, which emits a pure wave, free from harmonics and mush, and the receivers were most carefully designed as to selectivity. The difficulty of receiving several messages at a time on a ship, especially if a single aerial is used, is to keep from interfering with the other receiving sets tuned to various waves. This is difficult with ordinary apparatus, if possible at all, due to the fact that in tuning up and down the scale the waves to which other sets are tuned are interfered with and the messages interrupted.

This system of sending and receiving was effectively tried out by the "Colorado" while lying off the Virginia Capes recently. She transmitted messages to San Diego

and San Francisco on a wave of 1,430 meters and at the same time copied five stations on 600, 1,300, 2,300, 4,300 and 4,600 meters during both day and night watches. The transmitting antenna, with about a 45 ampere input, was only a few feet away from the receiving antenna, a vertical affair of three or four strands suspended from a yard arm, which picked up the messages for the five receiving sets, itself a surprising feat. Two ten-KW capacity water-cooled tubes were used for transmitting the trans-continental messages over a distance of about 3,000 miles on the wave of 1,430, incidentally a low wave for this work compared with the 17,120 meter wave ordinarily employed by Annapolis for long distance work on the 500-KW arc set.

Standard naval receiving sets with amplifiers developed by the U. S. Naval Research Laboratory, Bellevue, D. C., were used in the tests.

The attention of broadcasters and listeners-in, who say some of the waves assigned to stations by the radio conference are too close, is called by naval experts to the fact that this vessel transmitted on 1,430 meters and received on 1,300 meters on almost adjacent antenna. Regular radio telegraph messages were used in the tests.

Engineers and Scientists Take Radio Afield

By Washington Service

RADIO equipment for use on land and sea is taking place with the essential instruments of precision used in navigation, surveying and recording of time. Future navigators and surveyors will no more think of going on an exploration trip without a radio set than those of past years would have gone without compasses and chronometers. This condition has, of course, prevailed for several years in the naval service, and to a certain extent in the Army, but it is now extending to all the scientific services of the government.

At the Bureaus of the Geological Survey and Coast Geodetic Survey, radio sets are owned by most of the engineers and are taken into the field when conditions permit. Along with the transit, level, barometer and such engineering instruments, the radio receiving set, if not the transmitting set also, is becoming part of standard field equipment.

Especially when making explorations in uninhabited country, where other means of communication are lacking, all government engineers and scientists will soon carry radio sets. Recently a group of longitude surveyors of the Coast and Geodetic Survey, operating in Alaska, was radio-equipped, while another field party from the Geological Survey took a receiving set down the Colorado River. Both parties got excellent reception.

In Alaska last summer, time signals from Annapolis, received daily by radio, were used in establishing exact longitudes; distance did not affect the efficiency of radio. In the more recent trip through the Grand Canyon it was found that radio waves carried even to the deepest, lowest levels of the river bed.

Col. C. H. Birdseye, of the Geological Survey, who re-

cently returned to Washington after the successful 450 mile trip down the Colorado, will shortly refute claims advanced about a year ago that radio waves would not penetrate the deep cuts in the earth's surface. The forthcoming announcement of Col. Birdseye will be based upon actual experiments with a special portable three-tube Armstrong regenerative hook-up used frequently all the way along the river bed, even in the Canyon at Bright Angel Trail, nearly a mile below the rim. "We got radio messages and broadcasts every time we hooked up the set," the leader of the survey party announced to the writer.

Broadcasts were received in the deep reaches of the Canyon regularly from Los Angeles, Salt Lake City, San Francisco, and once from Colorado Springs. On two occasions orders from the Survey Office in Washington were received. Static and local thunder showers interfered somewhat with the reception, but something came in every time the receiver was set up. It proved entertaining for the men, bringing concerts, news, baseball scores, etc., daily. News of President Harding's death and the Japanese earthquake came over the radio.

It is probable that recommendations will be made by these modern radio-equipped explorers that government field parties of the future going into places where communication is lacking, take radio receiving sets, so that orders and entertainments can be received. When possible, sending sets will, of course, be carried, but the necessary power source for transmission is a problem, as generators can seldom be carried on such trips as the one through the Grand Canyon. However, as at sea, it is anticipated that the safety of life may influence the radio equipment for land explorations.

Record Crowd at the Chicago Radio Show



(Photo by Kaufmann & Fabry Co.)

The popular appeal which radio makes is forcefully shown in this picture of one of the crowds which attended the Radio Show recently held at the Coliseum in Chicago. This exhibition of radio devices was a great success and did much to spread the gospel of radio.

Pie Pans Eliminate "Home" Station

WHY howl for a "silent night" when ambitious DX folks can eliminate "troublesome" home stations every night, if desired, by the use of a simple wave trap?

As a substitute for the silent night, desired by tube fans in many cities and especially in Washington, D. C., W. L. Tesch, engineer in charge of WRC, "The Voice of the Capitol," gives the formula for building apparatus which will tune out local stations. In a recent broadcast Mr. Tesch said:

"In the ordinary receiving set, all signals picked up by the antenna are free to run through the primary coil of the receiver. Some selectivity is obtained by tuning the set to respond to the particular wave length or frequency desired. However, if some particular signal is very strong, it will force the receiver to respond regardless of the tuning. Although there are receivers built that are selective enough to eliminate this troublesome interference, the simplest and most effective means of elimination is to stop these interfering signals before they reach the receiver. In order to do this, we cause all signals to first pass through a simple resonant circuit known as a wave trap; by tuning this circuit to the frequency of the interfering signal, the troublesome energy is absorbed before it reaches the receiving set, whereas all other signals will come through without losing their energy.

"In construction, the wave trap is a very simple device, consisting of a coil and a condenser. The condenser should be of the veritable type of 23 plates and preferably should have a vernier attachment for fine adjustments. If a larger condenser is available, such as the common forty-three plate size, it may be used, but will be harder to adjust properly. A condenser of the type recommended may be purchased at any radio store for from three to six dollars. In fact, the entire wave trap may be purchased for seven or eight dollars and should carry a guarantee of satisfaction from the dealer.

"The coil may be constructed at a total cost of less than one dollar. First, procure a round tube of some insulating material such as bakelite, ormicarta or even ordinary cardboard; a round oatmeal box will serve nicely. This tube should be about 3" long and from 2" to 5" in diam-

eter. If a 3" tube is used, wind about 40 turns of No. 24 or No. 26 insulated wire on it, or if a 4" tube is used, wind on only 30 turns; in other words, the larger tube requires a lesser number of turns and the smaller tube requires a greater number of turns.

"The next step will be to connect one terminal of the coil to one terminal of the condenser and also to the antenna. The second terminal of the coil is connected to the second terminal of the condenser and also to the antenna binding post of the receiving set. Your wave trap is now completed and ready for operation.

"Possibly you are skeptical regarding the ability of this simple device to eliminate the powerful signals of the nearby stations, but just try it. As you turn your set on, you will hear the nearby station as usual, but start turning the condenser of the wave trap. Soon you will come to a point where the signals begin to grow fainter. Continuing carefully from this point you will soon reach a point where the signals cannot be heard. Leave the wave trap condenser at this point and tune your receiver as usual for distant stations. You will not be bothered by the local station until the position of the condenser is changed.

"In regard to the effectiveness of this device I might say that I live only three blocks from WRC and have listened to programs from Cuba, Minnesota, Illinois, Nebraska, Kansas, Texas and many other states, and without a particle of interference. In fact, I have successfully tried a 'flivver' model of the trap, the entire cost of which was scarcely ten cents. Two tin pie pans and an old oatmeal box were surreptitiously obtained from the pantry. On the oatmeal box was wound 30 turns of No. 24 cotton covered copper wire, the wire costing about ten cents. This constituted the coil. For a condenser, one pie pan was placed on the table upside down while the second pie pan was placed right side up on top of the first pan and insulated from it by a sheet of paper. This makeshift arrangement was connected as previously described. By pushing the top pan with a pencil so as to change the amount of overlapping area, a point was found where the local signals were eliminated and these signals very kindly remained in the pie pans while we listened to programs from Texas."

The Radio Primer

LESSON 2. BATTERIES.—In the last lesson we found that we may cause attraction to or repulsion from a body that is positively charged with electricity. That manifestation of electricity is called static electricity. In common everyday usage we do not take advantage of it, but rather produce electricity by other means, either chemically or magnetically. We will now consider the chemical means of producing electricity or electrical energy.

In common usage it is the general practice to call a single cell a battery. This is wrong. A battery is a number of cells connected together, while a single unit of a battery should be called a cell.

The common cells consist of two elements immersed in a chemical solution that acts on one more strongly than on the other, or that acts on one alone. These two elements are made of different materials and the solution is generally an acid. In everyday practice there are two types of cells used. One is the dry cell and the other the wet cell. In both these cells the elements may be the same, the composition of the electrolyte being the only different material. The dry cell generally uses carbon rods as the cathode, with zinc as the anode. The electrolyte in both cases is of an acid character.

When a carbon rod and a zinc plate are placed in an acid solution, a complex electro-chemical reaction takes place, which causes the zinc to be eaten away. Current will be found to flow if the combination is connected together by means of a wire. It flows from the zinc to the carbon, through the circuit and back to the zinc, completing the circuit.

To show this experiment, obtain the following: a piece of carbon rod, a sheet of zinc, and a saturated solution of sal-ammoniac, or weak solution of sulphuric acid, and a glass jar. Mix the sal-ammoniac in the water until the water has dissolved as much as it will hold. Pour off the solution and remove the remaining sediment. Pour the clean solution in the jar, and immerse the zinc and the carbon rods at opposite sides. A small flashlight lamp connected between the two terminals of the battery will glow when the circuit is closed, showing that there is current flowing in the circuit.

In commercial work the compound is in the form of a jelly, with the zinc as the outside container with the carbon in the center. However, in this form of dry cell, there is an effect called polarization that takes place. This is the forming of hydrogen gas on the carbon or positive side of the battery which causes the cell to increase in internal resistance enormously. To get away from this a substance such as manganese dioxide which is rich in oxygen is used. This effectually cuts out the formation of the hydrogen gas on the surface of the positive terminal.

The negative terminal is the one that gets all the real wear, and that is why when the zinc sides on a dry cell start to bulge and form a white deposit where they crack, they are "run out." Therefore when a dry cell starts to show white deposits or when the case starts to bulge, stop fooling with it, and throw it in the waste can—its useful

life is over, as the electro-chemical reactions taking place have changed the composition sufficiently to render it useless as a producer of electric current.

New Broadcasters

THE following Class "A" broadcasting stations were licensed by the Department of Commerce last week:

Call	Station	Frequency Kcys.	Wave Length Meters	Power Watts
KFLX	George Roy Clough, Galveston, Tex.	1250	240	10
WABS	Essex Mfg. Co., Newark, N. J.	1230	244	50
KFLY	Fargo Radio Supply Co., Fargo, North Dakota	1300	231	20
WABQ	Haverford College Radio Club, Haverford, Pa.	1150	261	50
WABR	Scott High School, N. W. B. Foley, Toledo, Ohio	1110	270	50
Transferred from Class C to A				
WLAQ	Arthur S. Schilling, Kalamazoo, Michigan	1060	283	10

Schnell Has Two-Way Chat With France

HARTFORD, CONN.—F. H. Schnell, traffic manager of the American Radio Relay League and the first American amateur to establish two-way communication with Europe, is the proud owner of a brown derby, which was presented to him by Kenneth B. Warner, secretary of the A. R. R. L., following his successful effort to unite Europe and North America by two-way amateur radio.

He came very near losing the hat in favor of John Reinartz, of South Manchester, Conn., who was on the air at the same time and also exchanged messages with the French amateur station operated by Leon Deloy, but not until after Schnell had made the contact which will go down in the history of short wave radio.

The feat might never have been accomplished, however, if it had not been for Reinartz, since he designed the circuit that was used by all three transmitters in working across the Atlantic. M. Deloy visited the United States recently for the express purpose of studying amateur radio conditions in this country with a view to realizing the two-way achievement for France.

While in this country he talked with Reinartz in order to obtain suggestions from the man whose receiving tuner has become famous in the United States and European countries as well. Mr. Reinartz gave him the transmitting circuit and the French amateur, enthusiastic over the prospect of two-way communication, lost no time in installing the new hook-up on his own sending set.

M. Deloy and Mr. Schnell, who became friends during their World War service, anticipated five years ago the time when they would communicate across the ocean from their own homes.

(Concluded from page 9)

and potentiometer P to give the grid a negative bias. Place the cat whisker on the crystal. Set the two condensers C_1 and C_2 to minimum capacitance and then slowly increase the capacitance of each by turning the dials together. After some station has been picked up, set condenser C_1 to give maximum signal strength and then by adjusting C_2 and the setting of the cat whisker, try to stop tube oscillations and get greater signal intensity. If it is not possible to prevent the tube from oscillating by this means, readjust the potentiometer P to give the grid a slight positive bias. With a little

care and patience the use of the potentiometer will not have to be resorted to in the majority of cases. After the set has been tuned to a station and has been stabilized, the loop should be swung into different positions in order to take advantage of its directional properties which will make the signal strength maximum in a certain position.

The receiving range of this receiver cannot, of course, be guaranteed, but the writer has found it to compare favorably with the single tube regenerative set utilizing a single wire antenna. This comparison is particularly true if a long ground wire is used.

A Five-Watt Phone or CW Transmitter

By Leroy Western

THE life of a radio bug is sometimes greatly varied and the average fan finds his interest jumping from one point to another in radio work. After the usual fever of the reflex, neutrodyne and other circuits (some good and some bad), the mind of the average experimenter turns to transmission. Here an entirely new field is opened up, and one sees before him vistas of unlimited possibilities. Of course, the one drawback is, as usual—cash.

It will be noted from the circuit diagram herewith that the instruments found in an average radio receiving set are used. Very few additional units are necessary, and even these, when once purchased, will suffice to carry the amateur on through other experiments and will give excellent results in higher powered sets.

Of course, we must remember that in order to operate any kind of a transmitter it is necessary to obtain a license. Therefore, brush up on the code, get in touch with your nearest radio inspector and take your examination for a license.

A hard tube is to be used and it acts as the supply of oscillations, the grid method of modulation being used. A Western Electric VT2 or a UV202 will give excellent results and as high plate voltage as practical should be applied to the plate. This, of course, means up to the point where the tube ionizes or paralyzes or up to the point where the plates begin to show signs of becoming overheated. Ordinary "B" batteries may be employed for this work.

A 4" bakelite tube should be obtained and thereon should be wound 30 turns of No. 16 bare copper wire, each turn being spaced the diameter of the wire. This can be easily done by winding on the tube two wires in parallel and later removing one of them. The walls of the tube should be quite thick so that the windings can be placed thereon firmly without fear of collapsing the walls. This coil should then be mounted with a slider, or else a tap of the well known variety may be made at each turn so the contact can be made thereto with an ordinary clip. If the above mentioned type of inductance coil is used the lead from the plate and from the antenna should be connected to the clip and placed in the correct position on the inductance.

The two variable condensers used should be well made and well insulated so that no high resistance short circuits will be found. This is quite necessary to conserve the small amount of energy found in these circuits. They should have plates comparatively far apart to prevent sparking over and before being placed in the circuit they should be examined carefully to see that none of the plates touches in the condenser which is placed in series with the ground. A shorting of the latter would short-circuit the "B" battery. If the .0005 mfd. condenser were to short circuit with the key closed, the voltage of the "B" battery would be thrown through the secondary of the transformer and the grid leak. Therefore, examine your condensers carefully before placing them in circuit.

The transformer indicated for use as a modulation transformer may be an ordinary Ford spark coil. The case of the coil should be removed and the four leads separated so that they may be used without any connection between them. This is done because there is a common primary and secondary lead on a Ford coil.

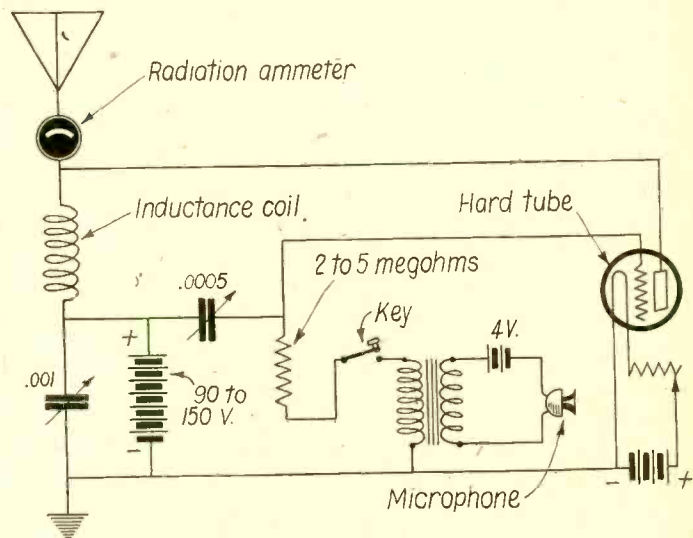
However, if the amateur does not desire to use such a coil or wishes to get the very best of material, he may purchase a standard modulation transformer. Any one of the type designed for use with a 5 or 10-watt set will give very good results when used in this circuit.

Practically any type of microphone may be used, although it should be rather sensitive. The voltage applied

to it will depend upon its type. The writer would suggest that a microphone be purchased from any of the standard supply houses which deal in parts for transmitters.

The radiation meter or hot wire meter should also be purchased unless the builder is skilled in the making of such instruments. However, the purchased instruments are calibrated correctly and will show exactly the amount of current being radiated. A meter reading over a large scale up to .5 or 1 ampere should be employed.

With the above set, when it is desired to transmit by radiophone, the microphone battery is connected in the circuit. This should always be disconnected when not in use by means of a switch or by removing a clip from the battery as otherwise it will be found to degenerate rapidly because of the constant flow of current through the microphone and the transformer. The circuit closer on the key is then closed and the filament of the tube lighted. The



Circuit diagram of a simple transmitter which can be operated on common "B" batteries.

series ground condenser is then varied until the radiation meter shows its highest reading. At this point, it is well to employ a wave meter in order to ascertain whether or not the set is operating on the correct wave length. In conjunction with the variation of the variable condenser, the amount of inductance on the coil should also be adjusted. After this, the variable grid condenser should be changed in value until the best point of operation is found. Then for phone transmission, the operator speaks clearly and distinctly into the mouthpiece.

For CW transmission, this set is adjusted as above mentioned, whereupon the circuit closer is opened and the key manipulated to produce the desired CW signals.

Don't Do It!

AFAN heard that he could use his electric lighting circuit as an antenna, and thinking to save money neglected to find out what was necessary. He simply hooked one side of the circuit to the set as antenna, switched on the current, and then attached the ground. Blooey! The result was that one set was demolished, two hands were badly burnt, and the local fire department had a nice little electrical short-circuit fire to play with. Before you get any bright ideas of that sort, investigate.

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DECEMBER 15, 1923

British-American Radio Tests Successful

THE many efforts to advertise radio during the National Radio Week reached an interesting climax on the night of December 1. At 10 o'clock all broadcasting stations, whose wave lengths would interfere, were requested to stay off the air for 30 minutes so that tests could be conducted between the English broadcasters and certain designated broadcasters on this side of the ocean. The idea was for American stations to call England for five minutes and then for the English stations to begin sending at 10:05. Transmitting was to alternate every five minutes until 10:30. The request for silence was heeded by all the American stations except WTAM, of Cleveland, which broke in on the test at 10:05 as the British started to send.

While complete reports are not available at this writing it is known that the tests were successful. Not only did the American stations hear the English broadcasters with which

they were paired but many amateurs also picked up the overseas programs. Among those who made addresses from this side were General James G. Harbord, president of the Radio Corporation of America, and E. W. Rice, Jr., of the General Electric Company, both of whom spoke through Station WGY, Schenectady, N. Y., and Charles Hyde, British Consul-General at Pittsburgh, who spoke from KDKA.

The tests were most interesting from several angles, the most important of which was that many amateurs in the United States already are equipped with radio receivers of a commercial type sufficiently sensitive to pick up programs sent across the Atlantic.

The Radio Widow

THERE has been a great deal of joking about the radio widow who has been forced by the march of progress to join her sisters, the golf widows, whom she formerly pitied. The humorous paragraphers have turned many honest pennies by exploiting the plight of each.

The chances of a man becoming a radio fan as well as a golf fiend are excellent, as the virus of one species of infecting bug does not counteract that of the other. It is claimed, moreover, that both varieties of bug can and do inhabit the same masculine anatomy simultaneously and exist in perfect harmony.

It also is asserted by competent observers that while the effect on the better halves of fans and fiends is quite similar, the method of acquisition of the two bugs by the male serves to differentiate them. The belief is put forth by those who claim first-hand knowledge, that the golf bug always attacks the male sex in the leg while the radio bug gains entrance through the wrist. Partial proof of this is found in the fact that to play golf with any degree of success one must keep walking. On the other hand, the use of the wrist in tuning a radio receiving set is a necessary prerequisite to hearing broadcast programs or getting DX.

The *ne plus ultra* of masculine selfishness would therefore seem to be the golfer who becomes a radio fan. This man's wife (or widow?) has little to look forward to in life but the divorce court unless, happily, she exercises the privileges of modern femininity and becomes a golf fiend and a radio fan herself. In fact, whole families have been discovered living harmoniously in the same home where two bags of golf clubs occupy a corner of the hall closet while a radio receiving set with two pairs of head phones holds a prominent position in the living room.

More Transoceanic Amateur Tests

THE fourth series of transoceanic tests under the auspices of the American Radio Relay League will be undertaken on December 22, 1923, to January 10, 1924. Believing that the efficiency of their transmitters was proved adequately last winter, American amateurs will not transmit, but will listen throughout the entire period of twenty days for signals from stations in continental Europe.

The number of amateur transmitting stations in European countries has increased on account of these tests in recent years, and the American radio men have decided to do them the courtesy of devoting the whole time to logging transmitters across the ocean. To facilitate receiving, French and British amateurs will transmit on alternate nights, the French starting the tests on December 22.

With amateur stations in this country keeping silent between the nightly transmission hours, 8 P. M. until 1 A. M., Eastern Standard Time, there will be no interference with broadcasting, and code transmission in this period may be attributed only to commercial or such successful foreign stations as "get across." However, most of the signals will be so weak that only finely tuned receivers can hear them.

Hi! Hi! Johnson!

SENATOR HIRAM JOHNSON undoubtedly lost the friendliness of a considerable number of radio listeners the other night when he broadcast a political speech from Chicago during the transatlantic tests. The powerful station sending out his remarks blanketed the broadcasting from England and caused great disappointment to many fans. It was unfortunate and poor politics. The day has come when the seeker after votes who takes account of all the winds that blow, as well as the little breezes, must reckon with the listeners-in—not only as people to be convinced by his appeal but, above all, as faddists of the most pronounced type who will not be denied their favorite indoor diversion. He who stands between the DXer and his far-off quarry is bold indeed.

"Them as has, gits." A homely and ungrammatical phrase of ancient lineage which right now can be properly pumped up and sent rolling down the line to do its bit for radio. As a slogan it fits the case like a California bathing beauty's one-piece suit. Certainly the man who doesn't own a receiving set gets nothing from the air except something to breathe.

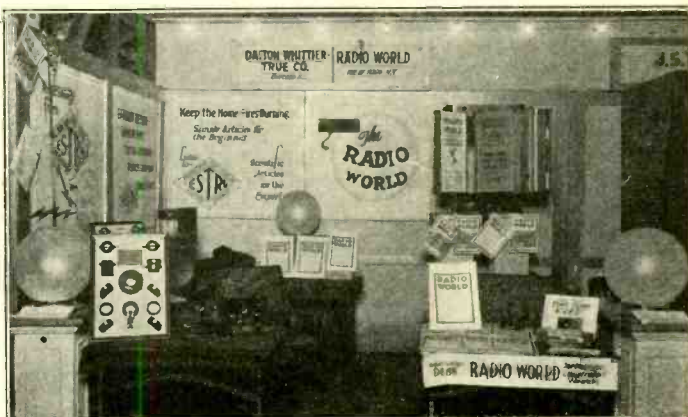
Bits of Radio News Shown in Pictures



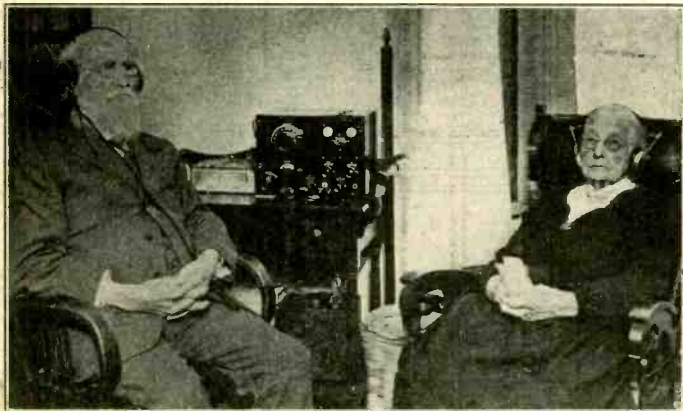
(C. International)
Staff Commander H. C. Fish, of the S.S. "Leviathan," operating the ocean greyhound's radio compass which has proved of great aid in finding the ship's location when a fog closes in. Due to the use of radio-frequency and special tuning circuits used for this work, the compass is accurate to a remarkable degree, and when the percentage of error is known, settings may be taken almost as accurately as with the compass and sextant.



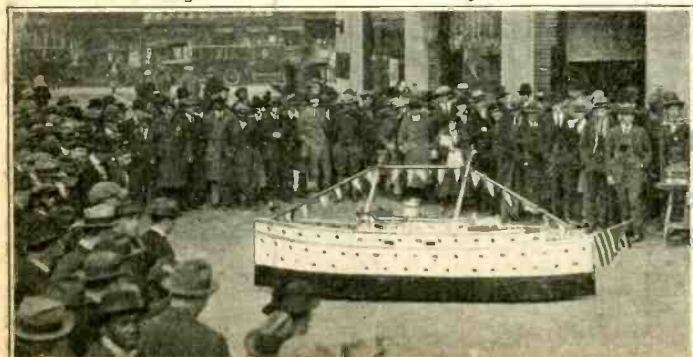
(C. Underwood and Underwood)
A view of WLAW, radio broadcasting station of the New York police department. The station is used for police work and police instruction. It will not be used for regular broadcasting work, such as is done by the present day stations, but rather to keep the people advised of police activities in case of riots or accidents or any other trouble that would be of benefit to the people to know about.



RADIO WORLD was right on tick at the Chicago Radio Show, having one of the best booths in the show, right next to the door, where they would see us coming in, and subscribe to us on the way out, after taking all the rest of the show in, and then wanting to read up what they missed.



(C. Wide World)
Mr. and Mrs. Charles D. Parker, of River Falls, Wisconsin, 96 and 93 years old, respectively, celebrating their 70th wedding anniversary in the up-to-the-minute manner by use of their Federal receiver. Mr. Parker has served 12 years in both branches of the legislature and was lieutenant-governor of the state for four years.



(C. P. and A.)
Demonstration in Washington by Mr. Westerhold of his 13 foot model radio controlled ship. It steers, backs, stops, starts, and does all the antics desired just by means of radio waves, controlled by Engineer Westerhold from the transmitter to the right.



(C. International Newsreel)
One of the features of the Chicago Radio Show was this portable receiver in a grip—batteries, phones, loud speaker and everything complete. The loop is contained inside the top and side, which is set up as shown, and when not in operation folds up like a traveling bag, weighing but little more.

Here Are Good Broadcast Programs

Station WJZ, New York City

455 Meters (660 Kilocycles). Eastern Standard Time. December 14.—3:00 P. M.—Organ recital on the Hotel Astor organ by Leo Riggs, by direct wire from the Hotel Astor. 4:00 P. M.—Recital by Marian Vandorseal, soprano. 5:00 P. M.—"The Larger Aspect of World Affairs," by Frederick Dixon, of the International Interpreter. 5:30 P. M.—Closing reports of the New York State Dept. of Farms and Markets; Farm and Home reports; closing quotations of the New York Stock Exchange; foreign exchange quotations; "The Conditions of the Leading Businesses," by the Magazine of Wall Street; Evening Post news. 7:30 P. M.—Burr McIntosh, the cheerful philosopher. 7:50 P. M.—Recital by Adaline Fisher, pianist. 8:00 P. M.—Looseleaf Current Topics. 8:15 P. M.—Recital by Adaline Fisher, pianist. 8:30 P. M.—Netherlands-American program, under the auspices of the Netherlands-American Foundation. 9:35 P. M.—"Biography of President Harding," by Joe Mitchell Chapple, editor of National Magazine. 9:55 P. M.—Time signals and weather forecast retransmitted from the government station NAA at Arlington. 10:30 P. M.—Dance program by Paul Specht's Alamac Hotel Orchestra, including the "Georgians," by direct wire from the Congo Room of the Alamac Hotel.

December 15.—4:00 P. M.—Tea music by the Hotel Belmont Stringed Ensemble, Harry Lerner, leader; Bernard Levitov, director; by direct wire from the Tea Room Balcony of the Hotel Belmont. 5:00 P. M.—Recital by Mme. Minnie Nagel. 5:30 P. M.—Closing reports of the New York State Dept. of Farms and Markets; Farm and Home reports; closing quotations of the New York Stock Exchange; foreign exchange quotations; Bradstreet's financial report; Evening Post news. 7:00 P. M.—"Uncle Wiggly Stories," by Howard Garis. 7:30 P. M.—Concert by Darl Bethman, high baritone. 8:15 P. M.—"Contests for New York's Annual Music Week," by Tertius Noble. 8:25 P. M.—Dance program by Irving Selzer's Cafe Boulevard Orchestra. 8:50 P. M.—"Book Review," by Grace Isabel Colbron. 9:00 P. M.—Pennsylvania Society Dinner, by direct wire from the Waldorf-Astoria Hotel; speeches by Charles M. Schwab, Honorable Andrew W. Mellon, Honorable James M. Beck, Honorable Gifford Pinchot, Governor of Pennsylvania, and Dr. Frederick Green.

Station KHJ, Los Angeles, Calif.

395 Meters (760 Kilocycles). Pacific Time. December 13.—12:30 to 1:15 P. M.—News items; music. 2:30 to 3:30 P. M.—Matinee musicale. 6:45 to 7:30 P. M.—Children's program; bedtime story by "Uncle John." 8:00 to 10:00 P. M.—Program presenting compositions of Hatye Mueller, composer-pianist. 10:00 to 12:00 P. M.—Broadcasting Art Hickman's Orchestra, by line telephony from the Los Angeles Biltmore Hotel.

December 14.—12:30 to 1:15 P. M.—News items; music. 2:30 to 3:30 P. M.—Matinee musicale. 6:45 to 7:00 P. M.—Children's program arranged by Harry James Beardsley, baritone. 7:00 to 7:30 P. M.—Organ recital from First Methodist Episcopal Church, Arthur Blakeley, organist. 8:00 to 10:00 P. M.—Program arranged by Faculty of Wee Tot Villa. 10:00 to 12:00 P. M.—Broadcasting Art Hickman's Orchestra by line telephony from the Los Angeles Biltmore Hotel.

December 15.—12:30 to 1:15 P. M.—News items; music. 2:30 to 3:30 P. M.—Matinee musicale. 6:45 to 7:30 P. M.—Children's program. 8:00 to 10:10 P. M.—Program presenting band from U. S. S. flagship "Procyon." 10:00 to 12:00 P. M.—Broadcasting Art Hickman's Orchestra by line telephony from the Los Angeles Biltmore Hotel.

Station WLW, Cincinnati, O.

309 Meters (970 Kilocycles). Central Standard Time. December 13.—10:30 A. M.—Weather forecast and business reports. 1:30 P. M.—Business reports. 3:00 P. M.—Market reports. 4:00 P. M.—Piano selections by Adellaide Anfel. Address: "Why I Belong to the League of Women Voters and the Democratic Party," by Mrs. Frank Gorman. 10:00 P. M.—Oriental program, with radio directed by Helen Schuster-Martin, of the Schuster-Martin Dramatic School. Musical arrangements by Mrs. Thonie Prewitt Williams, of the Cincinnati Conservatory of Music.

December 14.—10:30 A. M.—Weather forecast and business reports. 1:30 P. M.—Market reports. 3:00 P. M.—Stock quotations. 4:00 P. M.—Half-hour lecture; recital by Mildred Templeton Williams, of the Cincinnati Conservatory of Music.

December 15.—10:30 A. M.—Weather forecast and business reports. 1:30 P. M.—Business reports.

December 16.—9:30 A. M.—Sunday school services, conducted by the editorial staff of Sunday School Publications. Methodist Book Concern.

Station KSD, St. Louis, Mo.

546 Meters (550 Kilocycles). Central Standard Time. December 13.—8:00 P. M.—Broadcasting direct from the Odeon concert given by St. Louis Symphony Orchestra, Helen Traubel, soprano, soloist; Rudolph Ganz, conductor.

December 14.—Silent.

December 15.—7:30 P. M.—Orchestra concert. organ recital, vocal and instrumental specialties broadcast direct from the Missouri Theatre.

Station WOR, Newark, N. J.

405 Meters (740 Kilocycles). Eastern Standard Time. December 14.—4:00-6:00 A. M.—Special test with Japan, New Zealand and Australia; program for this period especially arranged. 2:30 P. M.—Mariateta Willats, soprano, in a group of English Cockney songs. 2:45-3:15 P. M.—Mrs. Charles H. Sabin, member of the National Republican Committee, in a talk entitled "What the Republican Party Has to Offer Women." 3:15 P. M.—Continuation of songs by Marietta Willats. 3:30 P. M.—"Health Hints," by Dr. Harriet Van Buren Peckham of Brooklyn. 3:45 P. M.—To be announced. 6:15 P. M.—"Iceicle," Santa Claus' assistant at his toy factory, will speak to the children. 6:20 P. M.—"Music While You Dine," by the Vernon Orchestra of Montclair. 6:30 P. M.—"Man in the Moon Stories for the Children"—copyright of the Newark Sunday Call. 7:00-7:30 P. M.—"Music While You Dine," by the Vernon Orchestra of Montclair.

December 15.—4:00-6:00 A. M.—Special test with Japan, New Zealand and Australia; program for this period especially arranged. 2:30 P. M.—Concert by Nathan Cygane, pianist, of Newark. 2:45 P. M.—Mrs. Lucie Lyons Chapman, New York State Chairman, D. A. R., on "Memorial Bell at Valley Forge." 3:00 P. M.—Continuation of program by Nathan Cygane, pianist. 3:15-3:40 P. M.—Contralto solos by Marjorie Harcum. 3:40-4:00 P. M.—Mrs. Franklin D. Roosevelt, Vice-President of the Woman's Division, Democratic National Committee, on "Why I, as a Woman, Am a Democrat." 6:15 P. M.—"Iceicle," Santa Claus' assistant at his toy factory, will speak to the children. 6:20-7:15 P. M.—"Music While You Dine," from Frank Dailey's Meadowbrook Dance Orchestra. 7:15 P. M.—Fred J. Bendel, sporting editor of the Newark Morning Ledger, in his weekly talk on "Sporting News Up-to-the Minute." 8:00-9:00 P. M.—Gene Ingraham and his Hotel Berwick Club Orchestra. 9:00 P. M.—Lilyan Mae Challenger, popular mezzo-contralto, in a semi-classical program. 9:15 P. M.—Belle Bart, well known astrologist, in a return engagement. 9:30 P. M.—Continuation of the program by Lilyan Mae Challenger. 9:45 P. M.—Belle Bart, astrologist. 10:00-11:00 P. M.—Jimmie Clark and his "White Way Entertainers."

Station KFAE, Pullman, Wash.

330 Meters (910 Kilocycles). Pacific Time. December 14.—The Value of Good Lighting, by Dean H. V. Carpenter, Engineering School; Books for Christmas, Miss A. L. Webb; Official Testing of Dairy Cattle, by E. V. Ellington, head of Dairy Dept.; musical numbers; Winter Care of the Dairy Cow, by Don G. Magruder, dairy specialist.

December 17.—Mutual Interests of Farmers and Miners, by Prof. Hugh Henton, School of Mines; musical numbers; chemistry talk; Educating the Whole Self, by Dr. C. W. Stone; The National Boys' and Girls' Club Congress, by Miss Elmira White, specialist in boys' and girls' clubs.

December 19.—How to Prepare for One's Vocation, by Dr. D. W. Hamilton; musical numbers; educational talk on the Value of a Knowledge of Spanish, Prof. F. C. Chalfant; Drainage from the Sanitary Standpoint, by Prof. A. B. Crane, specialist in Agricultural Engineering.

December 21.—Automobile Carburetors, by Harry Nash, Engineering Dept.; musical numbers; Holiday Books, by Miss Alice L. Webb; piano numbers, Miss Jean Fulmer, Pullman; Training Your Extension Workers, by Lincoln R. Lounsbury.

Station WFAA, Dallas, Texas

476 Meters (630 Kilocycles). Central Standard Time. December 14.—12:30-1:00—Address, Dr. Robert Stewart Hyer, Southern Methodist University, on the Sunday school lesson. "World-wide Missions." 8:30-9:30—Shriners Dance Orchestra, recital music broadcast from the Scottish Rite Cathedral, Al H. Reed, Potentate of Hella Temple, in charge.

December 15.—12:30-1:00—Dr. Ellis W. Shuler, Southern Methodist University, in "Stories from Stones," a discussion of the oil deposits. 9:30-10:30—Music of the orchestra, Don Albert conducting, and of the grand organ, Emil Velasco playing, broadcast from the Palace Theatre. 11:00-12:00—De Molay Band, Mort Herrin, director; young musicians from the preparatory school of masonry.

December 16.—6:00-7:00 P. M.—Radio Bible Class, Dr. William M. Anderson, Jr., pastor of the First Presbyterian Church, teacher; half hour * of address, half hour of song. 9:30-10:00—Dr. Robert Hunt, pastor, First Methodist Church, in song recital with his daughters, Misses Margaret and Miriam, pianist and singer. 10:00-11:00—Jimmy Allen's Southern Serenaders Dance Orchestra.

Station WJY, New York City

405 Meters (740 Kilocycles). Eastern Standard Time. December 14.—7:30 P. M.—"Income Taxes," by Frank Shevit. 7:45 P. M.—Recital by John Gpray, tenor. 8:15 P. M.—Piano recital by Moriz Rosenthal, direct from Carnegie Hall.

December 16.—8:45 P. M.—The Waldorf Astoria Symphonic Orchestra, with Joseph Knecht conducting.

Station WRC, Washington, D. C.

469 Meters (640 Kilocycles). Eastern Standard Time. December 13.—3:00 P. M.—Fashion Developments of the minute. 3:10 P. M.—Song recital by Mabel Finney, soprano. 3:25 P. M.—The Magazine of Wall Street. 3:35 P. M.—Piano recital by Mary Ashton. 3:45 P. M.—A talk on current events by the editor of the National Interpreter. 4:00 P. M.—Bradstreet's financial reports. 5:15 P. M.—Instruction in code practice. 6:00 P. M.—Children's hour by Peggy Albion.

December 14.—5:15 P. M.—Instruction in code practice. 6:00 P. M.—Children's hour by Peggy Albion. 8:00 P. M.—Song recital by Pauline Garon, soprano. 8:15 P. M.—Piano recital by Mildred Schultze. 8:30 P. M.—Song recital by Dorothy Trimble McCammond, contralto. 8:45 P. M.—Violin recital by Sydney Seidenham. 9:00 P. M.—A talk on Saint-Saens' opera "Samson and Delilah" by Mrs. Edouard Albion, with vocal selections by members of the Washington Opera Company.

December 15.—3:00 P. M.—Fashion developments of the minute. 3:10 P. M.—Piano recital by Philip Gaunt. 3:25 P. M.—Current events by the Review of Reviews. 3:35 P. M.—Song recital by Anne Todd, soprano. 3:50 P. M.—Travel talk by the National Geographic Society. 4:00 P. M.—Farm and home reports. 5:15 P. M.—Instruction in code practice. 6:00 P. M.—Children's hour by Peggy Albion.

Station WGY, Schenectady, N. Y.

380 Meters (790 Kilocycles). Eastern Standard Time. December 13.—11:55 A. M.—Time signals. 12:30 P. M.—Stock market report. 12:40 P. M.—Produce market report. 12:45 P. M.—Weather report. 2:00 P. M.—Music and address, "What Kind of Literature Do Our Young Folks Read?" Mrs. Hubert Hadlock, Schenectady Federation of Women's organizations. 6:00 P. M.—Produce and stock market quotations; news bulletins. 6:15 P. M.—Weekly report on conditions of roads in New York State. 7:45 P. M.—Program by the Publicity Department, General Electric Company.

December 14.—11:55 A. M.—Time signals. 12:30 P. M.—Stock market report. 12:40 P. M.—Produce market report. 12:45 P. M.—Weather forecast. 2:00 P. M.—Music and household talk, "Planning the Christmas Dinner." 6:00 P. M.—Produce and stock market quotations; news bulletins. 6:30 P. M.—Children's program. 7:35 P. M.—Health talk, N. Y. State Department of Health. 7:45 P. M.—Program by Alunnae Association, Troy Conservatory of Music, Troy, N. Y. 10:30 P. M.—Radio drama, "Rollo's Wild Oats," by WGY players.

December 15.—11:55 A. M.—U. S. Naval Observatory time signals. 12:30 P. M.—Stock market report. 12:40 P. M.—Produce market report. 9:30 P. M.—Program by Jack Symonds and his orchestra, from the Hampton Hotel, Albany, N. Y.

Station WOC, Davenport, Iowa

484 Meters (620 Kilocycles). Central Standard Time. December 14.—10:00 A. M.—Opening market quotations. 10:55 A. M.—Time signals. 11:00 A. M.—Weather and river forecast. 11:05 A. M.—Market quotations. 12:00 noon—Chimes concert. 2:00 P. M.—Closing stocks and markets. 3:30 P. M.—Educational program. (Musical numbers to be announced.) Lecture by C. A. Russell. Subject: "Discovery and Uses of the X-Ray." 5:45 P. M.—Chimes concert. 6:30 P. M.—Sandman's visit. 6:50 P. M.—Sports news and weather forecast. 8:00 P. M.—Musical program (1 hour)—Erwin Swindell, musical director.

December 15.—10:00 A. M.—Opening market quotations. 10:55 A. M.—Time signals. 11:00 A. M.—Weather and river forecast. 11:05 A. M.—Market quotations. 12:00 noon—Chimes concert. 12:30 P. M.—Closing stocks and markets. 3:30 P. M.—Educational program. (Musical numbers to be announced.) Lecture by C. C. Hall. 5:45 P. M.—Chimes concert. 6:30 P. M.—Sandman's visit. 6:50 P. M.—Sport news and weather forecast. 9:00 P. M.—Orchestra program (1 hour). P. S. C. Orchestra, Gerald M. Barrow, director. (Popular selections released through the National Association of Broadcasters, of which WOC is a member.)

Station WHAZ, Troy, N. Y.

380 Meters (790 Kilocycles). Eastern Standard Time. December 17.—Anniversary of the invention of the electro-magnetic operation of a bell over a wire, with the ringing of the original bell of 1832 brought from the New York State Museum for the purpose; addresses by men prominent in the telephone, telegraph and electrical world; concert program by Mrs. Laura Rhodes, soprano; Fritz Beiermeister, baritone; Miss Ruth Hardy, pianist, and Miss Vincent, violinist.

December 24.—Christmas Eva program of Christmas music by a quartet under the direction of Prof. S. Grahame Nobbes, with instrumental numbers, readings, and an address.

December 31.—Informal song program by the Radio Male Quartet, with special New Year's Eve features.

(Concluded on page 23)

The Radio University

A Question and Answer Department conducted by the Technical Staff of RADIO WORLD for the information and instruction of its subscribers.

I have constructed the Flewelling Flürver circuit as shown in one of the back issues of RADIO WORLD. I am using a WD11 tube, with 22½ volts on the plate, and have checked all my connections. The condensers are all good, being of the mica type with metal case. Every time I put the plug in the circuit, there is a loud click, but I cannot get any results out of the set itself. What can my trouble be, as the apparatus I am using has been used successfully in other circuits?—William C. Stieger, 1561 East 46th Street, Brooklyn, N. Y.

The tubes you mention do not function very well in this circuit. Also, you are not using enough plate voltage. This circuit needs at least 45 volts on the plate of the tube to operate satisfactorily. Sixty volts is even better. Make sure of your battery leads (the polarity) as this is important in this circuit. Also be sure that the tickler is running in the proper direction. Try reversing your leads on the tickler. Make sure of your grid leak resistances. It is important that this particular part of the set be the best obtainable. This set is easy to operate if the parts are very carefully assembled, and everything is of good make. It is very probable that some small detail has been overlooked, such as mentioned, so very carefully check up and try it out again. The fact that you get a loud click seems to indicate that there is a short somewhere in your set, as you should not get any click, outside of a faint one signifying that the phones have been inserted in the plate circuit. Watch your leads, and especially where any solder or soldering paste has been used. Use spaghetti or varnished cambric tubing on each and every lead.

Is there any possible way that two receivers can be used by two parties with the same antenna? The antenna is 120' long, one receiver is at one end and the other at the opposite end. We want to preclude the necessity of erecting another antenna, as it is an extremely difficult job in the location, as it is a slate peaked roof on a group of houses. How can it be eliminated?—J. F. McCullon, East Pittsburg, Pa.

You cannot operate two receivers with any successful degree of certainty on one antenna. It can be done in some small measure if a coupling coil is used on the lead-in but tuning in on either one of them will de-tune the other. The best method of getting around it is to erect two antennas, one for each receiver, and be sure of good reception when both desire to use their sets at the same time. Erecting a single wire, under the first wire, using the same poles will be satisfactory unless one of the sets happens to be a violent re-radiator, which will cause a squeal every time both of you want to listen to the same program.

You have answered questions stating that a condenser in series with the antenna or ground lead cuts down the wave length to which the receiver will respond. Before the wave lengths were changed I used a five plate condenser in series with my vario-coupler, and could tune in on everything without moving the tap switch. Afterwards I rewound the coupler, putting 100 turns on the stator. With my condenser nearly all out, I could get WGR (319 meters). I then tried

a seventeen plate condenser. Now I get WGR just faintly and KSD fine. Why? Shouldn't I get the lower stations better when this change is made?—F. L. Harcourt, 138 Manuel Ave., Toronto, Can.

Naturally what you noticed is true. The more plates in the condenser the higher the wave length that you will be able to tune to. The more surface that is exposed in a condenser, the better transfer of energy from one side to the other. However, that does not get away from the fact that the series condenser cuts down the wave frequency to which any given inductance will respond. The fact that you get KSD loud now, and WGR faint, proves that your set is working better on KSD wave frequencies than on WGR or high frequencies. If you use five plate condenser and a series-parallel switch, you will be able to cover them both with efficiency.

I intend building the Reinartz tuner receiver, but am in doubt as to several points. I have been advised that when winding the spiderweb coil, that the plate coil and the antenna coil should be wound on separate formers, and then held together with strings. Is this correct? What size wire should I use? If I use UV199 tubes, what size rheostats should be used?—E. P. Moens, Inland Steel Co., S. S. "Leopold," Indiana Harbor, Ind.

Complete instructions for the making of these coils appeared in RADIO WORLD for January 13, page 23. In general practice, and for best results in the particular type of Reinartz you mention, both windings should be placed on the same former. For these tubes you must use 30 ohm rheostats.

I would like to incorporate a switch whereby I can use my Western Electric power amplifier at a distance, or on my set. Can you furnish such a diagram?—Howard Pearl, Union Street, Newark, N. J.

Your question is rather vague as to purpose. However, if you want to operate a loud speaker at a distance from your receiver, all that will be necessary is to wire the additional loud speaker, and use a plug to place it in the original circuit, the same as you do when you operate it on your local speaker. A double-throw double-pole switch can be used for the same purpose, one side going to the distant loud speaker and the other side going to the local speaker, the switch arms going to the output side of the power amplifier.

I intend to build the "Improved Selective Double Feedback" receiver described in RADIO WORLD by H. H. Lerchen. I would like to know if it is possible to obtain more definite plans of the receiver, such as panel layout, plans, etc? Where can I find a dealer selling the exact parts required according to the write-up? What would be the approximate cost of the parts required?—E. Rios, 1917 Walton Ave., Bronx, N. Y.

As previously stated in RADIO WORLD we do not furnish panel layouts unless they are printed with the article in question. The individual builder likes to incorporate his own ideas in the set and therefore we do not give any. Any dealer should carry the parts necessary. We cannot quote prices through these columns. See the advertising pages in this issue.

I have an R-C two unit receiver, but find that 385 and 509 meter stations cannot be tuned off. How can this receiver be made more selective? Is it possible to use R. F. in such a manner that greater distance would be possible? I intend using WD12 tubes. Would this increase selectivity? Would tuned R. F. be better?—Harry B. Walton, 16 East Lynwood Ave., Glenside, Pa.

If these sets are properly operated they are selective to a great degree. It all depends upon two things, the amount of tickler used and the filament current. Use about ¾ of your tickler, and keep the filament of the detector just below the "spill-over" point. Another means of increasing the selectivity when nearby stations are in operation is to use a small antenna (65 feet long is about correct). By means of switches, you can then use either a long antenna for volume, or a short antenna for selectivity.

* * *

I am submitting a diagram of a receiver that I recently built. There seems to be nothing wrong with it but I am sure that there is room for improvement. Can you make any suggestions that will lead to the improvement of it?—Douglas Barbour, 17 Sampson Street, Atlanta, Ga.

The only thing that we can find fault with is the number of controls that are necessary to tune the circuit. According to your diagram there are nine controls. This does not count the five rheostat controls which brings the number up to 14. Suggest that you simplify it by making one rheostat control the radio-frequency tubes, one the detector, and one the audio-frequency. By the use of proper transformers you will be able to do away with the two transformer controls you have. Use an aperiodic, or semi-aperiodic primary, doing away with the primary condenser and control. A set with too many intricate controls is like a car with too many brakes—before you operate the right one, the car has been wrecked—or the station lost. Over two-thirds of the controls you are now using are unnecessary. Simplify it and you will increase its efficiency.

* * *

Would it be possible to add radio-frequency amplification (two stages of transformer coupled) to the Potter circuit published in RADIO WORLD? How much plate voltage should I use on UV199 tubes when they are used as amplifiers? Will a C battery help the volume? Does it make any difference which terminals of the primary output are connected to the primary of the transformer?—Fay L. Bellendorf, Sandwich, Ill.

While it is possible to add radio-frequency to this receiver, the addition makes it extremely hard to tune. So much so that there is no means of controlling the oscillations and the set howls unless each circuit is in exact resonance. We do not advise it. For the tubes you mention, 45 to 60 is sufficient. A C battery will prove of great help when the tubes are used in audio-frequency circuits. There is one correct manner of hooking up transformers and this should be followed. One terminal is marked B, the other is marked P. This designates that one goes in the B side of the circuit, the other goes to the plate. In the secondary, one side goes to the grid (marked G on transformer), the other goes to the minus filament (marked F or F—on transformer).

* * *

I have noticed that A. D. Turnbull has an article which sounds interesting. How can I get in touch with him?—J. J. Coldham, 336 Flora Street, Ottawa, Canada.

Communicate with Mr. Turnbull direct. His address is 57 Union Street, Sydney, N. S., Canada.

Federal Trade Commission Reports to Congress on the Radio Industry

RADIO WORLD has received the following communication from the Federal Trade Commission under date of Washington, D. C., December 3:

The Federal Trade Commission today submitted to Congress a report of facts with respect to the radio industry. The report contains the results of the investigation made pursuant to House Resolution 548, Sixty-seventh Congress, fourth session.

An attempt has been made to collate the data with respect to the various phases of the inquiry as outlined by Congress in the resolution. In Chapter I, the facts concerning the development of the industry are presented, which includes the organization of the Radio Corporation of America, the most important factor in the industry. In Chapter II, the agreements between the various companies, respecting the hundreds of patents covering radio devices and apparatus, are discussed, which agreements are set out in full in the Appendix. In Chapter III is discussed the various traffic agreements respecting international radio communication, and which are also set out in full in the Appendix. Chapter IV is devoted to a discussion of the practices relative to the manufacture, sale, and use of radio apparatus and parts. This naturally includes an outline of the sales policy of the Radio Corporation and the facts as to its sale of vacuum tubes, which product has been termed the heart of radio.

The Commission calls attention to certain facts disclosed by the investigation which may be summarized as follows:

The Marconi Wireless Telegraph Company of America was the first company in America formed for the purpose of engaging in the transmission of messages by wireless. It was organized November 22, 1899, with a capitalization of \$10,000,000, of which about 25 per cent. was owned by the Marconi's Wireless Telegraph Company, Ltd., a British corporation.

In the United States and territories, this concern had the exclusive right to use and exploit the patents controlled by the British Marconi Company, among which were the important Fleming tube patents. The Marconi Company erected high-power wireless stations at New Brunswick, N. J.; Belmar, N. J.; Marion, Mass.; Chatham, Mass.; Bolinas, Calif.; Marshall, Calif.; Kahuku, Hawaii, and Kokohead, Hawaii. In the ship-to-shore communication business it practically had a monopoly when it was taken over by the Radio Corporation in 1919. Some of the wireless apparatus used was manufactured at its plant at Aldene, New Jersey, where it also manufactured radio parts, which it sold to amateurs and experimenters in radio, while the equipment for its high-power stations was purchased from the British Marconi Company.

There were only two other companies in the United States engaged in the operation of a radio communication service, the United Fruit Company and the Federal Telegraph Company. The United Fruit Company, which operates a fleet of vessels in connection with its tropical fruit business between the United States, the West Indies, Central and South America, obtained a few radio patents and a license from the Marconi Company under certain of its patents. Its vessels were equipped with wireless apparatus and stations were erected in Boston, New Orleans, and a few points in Central America from which a commercial service was

maintained. The Federal Telegraph Company of California was organized in 1911 and operated a ship-to-ship and ship-to-shore service on the Pacific Coast.

Prior to the war, broadcasting for entertainment purposes had not been developed and the radio apparatus required in receiving and transmitting sets were sold to the concerns engaged in the commercial field, the United States Government, and amateurs and experimenters in the radio art. The principal manufacturers of apparatus and parts were the Marconi Company of America, Federal Telegraph Company, DeForest Radio, Telephone & Telegraph Company, and the Wireless Specialty Apparatus Company, a subsidiary of the United Fruit Company. None of these concerns manufactured what is now termed the modern vacuum tube and which is considered so essential by the industry. Only the Marconi and DeForest Companies manufactured vacuum tubes which, because of certain defects, were not considered of much importance. The DeForest Company manufactured tubes for only a short time since it was infringing the Fleming tube patents of the Marconi Company. The device then used for rectifying purposes was the crystal. Crystals and crystal receiving sets, efficient for short communication, were manufactured chiefly by the Wireless Specialty Apparatus Company. The Federal Telegraph Company manufactured the Poulsen arc, which is used in high-power stations, for its own use and sale to ship owners and the government. The three important manufacturers of electrical apparatus, the General Electric Company, the Western Electric Company, and the Westinghouse Electric & Manufacturing Company, prior to the war did not sell radio apparatus, although they had done considerable research and development work. Some of the apparatus manufactured, however, was adapted for both radio and general electrical purposes.

Although engaged primarily in the manufacture of electrical machinery and apparatus, the subject of radio was of interest to the General Electric Company, since many of its patents were also adapted to the radio art. Among its developments is the Alexanderson alternator, which is a machine for generating high-frequency current, useful especially in long-distance communication. The first of these machines was installed in 1917 at the New Brunswick, N. J., station of the Marconi Company. Shortly thereafter the British Marconi Company commenced negotiations for the exclusive rights to the machine, but because of the war negotiations were suspended. After the signing of the armistice, negotiations were resumed, but were practically concluded after a conference in April, 1919, between Rear Admiral Bullard, Director of Communication of the Navy; Commander S. C. Hooper, of the Bureau of Engineering of the Navy Department, and officials of the General Electric Company. The officials of the Navy Department suggested that an American radio corporation be formed to which the rights in this machine be sold and thus enable it to compete with British interests. A contract was proposed which provided for the organization of a company in such a manner that the control thereof would remain in the control of American citizens. At a conference in May, 1919, with officials of the General Electric Company,

Secretary Daniels stated, (1) that he was in favor of government ownership of radio, which he intended to urge upon Congress, and (2) that he doubted his power to execute such a contract except with the consent of Congress. No such authority was granted, so the contract never became effective. The General Electric Company, therefore, began negotiations for the purchase of the British Marconi Company's holdings in the Marconi Wireless Telegraph Company of America with a view of organizing a new company to carry on the radio business.

The Radio Corporation of America was caused to be organized by the General Electric Company, October 17, 1919. Its original capital stock was \$1,000, but at the first meeting of the stockholders was increased to \$25,000,000. On December 31, 1922, there was outstanding 3,955,974 shares, preferred stock, par value \$5.00 per share, and 5,734,000 shares common stock, no par value. Of this amount the General Electric Company owns 1,875,000 shares common, and 620,800 shares preferred; the Westinghouse Electric & Manufacturing Company, 1,000,000 shares common and 1,000,000 shares preferred; and the United Fruit Company 160,000 shares common, and 200,000 shares preferred. The remainder is held largely by the former stockholders of the American Marconi Company. The companies mentioned are represented on the Board of Directors with the exception of the American Telephone & Telegraph Company.

On November 20, 1919, the Radio Corporation entered into an agreement with the Marconi Wireless Telegraph Company of America whereby the Radio Corporation issued to the Marconi Company 2,000,000 shares of its preferred stock in exchange for the physical properties, patents, licenses and good-will of the Marconi Company.

The Radio Corporation has entered into agreements with the various companies which own or control practically all patents covering radio devices considered of importance to the art. The number of patents involved approximates two thousand. Agreements of this character have been entered into with the General Electric Company, Marconi's Wireless Telegraph Company, Ltd., American Telephone & Telegraph Company and its subsidiary, the Western Electric Company, the United Fruit Company and its subsidiary, the Wireless Specialty Apparatus Company, the International Radio Telegraph Company, the Westinghouse Electric & Manufacturing Company, and the Radio Engineering Company of New York. With certain minor limitations, the Radio Corporation under these agreements has secured an exclusive divisible right to sell and use the radio devices covered by the patents involved or by patents which these companies may acquire before the termination of the agreements. The agreements with the American Telephone & Telegraph Company and the Western Electric Company are to terminate in 1930, while the remainder are to terminate in 1945. Provision is made for the mutual exchange of information relating to radio and, in most instances, the Radio Corporation has granted to the other company a license under its patents to make and use devices in the particular field in which the other company is interested.

The Radio Corporation, under these agreements, is made the selling company for practically all radio devices to be sold the public under the hundreds of patents involved. The General Electric Company and the Westinghouse Electric & Manufacturing Company are to manufacture and to sell to the Radio Corporation only, these devices and apparatus,

the Radio Corporation agreeing that sixty per cent. of its annual requirements would be purchased from the General Electric Company and forty per cent. from the Westinghouse Company. Until the expiration of the Fleming patents in 1922, the Radio Corporation had an absolute monopoly in the sale of vacuum tubes. On the expiration of these patents, the DeForest Radio, Telephone & Telegraph Company, which had retained a right to manufacture and sell, commenced the sale of such tubes to the general public. In the sale of receiving sets, the Radio Corporation has competition from seventeen concerns licensed under the Armstrong patents, although their sale of sets for use in conjunction with tubes is being contested in the courts at the present time. It is contended that their sale and use under the present patent situation constitutes an infringement of the tube patents of the Radio Corporation, which, if upheld by the courts, will prevent all competition in the sale of complete sets, since the Western Electric Company is manufacturing and selling only transmitting apparatus for commercial purposes.

In communication by radio between ships at sea and the shore, the Radio Corporation is the dominant factor. Its chief competitors are the independent Wireless Telegraph Company, Ship Owners' Radio Service Company, Wireless Company of Port Arthur, and Gulf Radio Service operating on the Atlantic Coast and the Federal Telegraph & Telephone Company and Kilbourne & Clark, operating on the Pacific Coast. The question as to the right to use tubes, the patents to which are under the control of the Radio Corporation, in apparatus furnished the ships and land stations is also involved in litigation, suit having been instituted by the Radio Corporation against the Independent Wireless Telegraph Company on this ground. The U. S. District Court for the Southern District of New York recently dismissed this bill for lack of parties since the DeForest Company, the owner of the patents involved and which had retained a personal license to make and sell, was a party to the proceeding in name only. If the contention of the Radio Corporation should finally prevail, competition from the other ship-to-shore service companies will be eliminated until there is a change in the patent situation. The Tropical Radio Telegraph Company, a subsidiary of the United Fruit Company, is also engaged in a ship-to-shore service in the Caribbean Sea, but is affiliated with the Radio Corporation.

The Radio Corporation is the only concern now engaged in transmitting and receiving radio messages between the United States and foreign countries and contends that in order to function properly it must of necessity secure a monopoly in this field. The company has secured a virtual monopoly and controls all the high-power stations with the exception of those owned by the government. In addition, it has entered into traffic agreements with the various foreign governments and radio companies, the majority of these agreements providing that all messages intended for the United States shall be transmitted only through the facilities owned by the Radio Corporation of America. Agreements of this character have been made with Marconi's Wireless Telegraph Company, Ltd., covering the British possessions, and the governments of Norway, Germany, France, Poland, Sweden and the Netherlands. An agreement of a similar character between the Marconi Company and the Japanese Government was assumed by the Radio Corporation when it purchased the assets of the Marconi Wireless Telegraph Company of America and traffic by radio between the countries established. In 1921, the Radio Corporation entered into an agreement with Marconi's Wireless Telegraph

Company, Ltd., a British concern, the Compagnie Generale de Telegraphie sans fil, a French concern, and the Gesellschaft Fuer Drahtlose Telegraphie m. b. H., a German concern, respecting radio traffic from South American countries which was afterwards extended to Central American countries. Steps have been taken to establish service between Brazil, Argentina, Colombia, Venezuela and the United States. This agreement was made subject to the rights of the United Fruit Company in Cuba, Colombia, the Panama Canal Zone and Central America, and its agreement with the Radio Corporation whereby it agreed not to establish or operate stations for wireless communication outside the allotted territory.

The Federal Telegraph Company of California, which is engaged in a ship-to-shore communication service on the Pacific Coast, in 1921 entered into a partnership agreement with the Chinese Government providing for the erection of stations in China and the establishment of a transoceanic service. This agreement was assumed by the Federal Telegraph Company of Delaware, which was organized by the old Federal Company and the Radio Corporation. An agreement between the various companies holding concessions in China was also proposed. The agreement was apparently not executed and the correspondence with the Navy Department shows that the department would oppose any agreements of this character unless they were first approved by the respective governments. In a letter to the Secretary of State dated December 16, 1921, Mr. Denby, Secretary of the Navy, emphasizes the importance of maintaining competition in radio communication to and from China. The possibility of a monopoly in other fields than that of service is also pointed out, as is shown by the following excerpt from the letter:

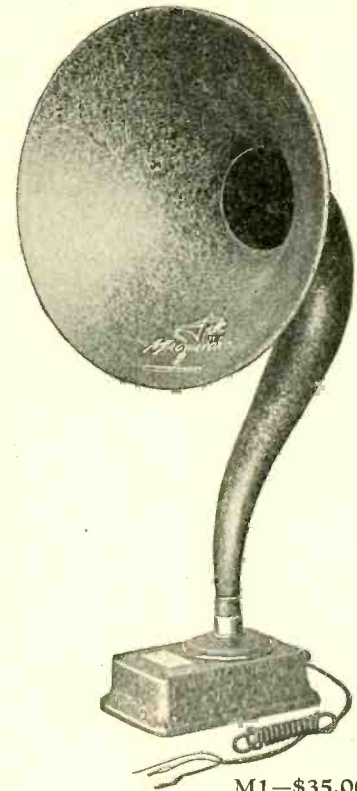
"The Navy Department fears that any commitment on the part of the government to an arrangement favorable to a monopoly by a single commercial company, though limited to a particular service, would but lend a means towards extending monopoly to other services, such as development and distribution of apparatus in general, and this is considered absolutely undesirable, particularly in the field of supply and service to ships."

At the present time, the Radio Corporation has in operation communication circuits with Great Britain, Norway, France, Germany, Poland, Italy and Japan. It is expected that the station in Sweden will be completed and ready for operation within the next six months and that the station near Buenos Aires, in the Argentine, will be completed in the near future.

Because of the provisions in these various agreements providing for service through the facilities of the Radio Corporation exclusively, it is not believed that it will be possible for any other company in the United States to conduct an efficient transoceanic service. In fact, a group of newspaper publishers in the United States who sought to erect a station for the receipt of radio messages, after conducting experiments in this country, eventually built such a station at Dartmouth, Nova Scotia. This station is now being operated, its service being supplemented by virtue of an agreement with the British Post Office. The following are members of the association operating such service: *The Chicago Tribune, The New York Times, The New York World, The New York Herald, The New York Tribune, The Philadelphia Public Ledger, United Press Association of America, International News Service, Universal Service.*

The association is not exclusive and business for other newspapers is conducted. (Concluded on page 29)

MAGNAVOX Radio Products



M1—\$35.00

Magnavox Reproducer for dry battery receiving sets

THIS new semi-dynamic Magnavox Reproducer is particularly recommended for dry battery receiving sets where low voltage and low current consumption tubes are used. The M1 is supreme in its class.

Magnavox Reproducers

R2 with 18-inch curvex horn \$60.00
R3 with 14-inch curvex horn \$35.00
M1 with 14-in. curvex horn. Requires no battery for the field . \$35.00

Magnavox Combination Sets

A1-R consisting of electro-dynamic Reproducer with 14-inch curvex horn and 1 stage of amplification \$59.00
A2-R consisting of electro-dynamic Reproducer with 14-inch curvex horn and 2 stages of amplification \$85.00

Magnavox Power Amplifiers

A1—new 1-stage Power Amplifier \$27.50
AC-2-C—2-stage Power Amplifier \$55.00
AC-3-C—3-stage Power Amplifier \$75.00

Magnavox products can be had at Registered Magnavox Dealers everywhere. Write for new 32-page catalogue.

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Oakland, California

New York Office: 370 Seventh Avenue
Canadian Distributors
Perkins Electric Co., Ltd., Montreal

Radio Merchandising

Advertising Rates: Display, \$5.00 an inch, \$150.00 a page. Classified Quick-Action Advertising, 5 cents a word. Phones: Lackawanna 6976 and 2063

New York Radio Ball a Success

A RADIO BALL was held at Roseland, New York City, on the night of December 5. The proceeds were donated to the Christmas Fund for the Poor of New York being collected by one of the daily newspapers.

Among the many features was the personal appearance of the following popular dance orchestra leaders and their bands: Paul Whiteman, Vincent Lopez, Paul Specht, Sam Lanin, Gene Fosdick and his Hoosiers.

The big feature of the ball was a Federal DX 61 set with receivers arranged so that people could listen in to radio music between dances. Acting Mayor Murray Hulbert and a party of thirty people put in an appearance, and evidently were as much interested in radio as in the ball, spending more time listening in on the receiver than an acting mayor would be expected to at a public function.

All the announcements were made by means of Western Electric speech amplifiers. The reserved tables had receivers, supplied by the DX 61, and they were switched on between dances, keeping every one busy.

New Radio and Electrical Firms

C. Brandes, New York City, has increased its capital from \$500,000 to \$1,000,000.

Ulrich & Co., New York City, electrical appliances, \$25,000; R. N. Kristeller, J. C. Williams, O. W. Swift. (Attorneys, Watson, Kristeller & Swift, 68 William St.)

Gosper Radio Corp., New York City, \$10,000; S. Gottlieb, H. Strizver, F. J. Greco. (Attorneys, Greco & Strizver, 38 Park Row.)

Ajax Electric Contracting Corp., New York City, \$10,000; M. J. and S. J. Rosenthal, W. L. Beers. (Attorney, Julius Hallheimer, 33 West 42d St.)

Greenberg Electrical and Radio Co., Brooklyn, N. Y., \$20,000; P. and D. Greenberg, R. Rabin. (Attorney, N. A. Goldenenthal, 350 Madison Ave.)

Radio World in China

SERVICE EDITOR, RADIO WORLD: As the secretary of the Tientsin Amateur Radio Association as well as proprietor of a motor accessories shop which has been marketing radio supplies here, I would be glad if you will place my name on your list to receive pamphlets, trade circulars and price information regarding radio equipment.

Yours very truly,

HAROLD W. GRAMBS.

The American-Chinese Co., Inc.,
Tientsin, China.

Col. Saltzman New Army Signal Corps Chief

THE selection of Col. Charles McK. Saltzman to succeed Maj.-Gen. George O. Squier, as chief signal officer of the army, was announced last week by the War Department. Gen. Squier will retire soon, after more than forty years' active service.

Valuable Prize Offered to Amateurs

AS a special inducement to demonstrate the high-grade efficiency of foreign stations and to insure "quiet air" during the A. R. R. L. tests, December 2 to January 10, a number of leading American manufacturers through arrangement with the League have offered thousands of dollars worth of equipment in prizes for the best receiving records.

The largest single prize, which is probably the most generous ever offered in a competition of this kind, is a complete four 50-watt tube transmitter, valued at \$1,100, donated by A. H. Grebe & Company, Inc., Richmond Hill, N. Y., pioneers in radio manufacturing. It will be awarded to the operator having to his credit the greatest grand total of miles reception during the entire tests, logging each station heard only once each night.

Major E. H. Armstrong Weds

MAJOR EDWIN H. ARMSTRONG, of Yonkers, N. Y., inventor of the Armstrong circuit, and Miss Esther Marion MacInness, daughter of Mr. and Mrs. Angus MacInness, of Merrimac, Mass., were married at the home of the bride on the evening of December 1. George Burghard, of New York, president of the Radio Club of America, was best man. The bridegroom is a graduate of Columbia University, class of 1913, and at present is engaged in research work in the Marcellus Hartley Laboratory.

Addition to the Sleeper Line

GORDON C. SLEEPER, president of the Sleeper Radio Corporation, New York City, is walking around these days with his chest out very much like Jack Dempsey having become the proud father of a future radio engineer named Gordon Crothers, Jr., who started broadcasting on his own account on November 10. The young man tipped the scale at seven pounds and three ounces.

1924 Will Be Better Says Judge Gary

THE outlook for 1924 is that it will be a better year than 1923, as there is nothing in sight to cause apprehension for the near future, says Judge Elbert H. Gary, Chairman of the board of the United States Steel Corporation, in an article, "What's Ahead for Business in 1924?" appearing in the January issue of "System."

Call 8BMP Reissued

ALBERT A. ARNOLD, 268 James Street, Akron, Ohio, informs RADIO WORLD that the call 8BMP has been reissued to him.

Coming Event

SECOND ANNUAL RADIO SHOW, Los Angeles, Calif., February, 1924.

Radio Literature Wanted

Manufacturers of and dealers in radio apparatus and accessories are notified that literature and catalogues describing their products have been requested, through the Service Editor of RADIO WORLD, by the following:

Fred R. Bell, Box 255, Elkhart, Ind.
Lewis Allen, 500 Flint St., Portland, Ore.
Ray E. Fern, 1323 Olive St., Scranton, Pa.
Roof Bros., Box 445, Gallatin, Mo.
R. G. Kirkwood, 1510 A Ave., Newcastle, Ind. (Interested in parts.)
Henry Tyssie, 88 East 13th St., Holland, Mich. (About to install several receiving sets.)
M. O. Rester, P. O. Box 785, Beaumont, Texas.
Fleming's Radio Shop, 1215 Peabody Ave., Dallas, Texas.
Walter M. Hankins, Summit, Ill. (Wants sets and parts.)
Jas. Dowler, 10 Monroe St., Port Washington, Long Island, N. Y.
Alexander Baird, 12 Rapp St., Leetsdale, Pa.
Alfred J. Riedel, 1476 24th St., Milwaukee, Wis.
Philip P. Coyle, 1712 Beaver Ave., McKeesport, Pa.
G. L. White, White House, Deadwood, South Dakota. (Distributor.)
Samuel Hodge, Box 593, Turlock, Calif.
H. O. Thompson, 208 Seventh St., Fairbury, Neb.
Edw. R. Aspen, Gen. Pet. Corp. No. 2, Lost Hills, Calif.
R. E. Brinser, Point Pleasant, Madison Lake, Wisconsin.
Harold W. Grambs, The American-Chinese Co., Inc., Tientsin, China.
Eng. George Shoolman, Sofievski per 9, Odessa, Russia.
A. B. Jackson, 6029 30th, Detroit, Mich.
L. V. Kenerson, Norfolk, Nebraska.
Lewis Thompson, Brandon, Minn.
F. W. Palmer, 19 Pearl St., Ayer, Mass.
W. J. Robb, 31 Colonial Ave., Dorchester, Mass.
J. R. Fischer, 617 West Candy St., Denison, Texas.

Radio and Electrical Business Opportunities

Rate: 40c a line. Minimum, 3 lines.

MANUFACTURER seeks distributor for unique one bulb reflex radio set, one tuning control, compact, attractive; should go very big handled right. Marti, 171 Washington St., Newark, N. J. Phone Market 8397.

METAL novelty manufacturing plant, fully equipped, including soldering, polishing, plating, tool room; price reasonable. KK, Radio World.

LET US BE YOUR FACTORY

Don't put your capital into machinery; we have excellent equipment, skilled mechanics and wide experience in building dies, tools and economical manufacturing of small devices; we do not finance inventions, but if you have funds to produce your article you can employ our facilities profitably and with less risk; at a reasonable charge we will design and build your tools, make your parts, and, if desired, assemble, pack and ship the complete device; our responsibility is established. Interstate Mechanical Laboratories, 521 West 57th St. Phone Columbus 5321.

Radio Dealers in Cincinnati Organize

THE Cincinnati Radio Dealers' Association has been formed with L. Burkart, president, and G. D. Kroeger, secretary-treasurer. The object of the association is to promote the welfare of the radio business, with the idea of securing co-operation among the legitimate dealers and to eliminate irresponsible dealers.

Chicago Radio Dealers to Form Association

IT is rumored in commercial circles that the radio dealers of Chicago are about to form an organization for the advancement and welfare of their interests.

Here Are Good Broadcast Programs

(Concluded from page 18)

Station WEAF, New York City

492 Meters (610 Kilocycles). Eastern Standard Time. December 14.—The syncopating Phil Ohman trio, R. De Marcus, saxophonist; Phil Ohman, pianist, and Sam Hermann, xylophonist, all of them famous recording artists, will broadcast a series of popular numbers in the afternoon. Anna Hutler, soprano, and Elsie Jean, story teller, will complete the afternoon program. In the evening, John V. L. Hogan, radio engineer, will give another of his instructive talks on "Why Some Receiving Tuners Are Not Selective." Dorothy H. Burke, dramatic soprano, and Ruth Friedman, pianist, are other features of the evening program.

Station KDKA, East Pittsburgh, Pa.

326 Meters (920 Kilocycles). Eastern Standard Time. December 14.—9:45 A. M.—Union live stock market reports. 11:55 A. M.—Arlington time signals; weather forecast. 12:00 M.—United States Bureau of Market reports. 6:15 P. M.—Organ recital. 7:15 P. M.—Radio Boy Scout meeting. 7:45 P. M.—A visit by Santa Claus. 8:00 P. M.—Market reports. 8:15 P. M.—"World-Wide Missions," the Sunday School lesson for December 16, presented by Dr. R. L. Lanning. 8:30 P. M.—Concert. 9:55 P. M.—Arlington time signals; weather forecast.
December 15.—9:45 A. M.—Union live stock market reports. 11:55 A. M.—Arlington time signals; weather forecast. 12:00 M.—U. S. Bureau of Market reports. 1:30 P. M.—Concert by Dougherty's Orchestra. 6:15 P. M.—Dinner concert by the Westinghouse Band. 7:30 P. M.—"Bringing the World to America." 7:45 P. M.—"The Little Fir Tree," the children's period. 8:00 P. M.—"Life Insurance," by Royal S. Goldsby. 8:15 P. M.—Address. 8:30 P. M.—Concert by the Westinghouse Band. 9:55 P. M.—Arlington time signals; weather forecast.

Station WIP, Philadelphia

589 Meters (590 Kilocycles). Eastern Standard Time. December 14.—1:30 P. M.—Official weather forecast. 3:00 P. M.—Popular program by artists from the Remick Studios. 6:00 P. M.—Official weather forecast. 6:05 P. M.—George Thomas and his Little Club Cafe Orchestra. 7:00 P. M.—Uncle Wip's Bedtime Stories and Roll Call for the Children.
December 15.—1:00 P. M.—Organ recital by Karl Bonawitz on the Germantown Theatre organ. 1:30 P. M.—Official weather forecast. 3:00 P. M.—Popular program by Charles West's Orchestra. 6:00 P. M.—Official weather forecast. 6:05 P. M.—Greenwich Village Follies Serenaders, under the direction of Dave Martin. 7:00 P. M.—Uncle Wip's Bedtime Stories and Roll Call for the Children. 8:00 P. M.—"The Conquest of Malaria," by Dr. Horatio C. Wood, Professor of Medica Materia, Philadelphia College of Pharmacy and Science. 9:00 P. M.—Shrine Legion of Honor Minstrel Troupe. 10:15 P. M.—Charlie Kerr and his orchestra from the St. James Hotel.
December 16.—4:00 P. M.—Direct broadcast from the Germantown Theatre of a meeting held under the auspices of the Germantown Y. M. C. A. Frank Preston Johnson on "The Basis of Liberty." Music by William R. Keech, tenor.

Station WBZ, Springfield, Mass.

337 Meters (890 Kilocycles). Eastern Standard Time. December 14.—11:55 A. M.—Arlington time signals; weather reports; Boston and Springfield market reports. 6:00 P. M.—Dinner concert by the WBZ Quintette. 7:00 P. M.—"From the Main Truck," a dramatized story from the Youth's Companion. 7:30 P. M.—Twilight tales for the kiddies; Current Book Review, by R. A. Macdonald of the Court Square Book Store. Farmers' period—"The Red Clover Situation," by John J. Dickinson, manager seed department of the Eastern States Farmers' Exchange. 9:55 P. M.—Arlington time signals. 11:00 P. M.—Program of Chamber Music by the WBZ Quintette.
December 15.—11:55 A. M.—Arlington time signals; weather reports; Boston and Springfield market reports. 7:00 P. M.—Dinner concert by the Hotel Kimball Trio direct from the Hotel Kimball. 7:30 P. M.—Twilight tales for the kiddies. "What the December Elections in England May Mean to Agriculture and to Business in the United States," with familiar talks upon other new phases of farming this winter, by Herbert Myrick, editor Farm and Home. "Last Minute Christmas Suggestions for Folks in Country and Town," by Mrs. Mary R. Reynolds, household editor Farm and Home. 8:00 P. M.—Concert by Mabelle E. Gray, contralto; Mrs. Burton R. Rogers, accompanist. 9:00 P. M.—Bedtime story for grown-ups by Orison S. Marden. 9:55 P. M.—Arlington time signals.

Station KYW, Chicago

536 Meters (560 Kilocycles). Central Standard Time. December 14.—9:30 A. M.—Late news and comment of the financial and commercial markets. 10:00 A. M.—Market reports. 10:30 A. M.—Late financial news and comment. 10:58 A. M.—Naval observatory time signals. 11:00 A. M.—

Market reports. 11:05 A. M.—Weather report. 11:30 A. M.—Late news and comment of the financial and commercial markets. 11:35 A. M.—Table talk. 12:00 M.—Market reports. 12:30 P. M.—"The Progress of the World." 1:00 P. M.—News and sports. 1:30 P. M.—Closing market quotations. 2:15 P. M.—Late financial comment and news bulletins. 2:30 P. M.—Closing stock quotations, Chicago Stock Exchange. 3:00 P. M.—News and sport bulletins. 4:00 P. M.—Late news and sport bulletins. 4:30 P. M.—News and sport bulletins. 5:00 P. M.—Latest news of the day. 6:30 P. M.—News, financial and final market and sport summary. 6:50 P. M.—Children's bedtime story. 10:00-12:30 P. M.—Late show.

KYW, "The World Crier Station," will broadcast the latest news of the world every half hour night and day.

Station WGI, Medford, Mass.

360 Meters (830 Kilocycles). Eastern Standard Time. December 14.—12:00 Noon—Program of selections on the Edison Laboratory phonograph and by the Ampico. 12:40 P. M.—New England weather forecast. 12:45 P. M.—Closing report on farmers produce market report. 3:00 P. M.—Amrad Women's Club program; talks by Miss Dorothy H. Goodwin; especially arranged Edison program, arranged by Vocalion Hall, Boston. 5:30 P. M.—Closing stock market reports; live stock markets reports; government reports. 6:15 P. M.—Code Practice, Lesson Number 188. 6:40 P. M.—Boston police reports. 6:45 P. M.—Late news flashes; sport news. 7:30 P. M.—Evening program. Selected verses by Mr. Charles L. H. Wagner, radio poet; Red Cross health talk, by Henry Copley Green, of the Metropolitan Chapter of the American Red Cross; evening's musicale.

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Chats About Broadcasting Stations

By Hirsch M. Kaplan

Suppose you've all missed our Newark neighbor station WAAM these past few days. Due to an unexpected accident at the station they will be off the air until further notice.

Miss Sylvia Waldon, violinist at station KSD entertained with some very pretty violin obligatos.

WGI was on the air with a musical DX contest with vocal and instrumental solos. The winner of this contest was to be decided by a vote of the listener in, so if you heard this novelty program don't forget to cast your vote.

WEAF sprung a surprise on us when they broadcast a scene from "Little Miss Bluebeard," a comedy featuring Irene Bordoni. Too bad it was not offered the latter part of the evening for I am sure that many more would have enjoyed listenin' to so splendid a performance. As it was many missed it.

The Campus Serenaders at station WHAZ furnished us with a splendid program of dance music. By the way, I've heard that their program was heard in Scotland during the international tests. Congratulations.

Instead of being put to sleep with a bedtime story, we are going to sleep with the music of some popular dance orchestra ringing in our ears. It seems that after 11 P. M. all stations that are on the air have a dance program to offer. Well, this is 1923, the jazz year.

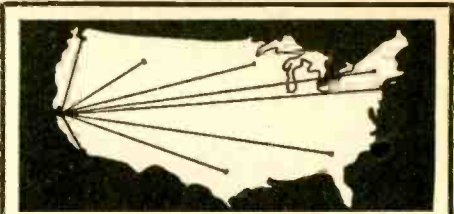
George W. Loft gave the women folks several recipes on "Home Candy Making" from Station WJAR. Say, old man, I'd like to know if you are any relation to the famous Loft candy manufacturer? For, what little I know about recipes, I can say that the ones you gave were jim-dandy.

The best bet for this week was Paul Specht, the "Master of Rhythmic Symphonic Syncopation," and his new Alamac Hotel Orchestra, which included the internationally famous Specht Georgians. They broadcast through Station WJZ. I would like to suggest that Paul charge the positions of his drummer and saxophonist before the "mike" as it will help matters a lot.

Say WOS, you'd better sound your S's, otherwise WOF will get the credit. The Hawaiian Trio is O. K.

Norfolk, Norfolk, Norfolk, Norfolk, ad infinitum. And that is the story of the big bout between battling Siki, the Senegalese wild man, and Kid Norfolk, the ebony-hued fighter of New York City's Africa. This bout was put on the air from WJZ.

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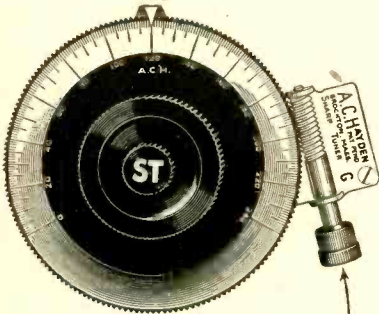
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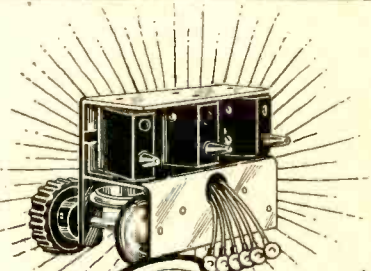
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ARRANGEMENTS for what is probably the greatest presentation of symphonic music which radio has yet attempted have been completed between Mr. Robinson of the American Orchestral Society and the Radio Corporation of America, with the result that Station WJZ, New York City, will broadcast the entire series of fifteen concerts which the Society, in cooperation with the New York Philharmonic Orchestra, has scheduled for the winter season. The first concert was given on November 25 at Cooper Union, and the series continues at regular intervals until April 8, 1924.

The fifteen concerts are classified in three groups of five each, the first five, which are given by the Orchestral Society for the New York Philharmonic Orchestra, and the second five, composing the annual series given by the Society to the Peoples' Institute, to be held in Cooper Union Auditorium, while the third group, the Children's Afternoon Concerts, will be given in Aeolian Hall. The ten Cooper Union concerts will be played by the entire Orchestral Society, over one hundred instruments in all, under the direction of Chalmers Clifton, while the Children's Concerts will be given by an orchestra of fifty-five picked members of the New York Philharmonic under the direction of Ernest Schelling.

The Cooper Union concerts will include the symphonic debut of several young American soloists of proven ability, and the programs will contain many compositions by young Americans in addition to thirty-two of the greatest symphonies. As the American Orchestral Society is composed solely of the finest of young American players, the concerts will present the absolute best in American composers, artists, and instrumentalists. The concerts will be given on the fourth Sunday and the second Tuesday of each month.

The educational series of Children's Concerts, under the direction of Ernest Schelling, will present the most famous symphonic compositions with musical explanation, and will include short biographical sketches of the composers. The first of this series will be given on the afternoon of January 8, and concerts will be continued on alternate Mondays thereafter.



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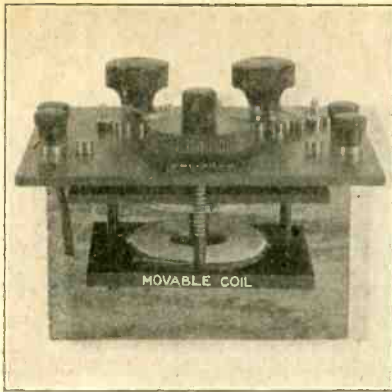
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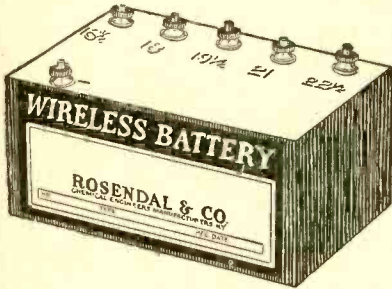
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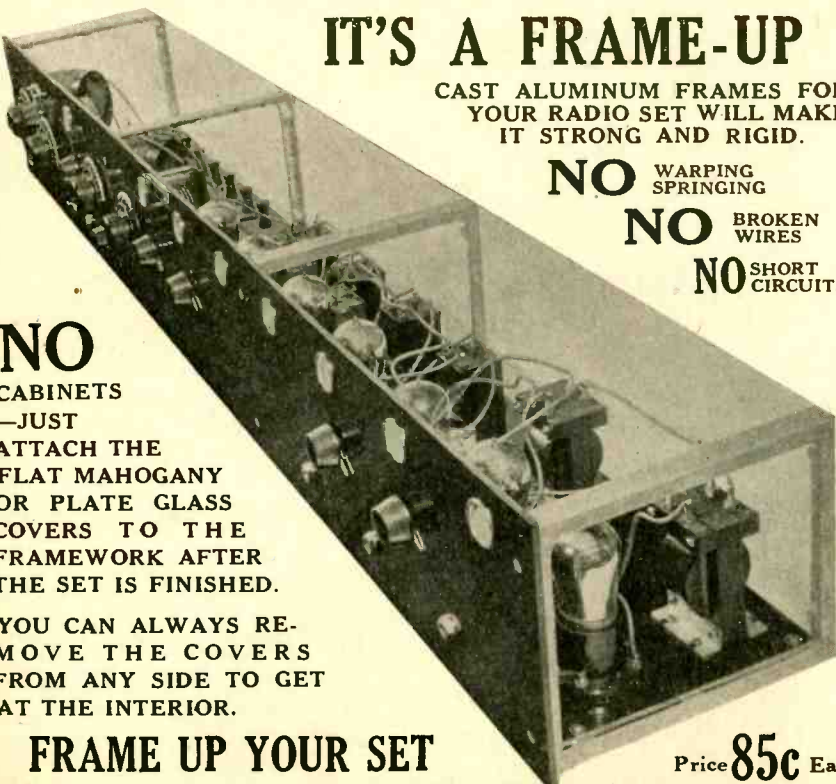
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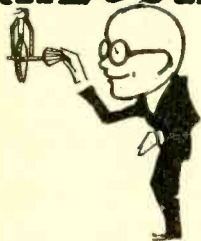
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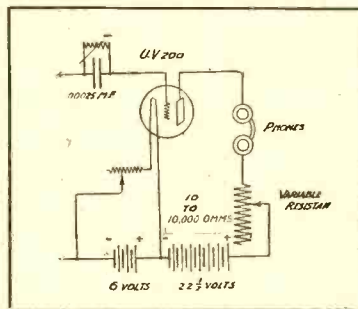
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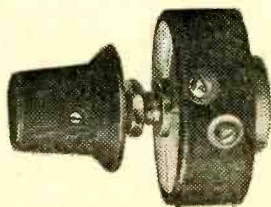
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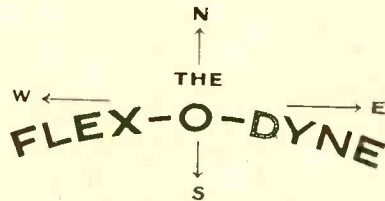
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RUSONITE CATWHISKER, Price 25c
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Manufactured Expressly for Reflex Circuits. Will Stand Up Under Heavy Plate Voltage.
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Without
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NO
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THE GUARANTEED
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Receiving Los Angeles
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Without Any Outside
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CHARLES HALL

1674 BROADWAY

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NEW YORK CITY

You Don't Need Tubes to get out of town. If you want new stations on your crystal set **WRITE ME TODAY.** Mine works 400 to 1,000 miles without tubes or batteries! Thousands have bought my plans and now get results like mine. **CHANGES OFTEN COST LESS THAN A DOLLAR.** Send self-addressed envelope for further information. Leon Lambert, 522 South Volusia, Wichita, Kansas.

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The Goodman
 The niftiest short wave tuner on the market. Great for present broadcasts, local and DX. Used in all parts of the world. Certificates of merit from testing laboratories. Pamphlet on request.
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 Tune in on station
WEAF (New York)
 every Thursday at 8.50 P. M. and listen to a story or article selected from
HEARST'S INTERNATIONAL
 This is one of the most popular weekly features "on the air"
FREE
 Write for Free Copy of the Latest Radio Reprint E. It contains a complete story from Hearst's International Magazine. Address Radio Editor, Hearst's International Magazine, 119 West 40th Street, New York City.

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 Including full size blue prints of panel layout, complete picture hookup, and fully illustrated instructions for construction and operation.
 Coils are fully assembled, made exactly as specified by Mr. Cockaday. D coil bank wound. Far more efficient than any home-made coils.
 Standard parts for this sensational circuit—panel, coils, condensers, verniers, variable resistance, vernier rheostat, socket, double jack, dials, switch, contact points, posts, busbar, wire, spaghetti, etc. (no tubes or phones).
 Complete for \$11.65
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 Send no money. **PAY THE POSTMAN**
 All Goods Shipped Parcel Post C. O. D.
RADIO SURPLUS STORES
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HUNT'S UNIVERSAL HAIR-LINE RADIO TUNING DEVICE

 PATENT APPLIED FOR

OVERCOMES BODY CAPACITY
 Gives micrometric adjustment outside the field of inductivity.
 Tested and approved by amateurs and experts. Enables you to tune distant stations easier and more clearly. Simple as A B C. Installed from outside, no dismantling of your set necessary. Audibility made more natural or less distorted by the fine adjustments obtained. One Hunt's Device handles all dials on set or several sets. Costs only one dollar on guarantee of money refunded if not satisfied. Ask your dealer or order direct from **Hunt Co., 486 Shrine Bldg., Memphis, Tenn.**

Don't miss a number of Radio World. Subscribe by the year. \$6.00, fifty-two numbers, postpaid.

Distance Records Made by Earnest Dial Twisters

DX Nite Owls, Attention!
THE DX season is now upon us.
 All faithful DXers are requested to get ready for the fray and prepare themselves for the night vigil.
 Send your records to the DX Editor of **RADIO WORLD.**
 Write only on one side of the paper and write clearly.
 Give full particulars of your location, your set, your aerials and other items of interest.

Miss Davis Qualifies On One Tube
 From Miss Miriam T. Davis, 812 Washington St., South Braintree, Mass.
 I have read your DX column with much interest and think, perhaps, some of your readers will be interested in my record with a flivver hook-up using one UV200 tube.
 On the evening of October 30, 1923, from 8:00 to 12:30 P. M., I received the following stations with remarkable clearness:
 KDKA—Pittsburgh, Pa., KDKA orchestra; WOR—Newark, N. J., dance music; WIP—Philadelphia, Pa., WIP orchestra; WBZ—Springfield, Mass., lecture; WGY—Schenectady, N. Y., WGY instrumental quartet; WJAR—Providence, R. I., trumpet solos; WJZ—New York City, N. Y., piano solo; WMAK—Lockport, N. Y., dance music; WJAX—Cleveland, Ohio, organ recital; WFI—Philadelphia, Pa., violin solos; WNAC—Boston, Mass., regular concert program; WCAE—Pittsburgh, Pa., baritone solos; WEAF—New York City, N. Y., lecture; KYW—Chicago, Illinois, soprano solos; WHN—New York City, N. Y., popular music; WCAP—Washington, D. C., soprano solos; WSAI—Cincinnati, Ohio, dance music; WMAQ—Chicago, Illinois, violin solos; WJAZ—Chicago, Illinois, bass solos; WDAP—Chicago, Illinois, baritone solos; WCX—Detroit, Michigan, "Red Apple Club;" WOAW—Omaha, Nebraska, radio jokes and police reports.
 This is a total of 22 stations, covering a distance of 9,361 miles, direct air-line.

Crystals to the Front!
 From W. H. Cahoon, 125 Commercial St., Lynn, Mass.
 Reading your articles in **RADIO WORLD** every week I was very much interested in Mr. R. L. Dougherty's article, "A Circuit for Clarity Plus Distance," in October 20 issue. I have tried three or four circuits, but I think that this one has them all beat.
 I am using an Atwater Kent variometer, Acme R. & A. 2 transformers, Dubilier .0005 and .001 Micadon condensers, a home made variocoupler with 90 turns on primary and 60 turns on rotor, and a 23 plate variable condenser shunted across the rotor. I have tried UV201-A and 201 tubes, but I find UV 199 with 30 ohm rheostats operate best. I am using an Erla fixed crystal detector in my circuit. I added on one (1) more stage of audio amplification and find it very good. I am having fair results picking up stations out through
 (Concluded on page 31)


Rechargeable Storage 'B' Battery
Build Yourself a 100-Volt Storage "B" Battery From Edison Elements \$9.00.
 140 Volt \$13.50, consisting of 140 elements, tubes, separators, wire, electrolyte and complete instructions. Assembled every 100 Volt, 1500 Milliamperes, \$17.50. 140 at \$23.50.
 Unassembled 100 Volt Battery, consisting of elements, cabinet and Bakelite panel board, double pole, double throw switch, rubber knobs \$13.50. 140 Volt Battery \$17.50. Drilled elements 6c per pair; glass tubes, 2c each; separators, 1c each; nickel wire 1c per length; rubber covered switch wire 2c per foot.
MAIL ORDERS FILLED
W. ROBERTS STORAGE "B" BAT. CO.
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 Near Broadway and Myrtle Ave. Tel. Pulaski 2023

Federal Standard Radio Products
 Standard of the Radio World, 130 separate units, each fully Guaranteed.
 Write for Catalog.
Federal Telephone and Telegraph Co., BUFFALO, N. Y.

Loudest and Most Powerful Radio Crystal
 DX-ALENA, the Sensational, Synthetic, Guaranteed Radio Crystal. Each Crystal tested on Broadcasting 50 miles distant. Fifty cents postpaid. Dealers should get our attractive proposition.
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 DISTRIBUTORS
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ALL LINES OF RADIO MERCHANDISE
 ARE IN OUR STOCK
 New York Prices Direct to You
 Just Tell Us What You Want
GLOBE RADIO SHOP
 115 West 23rd Street New York

Excellent Xmas Bargains for Radiophans.
 UV200, \$4.25; UV201A, UV199, WD11 or 12 tubes—\$5.45. Sockets—\$0.50; Bradlevstat—\$1.65; (Workrite Rheostats—\$1.00, Super Variocoupler or Variometer—\$2.85, EZ Tune Dial—\$0.69, Switch Set—\$0.45); (Mignon Vernier Var. Condensers .001—\$3.15, .0005—\$2.95); Mica Grid Condensers—\$0.25; (Freshman Var. Grid Leak—\$0.65, with Condenser—\$0.90); All American Audio or Radio Transformers—\$4.00; Erla Reflex Transformers—\$4.25; Tricoil Radio Transformers—\$1.80; Erla Crystal—\$0.90; (Burgess B Batteries 45V—\$4.75, 22V—\$2.65); Bind. Posts—\$0.04; Phone Tip Jacks—\$0.23; Phone Plug—\$0.45; Sgl. Circuit Jacks—\$0.40; Two Cir. Jack—\$0.60; Brandes 3000 Head Set—\$7.75; Dials 3"—\$0.25; Melo Lighting Arrestor—\$0.45; Radio Panel 7 x 14"—\$1.50; Cabinet 7 x 14"—\$3.50; France 6V. 6A. Battery Charger—\$13.25; Tuska No. 225 Receiving Set—\$67.75; Radio Call Book—\$0.45.
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7 COMPLETE PLANS 50c
 Reinartz Tuner
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 Two Stage R. F. Amplifier
 WD-11 Hookup.
FULL SIZE TEMPLATES
 List of parts, diagrams, and directions
AT DEALERS OR DIRECT FROM
 S. Newman Publisher

 74 Dey Street, New York

Federal Trade Commission Reports on the Radio Industry

(Concluded from page 21)

ed at a charge of only one cent per word. The refusal to sell or lease apparatus to competitors for international communication purposes is included in the well defined policy of the Radio Corporation of America. It also affixes to the apparatus sold a license notice, the object of which is to restrict the purchaser's use of the device to amateur and experimental purposes. In supplying ships with apparatus, devices and appliances, the ship owners are required to execute an agreement which provides that the apparatus, etc., furnished by the Radio Corporation is licensed only for use on board ships and aircraft in communications destined to or originating on such ships or aircraft.

The Radio Corporation distributes its products chiefly through wholesale concerns handling electrical supplies. In order for a distributor to handle these goods it must furnish evidence that it has the facilities for conducting a wholesale business and give an initial order amounting to not less than \$25,000. Independent manufacturers of sets are not sold vacuum tubes and other patented devices for resale in connection with sets manufactured by them. This was a hardship, particularly when there was a shortage of tubes, as the dealers were unwilling to furnish them with tubes. The investigation shows that the shortage in tubes was confined to three of the six types manufactured and prevailed during 1922 and first few months of 1923. There was a marked increase in the demand for tubes as the industry developed, as is shown by the orders received by the Radio Corporation which were as follows: 1921, 112,500; 1922, 1,583,021; and for the first nine months of 1923, 2,931,262 tubes. Although the officials of the Radio Corporation admit that they do not carry dealers who confine their orders to tubes exclusively, there is little evidence that the Radio Corporation required dealers to handle their goods exclusively or favored such dealers, in the supply of tubes, as compared with dealers who also handled apparatus manufactured by others.

The DeForest Radio, Telephone & Telegraph Company which is now engaged in the manufacture and sale of a modern vacuum tube, also affixes to its product notices with respect to use similar to those used by the Radio Corporation. This company has recently adopted the policy of making the distributors of its products agents.

The Commission submits no conclusions in this report as to whether the facts disclosed constitute a violation of the anti-trust laws, as the House resolution under which the report was prepared called only

for the facts and data "as in the opinion of the Commission may aid the House of Representatives in determining whether . . . the anti-trust statutes of the United States have been, or now are,

being violated . . . ; and such other facts as in the opinion of the Commission may aid the House in determining what further legislation may be advisable."

SHELTONE LOUD SPEAKER

This NEW Pyralin-SHELTONE, made by DUPONT, gives greater volume—better tone and is more beautiful in appearance.

AT ALL DEALERS

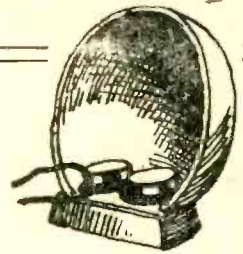
Use the SHELTONE with ANY good phones and get wonderful results. We are distributors for Nath. Baldwin phones and the new Baldwin Loud Speaker.

THE SHELTONE CO.

185-189 Clinton Avenue

Newark, N. J.

Discount to Dealers



\$3.00

Natural Re-PRODUCTION



Atlas AMPLITONE LOUD SPEAKER

The superiority of the Atlas re-PRODUCTION is pronounced. Patented "double diaphragm" renders music in all its original purity. Adjustable to individual receiving conditions. Ask your dealer for a demonstration TODAY!

Write for Booklet "S."

What have you accomplished with your Atlas Amplitone? Tell us about it.

\$25

Trade Mark

Multiple Electric Products Co. Inc.

ORANGE ST. RADIO DIVISION NEWARK, N. J.

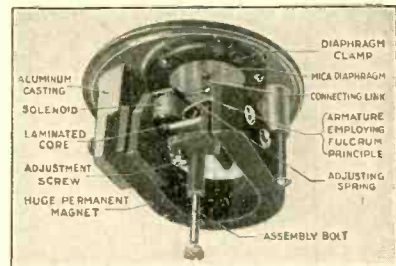
THE TRINITY LOUD SPEAKER

TYPE "A"
21" FIBER
HORN

\$25.00

TYPE "B"
(For Phonographs)

\$12.50



INTERIOR CONSTRUCTION

An ear phone is an ear phone no matter how fancy the horn that covers it may be, and, due to the delicate construction of an ear phone it is utterly incapable of giving true tone reproduction, especially when relatively large currents are passed thru its coils, such as the output of a two-stage or power amplifier.

The Trinity Loud Speaker element embodies the well-proven and tested principles of the phonograph reproducer with the soundest principles of electromagnetic design best adapted for loud speaker operation. It is not an ear phone when placed on a head band and a loud speaker when covered with a horn. It is a sturdy loud-speaking element ALWAYS.

SEND FOR LITERATURE.

TRINITY RADIO CORPORATION

446 TREMONT STREET, BOSTON, MASS.

Guaranteed Tube Repairs

WD-11	\$3.50
WD-12	3.50
UV-200	2.75
UV-201	3.00
C-300	2.75
C-301	3.00
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All tubes positively guaranteed to be satisfactory. Special discounts to dealers.

Tubes returned P. P. C. O. D.

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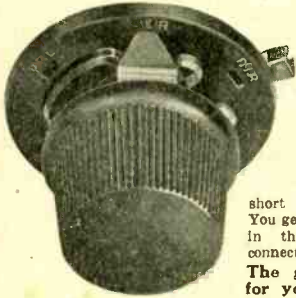
Tube at One-Half Cost



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The Marvel-Switch

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Series,
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Strictly anti-capacity. Build wisely. Have an arrangement for switching from long to short, or from short to long waves. You get added efficiency in the direct-ground connection. The greatest value for your money. Instructions for mounting given with each instrument.

List Price \$1.25

Attractive discounts for dealers and jobbers. Write for descriptive circular.

IF YOUR DEALER CANNOT SUPPLY YOU, SEND PURCHASE PRICE TO

MARVEL-SWITCH CO.

28 WEST 25TH STREET NEW YORK

Lament of the Radio Widow

By MAUDE M. TREGASKIS*

GATHER around me, friends of my youth!

List while I tell you the terrible truth. The man of my choice, the man of my heart

Is loving "another," a new-found upstart, And tonight I'm a radio widow!

The fire-lighted hearth, the lately shared book,

The garden, the porch, and our music-room nook,

Have lost all their charms for him. Now sadly I see

What a radio-bug a husband can be— Oh, pity the radio widow!

He sits with receivers clapped over his ears,

Yet, believe me, there isn't a sound but he hears.

We tiptoe about, but the newspaper's rattle

Has been known to precipitate many a battle

In the home of the radio widow.

'Twas just yesterday I hastened to see Why the man of the house was calling for me.

"A receipt for clam chowder," he hurriedly said,

And he clapped the receiver-piece hard on my head;

Thus he stoops to the radio widow.

And night before last a political speech, By a notable statesman, his viewpoint to teach,

Came radio-wise; but who cares what his view is?

The point was—it came all the way from St. Louis

To the spouse of a radio widow.

*In the New York Times.



SUNBEAM

12 Years at the Same Spot.

King Battery Chargers for AC Current, regularly \$18.00, our price, \$14.50

Full line of splendid electrical specialties, curling irons, stoves, grills, hair dryers, toasters, etc., at big discounts from regular prices.

FREE—with every order one of our handy, Pocket Size Radio Record Books.

SUNBEAM ELECTRIC CO.

71 Third Avenue

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Weekly Special XMAS OFFERINGS

Stanley & Patterson Devau Gold Seal Headsets (gold-plated). A handsome Christmas gift for the radio fan... \$6.00

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We handle only well known and nationally advertised lines. On top of that we give the kind of service you expect.

And—Our discounts are RIGHT.

Drop us a post card for our 36-page catalog just off the press.

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WERNES & PATCH
159 N. STATE ST., CHICAGO, ILL.

DO YOU WANT TO BUY, SELL OR EXCHANGE RADIO OR OTHER GOODS? TRY THIS DEPARTMENT AT 5c A WORD

RADIO WORLD'S QUICK-ACTION CLASSIFIED ADS

The rate for this RADIO WORLD QUICK-ACTION CLASSIFIED AD. DEPT. is 5c. per word (minimum of 10 words, including address), 10% discount for 4 consecutive insertions, 15% for 13 consecutive insertions (3 months). Changes will be made in standing classified ads. if copy is received at this office eight days before publication. RADIO WORLD, 1493 Broadway, N. Y. C. (Phone, Bryant 4796).

GREBE TUNED R. F. (RORN) with 4 Output Coils. Brand new. List price \$60. Sacrifice \$25. Hughes, 239 Moshulu Parkway, North, Bronx, New York City.

\$100 INVESTED IN AMERICAN MARCONI in 1911 yielded a profit in 1912 of \$5,000. Wireless and Radio Christmas Circular, suggesting 36 combination offerings, pre-eminently appropriate for Holiday Gifts, now ready. Mailed free on application. P. C. Kullman & Co., The Wireless Brokerage House, 110-116 Nassau Street, New York, U. S. A.

B. BATTERIES, LOUD SPEAKERS, Phones, Chargers, Sets, etc. All new standard goods sold direct to consumers at wholesale prices. Send for price list. All goods sold with money-back guarantee. National Reserve Radio Company, 2 Stone Street, New York City.

RADIO GIFTS—NO. OF RADIO WORLD, dated December 1. Do you want to build a three-tube super-regenerator? Are you uncertain as to what presents the folks would like? If so, see the Holiday Gifts Number of RADIO WORLD. Start your yearly subscription with this fine number and be assured of 52 consecutive numbers of the great radio weekly. 15c. per copy, \$6.00 a year. RADIO WORLD, 1493 Broadway, New York City.

PATENTS—SEND DRAWING. OR. MODEL FOR EXAMINATION AND OPINION. Booklet free. Watson E. Coleman, Patent Lawyer, 624 F St., Washington, D. C.

PATENT applied for on method of using atmospheric electricity for power. Want parties to finance patents and development for interest. DANA BERG, Springfield, Mo.

STANDARD ELECTRICAL DICTIONARY—By Prof. T. O'Connor Sloane. Just issued an entirely new edition brought up to date and greatly enlarged. Price, \$5.00. The Columbia Print, 1493 Broadway, New York.

BROADCASTERS APPRECIATE THANKS. "Radio Applause Cards" make this convenient. Just mark them ballot style, address and mail. 20 for 25c; 50 for 60c; 100 for \$1.00, postpaid. Stamps not accepted. ERNEST F. DOW, West Newton, Mass.

LIVE experienced radio man would like to represent large manufacturer of radio supplies in Chicago territory. Well acquainted with radio dealers. Address Box X Z, RADIO WORLD

"RADIO TUBES," 1½ and 6-volt guaranteed tubes, \$3.25 each. RANDALL RADIO CO., 156 Pujaski St., Brooklyn, N. Y.

EDISON STORAGE BATTERIES, \$4.00; nearly new; cost \$40.00; Edison Elements, 15c dozen; 500 volt generator. Miners' lamps with Storage Battery, \$2.00. 824 North Fifth, Philadelphia, Pa.

ELEMENTS OF RADIO TELEPHONY, by Wm. C. Ballard, Jr. A standard book on radio telephony, the work of a recognized authority. Accurate, simple, clear, reliable and strictly up-to-date. For the technical man who wants to post himself on radio and for the radio enthusiast who wants the fundamental principles of radio and their application tersely and entertainingly presented. Price, postpaid, \$1.50. The Columbia Print, 1493 Broadway, New York.

LONESOME? Make new friends. Write Dolly Gray Agency, Box 186B, Denver, Colorado.

MAGNAVOX R3 or M1—Latest nationally advertised reproducers. List, \$35. Introductory, \$25. The factory sealed carton is your guarantee. RADIO CENTRAL, Dept. W., Abilene, Kans.

GENUINE EDISON ELEMENTS (new) for making "B" Batteries. Obtained from U. S. Government. A positive and negative element—6c.; glass tube—3c; all other parts at reasonable prices. Postage, etc., 50c. extra per order. Free instructions. TODD ELECTRIC COMPANY, 103 West 23rd Street, New York.

EXCHANGE JOLLY, INTERESTING LETTERS THROUGH OUR CLUB. Betty Lee, Inc., 4254 Broadway, New York City. Stamp appreciated.

DO YOU GET THE DX STATIONS? If so, you will want a complete and up-to-the-minute list of broadcast stations, such as began in RADIO WORLD for October 13, and was completed in RADIO WORLD for November 24. All United States and Canadian Stations, listed according to Name, Call, Frequency, Wave Length, and Power. The complete list of seven issues for \$1.00, or start your year's subscription with October 13 issue. RADIO WORLD, 1493 Broadway, New York City.

HEAR 2,000 MILES ON A ONE TUBE SET. A marvel of simplicity. Easily built, using standard parts. Diagram 50c. Scientific Radio Laboratory, 25 Third Avenue, New York.

BUILD AN ULTRA-AUDION REGENERATIVE SET at home. \$7.98. Postage 20c. Selective loud and clear. Parts furnished with drilled panel ready to mount. Cabinet, phones and tube extra. A. L. DUNN CO., 2 Betts Place, South Norwalk, Conn.

Hearing One Station Twice

AN interesting experiment was recently carried out by Westinghouse Station KYW, Chicago, which caused listeners who had not heard the announcement to gasp in wonder and look at their sets twice. This station tried picking up other local and more distant stations on their regular receiver, amplifying the broadcast and then re-transmitting it on the KYW wave length. Now if one tunes in on KHJ, around KYW's wave length, one will have to listen twice to hear whether it is really KHJ or a trick being played by KYW.

DX Records

(Concluded from page 28)

Chicago, Cleveland and Philadelphia on loud speaker. I had this outfit on exhibition last week at the Thomson Radio Club meeting of the General Electric Co. Three or four of the local engineers were looking it over and thought well of it. They had not seen this combination before, but were impressed with its work. I find tuning very sharp and hard, but when I get a station tuned in I have it good and clear without any interference whatever.

If Mr. Dougherty has made any improvement in this circuit I would be very glad to hear from him. I am going to give this outfit a good two or three months trial and after learning to operate it properly I think it will be very satisfactory. If any changes or additions are to be made in my outfit I would appreciate the information. Crystal detectors have it all over the tube for clearness of tone in both music and speech.

Here Is Some Dial-Twister!

From Irving Johnson, 4551 N. Clark St., Chicago, Ill.

I am a constant reader of RADIO WORLD and have experimented with many hook-ups printed in your excellent magazine, but have finally settled down to the Armstrong three-circuit tuner, which has appeared in your publication many times. I am using two W. D. 12 tubes, one step, with a T shape aerial 150 feet long. Since constructing my set on August 12 I have heard 85 different stations. It is difficult to cut through the powerful Chicago stations, and we DXers are up against it except on Monday night which is silent night. Then, oh, boy! with the ether waves from Lake Michigan subsided for the evening the Armstrong set reaches out its long arm and brings in everything in the air. Monday night, November 5, I tuned in 38 stations which are as follows:

6:10, WDAF, Kansas City, talk; 6:25, WIP, Philadelphia, signing off; 6:35, WJZ, New York, announcing; 6:40, WOC, Davenport, Sandman story; 6:43, KDKA, East Pittsburgh, Bedtime story; 6:55, WGY, Schenectady, announcing; 7:10, WCX, Detroit, talk; 7:20, WCAE, Pittsburgh, library news; 7:30, WBB, Kansas City, talk for children; 7:50, WLAG, Minneapolis, talk for farmers; 7:55, WCK, St. Louis, orchestra—No, No, Nora; 8:01, WCB, Zion, opening announcement; 8:10, WBZ, Springfield, signing off; 8:15, WLW, Cincinnati, talk; 8:25, WPAH, Waupaca, Wis., orchestra—Dreamland; 8:30, WHAZ, Troy, soprano solo; 8:35, KSD, St. Louis, organ; 8:37, WWJ, Detroit, Detroit News Orchestra; 8:40, WAAW, Omaha, World Waiting for Sunrise; 8:50, WOS, Jefferson City, orchestra; 8:55, WMC, Memphis, On Old Back Porch 8:56, WOR, Newark, baritone solo; 9:18, WEA, New York, signing off; 9:20, WRC, Washington, Rain No More—Wendell Hall; 9:30, WFAA, Dallas, College Theatre organ; 9:40, WOO, Philadelphia, organ; 9:45, WDA, Philadelphia, orchestra; 9:58, WOAW, Omaha, Our Little Home; 10:04, WBAP, Fort Worth, Woman's College Chorus; 10:15, WBAH, Minneapolis, announcing; 10:35, WGR, Buffalo, orchestra; 10:55, WDT, New York, signing off; 11:00, WSB, Atlanta, Fox Trot; 11:30, KFI, Los Angeles, piano—Somebody Else; 11:45, KGW, Portland, Merchant Marine Talk; 12:00, WOAG, Belvidere, Ill., piano solo; 12:30, CFCN, Calgary, testing.

Ackerman LOUD SPEAKER

Complete, Ready for Immediate Use

\$9.50

Delivered to Any Part of the United States.



For the price of a headset you can have a loud speaker that actually speaks for itself. Not alone that, but a loud speaker superior to many of the much higher priced ones now on the market. Standing 21" high, with 11" bell and made of heavy metal, eliminating vibration, together with its special loud speaking unit, this speaker reproduces voice and music far beyond expectations. Finished in plain black or brown, also special alligator grain in black and green or black crystalline.

If your local dealer is unable to supply you, send order direct to us and pay postman on delivery. Sold on a money-back guarantee.

Ackerman Brothers Co., Inc.
301 W. 4th St. (Dept. "RW"), New York, N. Y.

WEIGHS ONLY 8 OZ.

The Scientific Scientific

SEND NO MONEY!

20,000 TURNS EQUIVALENT TO 3,000 OHMS

Order TODAY by Postcard and Pay Postman on arrival

\$2.95

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LOUD SPEAKER UNIT \$1.95

We Guarantee The Scientific Headset to be the greatest value on the market. Try it for five days. If not satisfactory send it back and your money will be refunded immediately. Circular on request. Dealers wanted.

THE SCIENTIFIC ELECTRIC WORKS
98 Brookline Ave. Dept. D BOSTON, MASS.

MASTER RADIO AT HOME

You can become one quickly. Write TODAY for scholarship. Our up-to-the-minute Home Study Course in Radio is the last word. Covers all angles and every new development; includes over 600 diagrams and drawings of Radio Sets, circuits, hook-ups, parts, etc.

\$40 SCHOLARSHIP FOR PROMPT ACTION given without charge to the first thousand who enroll. This introductory offer to widely advertise this course cannot be repeated.

THIS OFFER UNRIVALED
A complete \$50 Radio Course, including 600 diagrams and drawings—40 separate lessons, and all it will cost if you act quick is \$10. Never a bargain like it before.

WRITE TODAY. If you would be sure of a scholarship send in your enrollment with \$10 TODAY. Money back if dissatisfied. You take no risk. Circular showing reduced reproductions of the 600 diagrams and drawings sent on request.

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Yorke Burgess, Superintendent
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YOU Are Interested in PRICES Here They Are!

	Retails	Your Price
Electric Soldering Iron	\$.25	\$.15
Reinartz Colls	1.50	.95
CRL Rheostat	1.10	.45
Adjustable Grid Leak and Condenser	1.50	.69

Cash with Order or C. O. D.

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North Shore Radio Works, Dept. 14
813 Mulford Street Evanston, Ill.

Sta-Fix Detector



PRICE

1.25

Patent Pending

GUARANTEE

THIS Detector is guaranteed to be perfect in every detail and properly adjusted to be clear in tone and volume, and subject to FREE exchange if found imperfect.

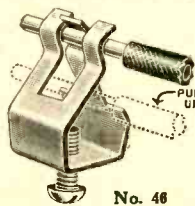
provided it has not been tampered with or glass broken, by presenting your sales receipt where purchased.

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Electric Service Engineering Co.
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Perfect Connections

are always sure with Fahnestock Patent Wire Terminal Grips Like a Vise Eliminates Vibrations Easily Attached—No Soldering Best of All for RADIO OUTFITS



No. 46

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CROSLEY
Model X-J
\$65

AS an acceptable gift that will bring untold lasting pleasure to the entire family, a Crosley Radio Receiver is just the thing. Local interference may be easily tuned out, and distant stations brought in clearly and distinctly.

The Crosley Model X-J, illustrated above, is a 4 tube set consisting of one stage of tuned radio frequency amplification, detector and two stages of audio frequency amplification. There is also the Crosley Model VI; price \$30, an exceptionally good 2 tube set and the beautiful Console Model X-L at \$140.

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Kennedy Tuner Revolutionizes Radio

Brings in any broadcasting station on any tube set

The Kennedy Tuner takes the place of "the old reliable" honeycomb coils. It is made of genuine Bakelite and best of material throughout. Radio "fans" using the Kennedy Tuner save the price of a honeycomb coil and a 23 plate vernier condenser, an actual saving of parts amounting to \$9.20.

The Kennedy Tuner hooked up to a receiving set as per the diagram that comes with it, and which is so simple that anyone can install it, revolutionizes your old receiver. Without difficulty one hears the broadcasting stations from Los Angeles to London. THE KENNEDY TUNER also cuts out all interference, so that reception is clear, loud and distinct.

**KENNEDY TUNER SAVES YOU \$9.20
AND DOUBLES THE JOYS OF RADIO**

3 Honeycomb coils @ \$1.40	\$4.20
1 Honeycomb coil mounting	5.00
1 23 Plate Vernier condenser	5.00
	<hr/>
	\$14.20

KENNEDY TUNER \$5.00
TAKES THE PLACE OF THESE ITEMS
SAVING \$9.20

THREE TUBE SETS:—

If you have a three tube receiver, why be limited to Locals and 400 or 500 mile reception with phone on when with a Kennedy Tuner you can at least double your reception not on phones but **Loud Speaker**.

Mr. W. R. Crosby of the N. Y. JOURNAL sat in with Mr. T. J. Kennedy, the inventor of the Kennedy Tuner, and heard him tune in 2LO, getting London clear and distinct.

HELP YOUR NEIGHBOR

If you have a single circuit set, show a little consideration for your neighboring radio fans by operating it with the rheostat turned just as low as possible. You are sending out a terrific whistle all the time on such a set, and every time you touch the dial you are causing untold interference for everyone for several blocks around. It is also a good thing to keep the B battery voltage rather low on the detector.—*Reprint from N. Y. Journal.*

SEND NO MONEY! JUST WRITE to the inventor, T. J. KENNEDY, 137 WEST 48th ST. NEW YORK CITY, and he will send you the tuner, complete diagram and full detail information and on receipt of same you will hand the postman \$5.00 and a few cents for parcel post.

Absolute Satisfaction Guaranteed or Money Refunded