

AN EFFICIENT RADIO COMPASS (See Inside)

15c. a Copy

September 29
1923.

\$6.00 a Year

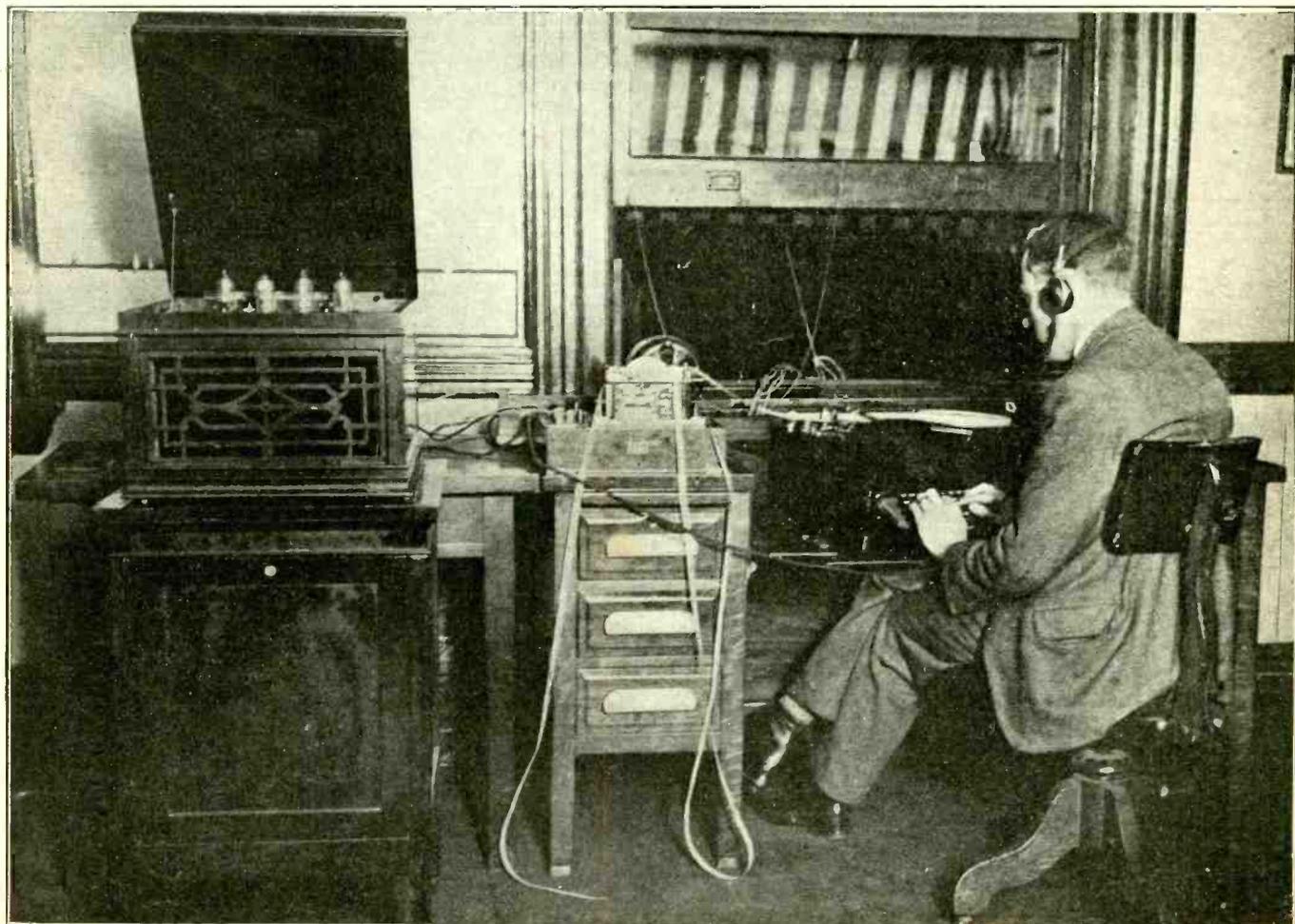
RADIO WORLD

Title Reg. U. S. Pat. Off.

ILLUSTRATED

EVERY WEEK

RELAYING BIG FIGHT NEWS NEW YORK TO BUENOS AIRES



(C. Photo-News, N. Y.)

Though thousands of American fans listened intently to the blow by blow returns of the Dempsey-Firpo battle, recently held at the Polo Grounds, New York City, the South American friends and supporters of the contender were not less interested. In order to supply them with instant news of the fight as broadcast, the above apparatus was used. In the first place, the fight returns were received over the air at the Broad Street office of the Radio Corporation of America, by the receiver shown. Then they were typed on the special high speed transmitting perforator, which in turn sent the news over special land lines to the Rocky Point station of the RCA and from there to Buenos Aires where the code was deciphered and the story of the fight was broadcast to South American fans. For further details and pictures see page 6.

VALUE OF RADIO MARKET REPORTS (See Inside)

The Wireless Oracle

By Hirsch M. Kaplan

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The supersensitive phone.

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The quality phone at a minimum price.

Be sure to send for a copy of our booklet, "What you should know about Radio Reception."

SUNBEAM ELECTRIC COMPANY
71 THIRD AVENUE NEW YORK 207 EAST 14TH STREET

Stations broadcasting radio plays could take a few tips from WGY, which came through the other night with three exciting melodramas. The music between acts especially is a good feature.

Charles Wold and his musical glasses once more gave us a half hour of enjoyment. This time he broadcast through Station WOR. Programs of his class sure do make a hit with radio audiences.

It may be strange, but whenever I pick up a DX station they're bound to have an orchestra on their program at the time. Do you find it that way also?

During the past week WWJ came through with its wonderful Detroit News Orchestra, who are the toddlers' delight.

WDAF, with its celebrated Coon-Sanders Orchestra, gave me an hour of the most delightful dance music that I've ever heard and that is saying something.

The following night WLW broadcast a program of dance music as rendered by the Eastern Hill Dance Orchestra, and let me tell you, that they certainly made you dance, even if you didn't want to. They're a great bunch of harmonizers.

Too bad WHN's modulation is so poor, as the programs they offer these days are good. Take, for instance, the other night when they broadcast a program consisting of the California Ramblers, an orchestra of high calibre, and the Lyric Quartet from the Broadway hit "Adrienne."

The station of the United States Playing Card Co., WSAI, offered a 95 per cent. concert program.

An organ recital that was on a par with many of those broadcast from our local stations was transmitted from the Modern Theatre, Boston, through Station WNAC.

Did you hear the new addition to the "Lucky Strike Orchestra?" It is the "Lucky Strike Trio," composed of the pianist, saxophonist, and xylophonist of the orchestra. This trio is another best bet for WEAf.

Firpo down, Dempsey down, Firpo down, Dempsey down—that is the story of the big bout that was broadcast through Station WJZ the other night. J. Andrew White is one of the few men of today who can put life into the description of a fight. For excitement I and twenty others who were seated around my radio set think that this bout had it all over on any of the others which have been broadcast.

Station WCBD, whose slogan is "Man Prospers Where God Rules," came through just in time to be heard signing off. Can you beat it? And to know that you just missed an unusual concert program!

Bob Brown, who played at Station WDAP of the "Sun Dodgers," sure can "Say It With a Ukelele." The Harmony Girls, also from this station, offered a pleasing program which I believe made a hit with all who listened in.

Why don't you broadcast more often, Ralph Meyhew? I know that the children await your stories with pleasure.

It is not very often that we hear a good program of Hebrew selections, but those offered by Cantor Green and his choir were a treat for the Hebrew race.

Thornton Fisher's daily sport talks through Station WEAf certainly must have all the athletic fans tuning their condensers for that station. Of all sport talks broadcast through the various stations his are the best for they are given daily and are therefore the latest obtainable.

Sporting fans attention! The next big event in the athletic world will be the Baseball World Series Championship. It will most assuredly be broadcast. Therefore, if you have not already purchased a radio outfit or at least dusted off the one that has been lying on the shelf during the past warm months, get busy!

The Bruno Brothers' Chin Lee Orchestra once more offered a swell program of dance music. Here is a chance for your dance friends to spend an enjoyable hour. They're from station WEAf, and will be on the air every Saturday afternoon for the next three weeks.

Archie Bell through station WJAX broadcast a very interesting talk about the part of Japan which has suffered most from the earthquake.

You who are interested in the stock reports and have not been posted on them during the day may obtain them through station KDKA who broadcast them every evening at 9:45 P. M.

WHAM had a dance orchestra that was all to the mustard. We'd advise the announcer to speak a "leettle bit" louder and slower, or else WAAM will be getting the credit.

The musical comedy, "Noah, Jonah, and Cap'n John Smith," given by Kathleen Kirkwood's Triangle Players, through Station WOR, sure was the berries. But why don't you companies that give us such splendid plays listen-in to WGY? I can give you my word of honor that you'll learn something.

Let me suggest WHN, that instead of repeating, "This is Station WHN, located in Loew's State Theatre Building, at Broadway and 45th St., New York City," before and after each number, that you adopt some slogan such as it used to be, "Home Sweet Home," that would not only be easier for you, but also less monotonous to the listener in. Another thing that gets us, is the announcing of your telephone number ever so often.

RADIO WORLD

[Entered as second-class matter, March 28, 1922, at the Post Office at New York, N. Y., under the Act of March 3, 1879]

A Weekly Journal Published Every Wednesday and Dated Saturday, by Hennessy Radio Publications Corporation from Publication Office, 1493 Broadway, New York, N. Y. Telephone: Lackawanna 6976.

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September 29, 1923

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An Efficient Radio Compass

By Dr. Alfred Gradenwitz

ENDEAVORS have long been made to use radio apparatus for finding a ship's bearing, but though the problem at first sight seems simple enough, there are so many difficulties of detail met with in actual practice that no fully satisfactory results have so far been obtained. Two fundamentally different methods are used in this connection, according as either radio transmitters or radio receivers on board ship are resorted to as direction finders. In the former method, which, thanks to the use of very short waves, has just been developed to a promising stage by the Marconi Company, radio signals are sent out from the ship's ordinary board station, the direction of which, as ascertained by several direction-finding stations on the shore, is eventually retransmitted to the ship.

The other method, which because of recent improvements in the design of vacuum tubes, seems to afford even greater possibilities, has been adopted by the Telefunken Company, whose improved radio compass, during trial trips from Kiel, Germany, aboard the surveying vessel "Panther," has shown remarkable accuracy and reliability. The position both of the ship carrying the instrument on board and of transmitting stations on the coast or on board other vessels could even in the densest fog and with a rough sea be ascertained with a maximum error of less than a degree.

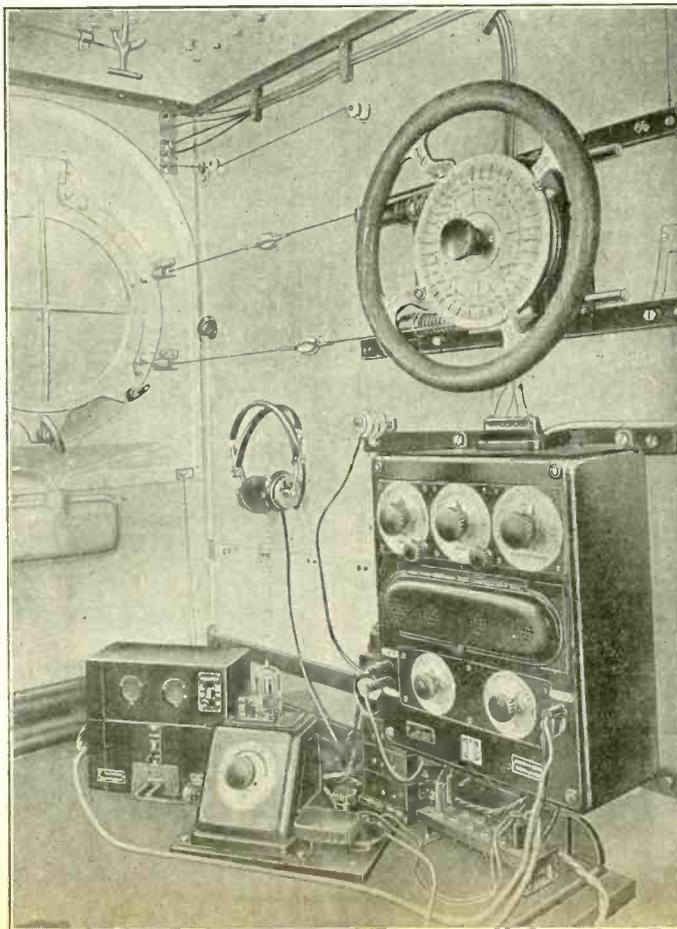
The new radio compass comprises a small rotary loop antenna which, of course, does not always give well defined minima, nor enable the direction of the transmitting post to be ascertained immediately. In fact, Fig. 1 illustrates the theoretical field curve of a rotary frame aerial during a rotation from 0 to 360 degrees, which comprises two acoustic maxima as the coil axis of the loop antenna at right angles to the line connecting the transmitter and receiver, and two

minima as the axis coincides with this line. However, such an ideal field curve hardly ever occurs in actual practice, the influence of existing electric fields displacing the minima positions referred to. This disturbing factor should accordingly be compensated for and while a number of more or less efficient methods have been suggested to this effect, a loop antenna rotating round a vertical axis in conjunction with an additional non-directional antenna has in actual practice been found to give the most satisfactory results.

This auxiliary antenna supplies either by capacity or inductance coupling, additional amounts of receiving energy the amplitude of which can be made equal, though opposite in phase, to that of the disturbing field, so as effectually to compensate any disturbance. In the place of a special auxiliary antenna, the earth of the frame aerial can be called upon to supply the non-directional receiving energy required for correction, this earth, which as far as possible should be provided in the centre of the loop coil, deriving the antenna effect from the latter.

Inasmuch as currents derived from the two halves of the loop are opposite in phase and accordingly compensate one another to a small fraction, this small fraction alone is to be corrected. Successful results have also been obtained by means of earthed rotary condensers connected up either to one or the other half of the loop coil. While an arrangement such as this obviously requires some additional superintendence, this does not entail any material complication of the scheme. The Telefunken direction-finding has been so dimensioned as to exclude any reaction on the tuning in correcting either of the receiving minima.

High-vacuum cathode tubes are used as amplifiers in the case of high-frequency amplification, as audions,



Wireless Compass Aboard Ship

as well as with low-frequency amplification. A special small heterodyne is used for receiving signals from continuous wave transmitters, which can as well be used in direction finding with musical spark transmitters over great distances. Though the timbre of musical spark signals is altered in this case, the heterodyne in the case of low acoustic intensities in the receiver has just been found to insure a considerable amplification, thus greatly improving the accuracy of

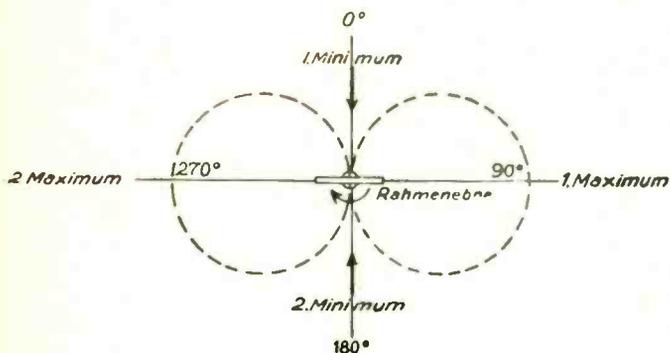


Fig. 1. Theoretical field curve of rotary frame aerial of radio compass. (Rahmenebene—Frame plane.)

readings. Actual tests have shown a Telefunken direction-finder with seven cathode tubes to ensure the same range as an efficient receiver in connection with an elevated aerial on board ship using four cathode tubes for receiving and amplifying, the direction of musical spark transmitters being ascertained up to a distance of 600 kms. and that of 1 KW vacuum tube transmitters up to 1000 kms. and more.

Fig. 2 is a schematic diagram showing the general arrangement of the direction-finder. The small rotary

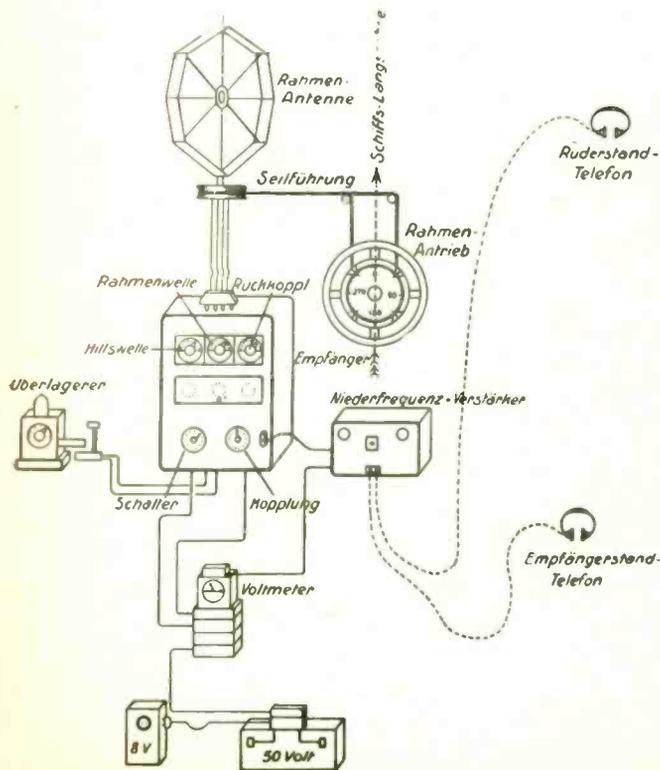


Fig. 2. Schematic view, showing arrangement of radio compass. Rahmen-Antenne—Loop Antenna. Seilführung—Pulley Rope. Rahmen-Antrieb—Loop Drive. Schiffs-Longsachse—Longitudinal Ship Axis. Ruderstand-Telefon—Helmsman's Telephone. Empfängerstand-Telefon—Receiver Telephone. Rahmenwelle—Loop Wave. Rückkoppl—Back Coupling. Hilfswelle—Auxiliary Wave. Empfänger—Receiver. Niederfrequenz-Verstärker—Low Frequency Amplifier. Überlagerer—Heterodyne. Schalter Kupplung—Coupling.

loop antenna is about 0.8 meter in diameter and is arranged amidships at a suitable place, all metal masses of any material size being situated at least one meter away. No considerable amount of metal liable to shift should be in the vicinity of the loop.

Four different lines of connection have been provided between the loop coil and the receiver. The receiver handle marked "loop-wave" enables the loop circuit to be tuned to wave lengths ranging between 440-1250 meters. The handle marked "back-coupling" enables the damping to be reduced. The handle marked "switch" serves to effect a selection between the various means of correction. The coupling between the loop antenna and the corrective arrangement is marked "coupling," while the handle bearing the inscription "auxiliary wave" allows the corrective arrangement to be tuned properly. The heterodyne, for which a special handle enables the wave length to be selected, is coupled by means of a coupling loop, and a low-frequency amplifier connected with several telephone receivers enables the telephone current to be amplified.

The helmsman fitted with a head telephone is in many cases able directly to steer the ship according

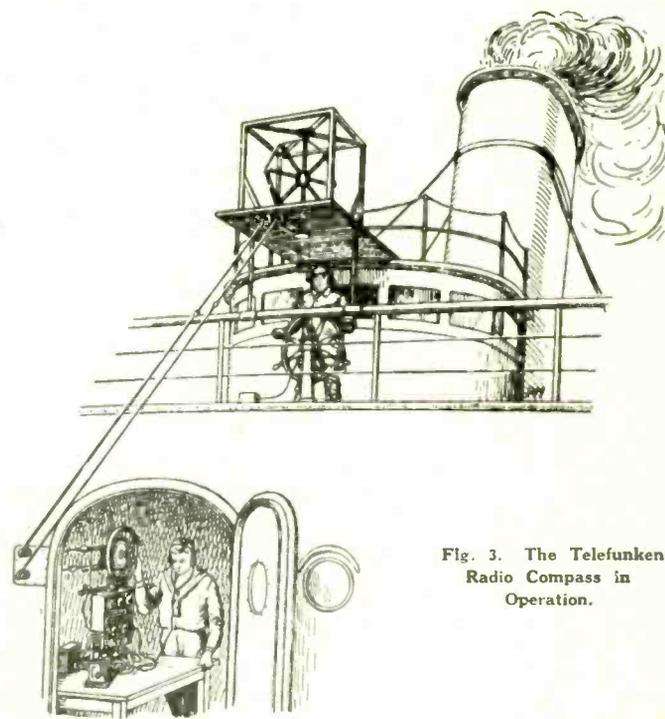


Fig. 3. The Telefunken Radio Compass in Operation.

to the functioning of the wireless direction-finder. A 6-volt battery sufficing for a 20-hours' operation is used for heating, while all anode circuits of the cathode tubes are fed from a 50-volt battery working several months on a single charge in the case of permanent operation.

Apart from the disturbing electric fields referred to in the beginning, there are other disturbing factors due to the influence of the hull, deck structures, aeri-als and near-by metal objects. However, all these disturbing factors can be ascertained once for all by comparing the results of optical and wireless direction-finders respectively, and can be allowed for by means of a special correction curve, which bears a striking resemblance to the deviation curve of magnetic compasses. A non-compensated magnetic compass on the same ship was found to show deviations about twice those of the non-compensated wireless compass. While the correction can in the case of rough readings be inferred from a simple table, the curve should be resorted to for the sake of accurate measurements.

Ships Farm Products on Radio Market Reports

By C. C. Hermann

WHAT benefits do you receive from your radio?" I asked Vaner Larson a few days ago. Mr. Larson lives on a 280-acre farm $4\frac{1}{2}$ miles south-east of Sherrard, Ill.

"We tune Davenport daily for the market and weather reports. The radio brings us the latest news and excellent concerts from Chicago, St. Louis, Kansas City, Davenport, Louisville, Ky., and many other places. It has reduced our trips to the nearby cities for entertainment and goes far towards keeping the children at home," replied Mr. Larson.

"Have you derived any definite financial benefits due to the reception of weather and market reports?" I inquired.

"We have," was the emphatic reply. "We have shipped hogs on the strength of radio market reports and we plan our farm operations with the weather reports received by radio as a basis. Since installing our radio we have enjoyed an outside contact that impresses us with the bigness of things, a feeling that we have never experienced before. It seems to show us greater responsibilities individually."

I was much impressed with Mr. Larson's radio ex-

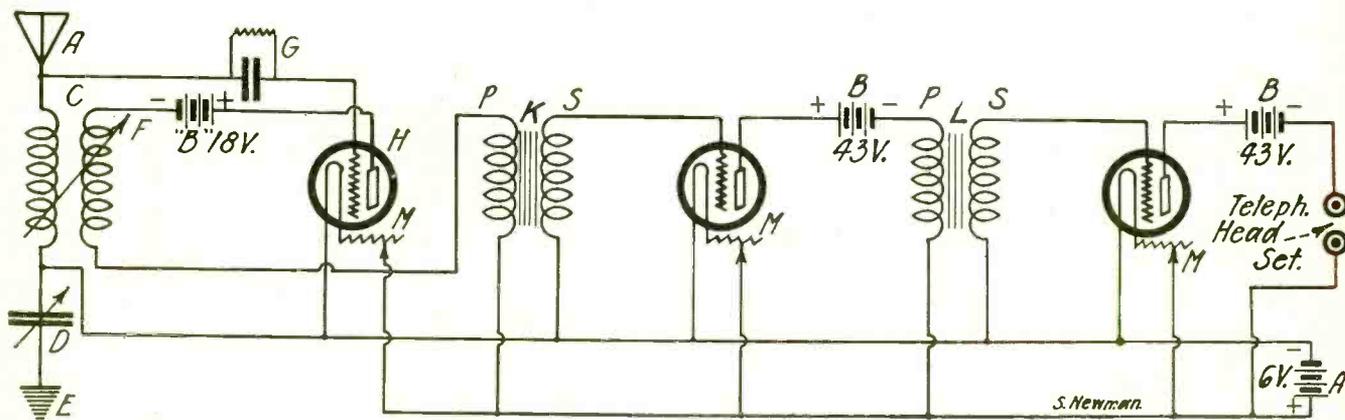
perience and questioned him regarding his set and its construction. He advised me that they had assembled the set, having purchased the necessary parts and that it had given very good satisfaction.

A very fine degree of workmanship characterizes the set which consists of an audion detector and two stages of audio amplification. A diagram of the wiring is shown herewith. The aerial is approximately 30 feet high and 140 feet long of L type single wire construction. One end of the aerial is fastened to the barn, and is suitably insulated. The wire is seven-strand twisted copper and is continuous from its free end to the lead-in. This is an important point in aerial construction and Mr. Larson has solved the solder joint problem by eliminating it entirely. The lead-in is entirely insulated from all building projections and tree branches were carefully avoided. Much of Mr. Larson's success is traceable directly to his antenna, its solid construction, perfect insulation and avoidance of interference. Ample ground protection from light-

ning has been provided by connecting the ground terminal of the lightning switch to the suction pipe of the pump. Whenever the set is not in use the antenna or lightning switch, as it is called, is thrown to the ground.

A brief description, sufficient to enable any one interested to use the hook-up is here given. The antenna is shown at A. The lead-in connects to the primary terminal of the vario-coupler C. The other primary terminal is connected to one terminal of a 43 plate variable condenser D. The remaining terminal of the variable condenser is connected to ground E. This ground connection is very important. If a pump suction pipe is handy, this forms an excellent ground. The pipe should be scraped clean and the wire soldered securely. A lead is taken off the primary of the coupler C and connects through a grid leak and grid condenser G to the grid of the detector tube H.

An 18 volt "B" battery is inserted in the plate circuit of the detector tube H. The "B" batteries for the amplifier tubes are 43 volts and connect to the plates of the respective tubes as shown. A wire is also con-



Constants of the circuit as outlined in the accompanying article. A—Antenna. B—"B" batteries (separate ones for detector and each amplifier is of great advantage). C—Primary of coupler. D—Ground condenser (43 plate type). E—Ground. F—Secondary of coupler, used as tickler. G—Combined grid leak and grid condenser, .00025 mfd. H—Detector tube. K—Audio frequency transformer (preferably high ratio). L—Audio frequency transformer (medium or low ratio). M—Rheostats. This circuit is the conventional single circuit, with the improvements as shown. If dry cell tubes are to be used, the 6 volt "A" battery shown in the lower right hand corner should be replaced by three or six dry cells connected in parallel.

connected to the ground side of the vario-coupler primary but above the variable condenser D and runs to the negative side of the 6 volt "A" battery shown at the right end of the drawing.

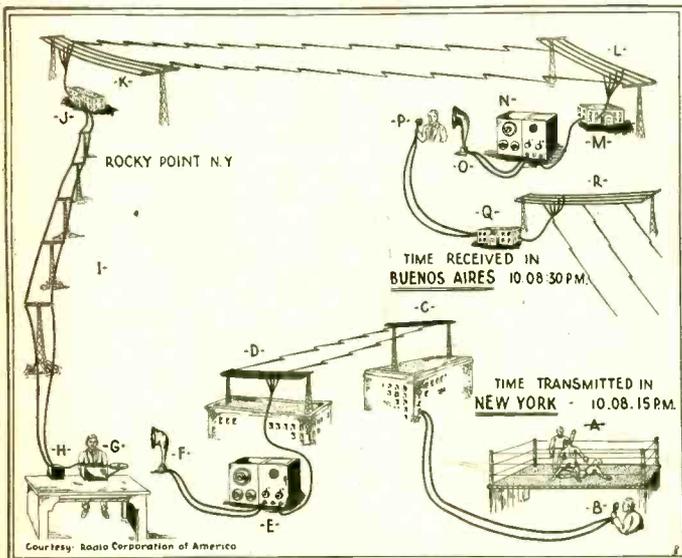
Audio-frequency transformers are used as shown at K and L. One terminal of the transformer K is connected to the terminal of the rotor of the variocoupler C. The other terminal is connected to the positive wire of the A battery. One terminal of the tube filaments is also connected to this wire. The filaments of the tubes are heated by the A battery which may be an ordinary 6 volt automobile battery. One terminal of the transformer secondary winding is connected to the grid of each tube and the other terminal connects to the negative lead of the A battery. The telephone head set is connected between the negative side of the last 43 volt B battery and the positive side of the 6 volt A battery. It is important that the positive side of the B battery is connected to the plates of the various tubes.

Dempsey-Firpo Match Radioed to Argentine Direct from Ringside in 15 Seconds

By J. L. Bernard

THE 85,000 spectators at the ringside at the Polo Grounds, New York City, on the evening of September 14, who saw Dempsey knock Firpo to the canvas for the count constituted an infinitesimal part of the audience that enjoyed one of the liveliest clashes in a twenty-foot ring. Neither the radio listeners within a hundred-mile radius of station WJZ, nor those within a thousand-mile radius of this station were the only persons who were on the air to

Grounds. From the antenna of WJZ, shown at "C," radio waves laden with the information given by White are hurled outward with the speed of light to be intercepted by thousands of receiving antennae scattered throughout the United States. A few miles from WJZ, the antenna shown at "D" receives a minute portion of the energy from "C," which is received by the broadcast receiving apparatus "E." After sufficient amplification at this point the blow-by-blow description of the bout is projected into the transmitting room of the Radio Corporation Central Radio office by means of the loud-speaker, "F." An operator intercepts White's word messages and transcribes the words received into dot-dash language which is recorded upon a tape by means of the perforating machine, "G." The tape is then instantly fed into an automatic high-speed transmitting machine connected directly in the control line extending to the giant radio telegraph transmitting station at Rocky Point, Long Island. This line, represented at "I," links New York City with the three-mile multiple-tuned antenna and two Alexanderson alternators, which deliver 700 amperes to the antenna, "K." Thus White's voice message is converted into telegraph characters and the waves radiating from "K" on 17,500 meters are an amplified telegraphic repetition of the

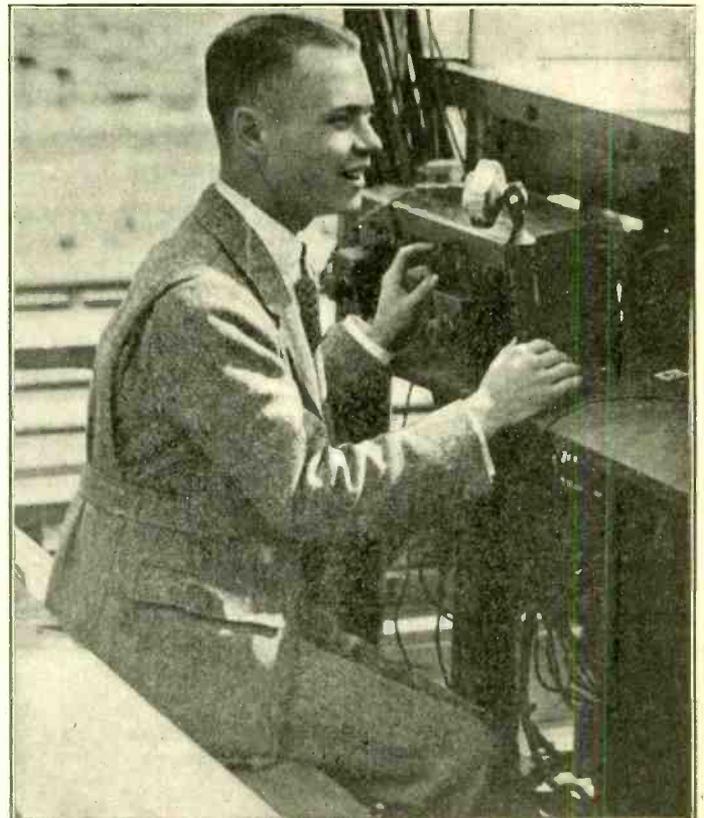


Schematic diagram depicting how the fight returns were heard by radio in Argentina 19 seconds after their occurrence in New York City.

get a word-picture of this great bout. Far from the scene of battle, to be specific, more than six thousand miles from the ringside in New York, some of the most eager fight fans listened tensely to a blow-by-blow description of the supreme fistic engagement of the year. And this invisible audience was Firpo's own, those who inspired him to enter the ring against Dempsey, confident in the belief that their giant brother would trot back to the Pampas with the world's heavyweight championship title. Disappointed as they are, nevertheless theirs is the satisfaction of knowing that the challenger fought bravely, although defeated, and this fact was made known to them by radio over their receiving sets through the intermediary of the most powerful radio station in the world, Radio Central, located at Rocky Point, Long Island.

The manner in which the transmission of this vital information was carried out during the many stages of its progress over telephone wires, telegraph circuits, and the many transformations of voice and telegraph signals, is represented schematically in the diagram herewith. This is what the chart shows:

Dempsey and Firpo clash in the ring shown at "A." While the battle rages, Major J. Andrew White, the announcer stationed at the ringside at "B," describes the mighty left and right blows exchanged between the champion and the challenger. Each movement within the ring is translated into a word-picture by White, which is transmitted over the line through the microphone at "B." This land line connects with the Radio Corporation station WJZ, located several miles from the scene of the engagement within the Polo



(C. Fotograms)

Testing the apparatus which sent the returns from the ringside the morning before the big battle took place.

short wave length energy broadcast from the antenna "C" at WJZ.

The system made up of the waves, the radio generators at "J," and the antenna at "K" elevated 750 feet above the earth on twelve steel towers, forms one
(Concluded on next page)

Complete Stoppage of New York Dailies Proves Tremendous Importance of Radio

THE amazing situation in New York City last week when none of the regular editions of the daily newspapers was published, owing to the strike of the Newspaper Web Pressmen's Union, drew direct attention to the utility and value of radio in the everyday life of American citizenry.

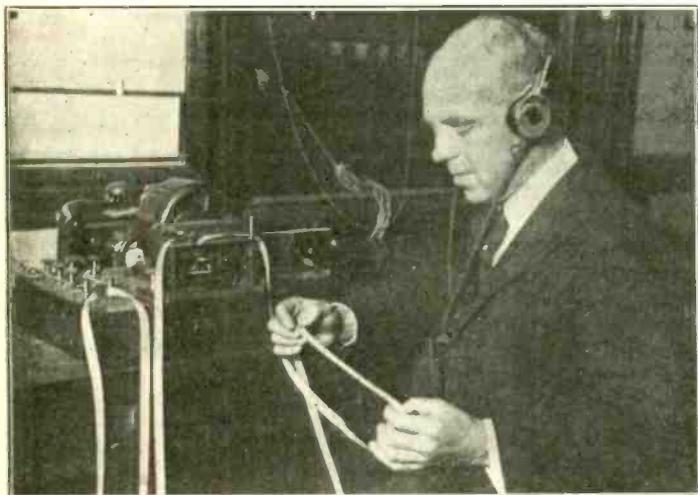
For the first time in the history of American journalism, the millions living in Greater New York were without their regular daily papers, had no means of knowing what was going on locally or throughout the world, and were in the position of those living in the wilds where daily papers are unobtainable. The scoures of

supply for news were completely shut off. Millions of invested newspaper capital were placed in jeopardy, to say nothing of the losses incurred by mercantile establishments, theatres, and other institutions that rely for their patronage on the rapid dissemination of the printed word.

Radio did its share towards giving the public some

(Concluded from preceding page)

New York terminal of the RCA trans-Atlantic radio system. During the period of the bout, however, its signals are intended for the high-power receiving station at Buenos Aires. Thus, 6,000 miles away, the powerful wave energy flung from the antenna "R" registers at the receiving set "N" through the Monte Grande antenna represented at "L." Over great ex-



(C. Photonews)

W. A. Winterbottom, traffic manager of the RCA, watching the ticker tape as the results of the Dempsey-Firpo fight were sent to Argentina by a combination of land and radio transmission.

panses of water and long stretches of land the progress of the big bout described by White journeys to the native land of Firpo. But the circuit is not yet complete. The telegraph signals issuing from the loud speaker at "O" must be converted back from that staccato language into the very words which White delivered to his microphone. This is carried out by a telegraph operator-announcer. He is stationed in the studio of the RCA broadcasting station shown at "O," where he translates dots and dashes into a word description. The antenna at "R" flashes his announcements to eager listeners sitting beside their short-wave receiving sets.

The range of this station is sufficient to carry the news of the battle at New York not only to radio fans in the Argentine, but to Chile, Paraguay and Uruguay.

From the moment the referee reached his tenth count while Firpo lay upon the canvas after a blow delivered by his opponent, only 15 seconds were consumed in transferring the news from New York City to the countries in South America.



(C. Fotograms)

The microphone located at the ringside, which picked up the words of the official announcer as well as the counts of the referee.

general idea of local and world happenings during the suspension of the dailies. For instance, Station WJZ and others broadcast news bulletins for the benefit of listeners-in and thus owners of receivers and their friends were able to learn something of what was going on outside their own homes.

All of which leads up to the statement that every owner of a radio set is in a far more enviable position than his radioless neighbors should such a condition arise again. It also leads to the natural conclusion that if every municipality had its own broadcasting plant, it could be used for the dissemination of news whenever necessary, and the public would not be in entire ignorance of great happenings.

Here are two big selling points for the radio industry at large and, with the proper selling slogans, they should be taken up by the various national and local radio trade organizations.

Radio has once again demonstrated that it is to-day the greatest moving, living force of civilization.

Editor, RADIO WORLD.

Bureau of Standards to Transmit Radio Frequency Signals

THE Department of Commerce has announced the schedule of standard frequency radio signals to be transmitted by the Bureau of Standards for the months of October, November and December. These signals should be of interest to all transmitting station operators in checking wave meters and adjusting transmitting and receiving apparatus. Their accuracy is better than three-tenths of one per cent.

Commercial and ship operators should be especially interested in the transmission of October 20. The signals of November 20 cover approximately the same band as those of October 20. The signals of November 5 cover the frequency band used by "Class B" broadcasting stations. The frequencies transmitted on December 5 cover those used by all broadcasting stations as well as some used by amateurs.

Measurements made at the bureau of the frequencies on which broadcasting stations are operated indicate that some stations are not remaining on their assigned frequencies, and hence are causing interference with programs from their own as well as other broadcasting stations.

The schedule followed in these transmissions will be slightly different from that followed in the past. All transmissions will be by unmodulated continuous wave telegraphy and no announcement will be made by voice. This considerably reduces the time of transmitting any one frequency. The signals will in other respects be similar to those transmitted in the past. A complete frequency transmission will include a "general call," a "standard frequency signal," and "announcements." The "general call" will be given at the beginning of the eight-minute period and will continue for about two minutes. This will include a statement of the frequency. The "standard frequency signal" will be a series of very long dashes with the call letters WWV intervening. This signal will continue for about four

minutes. The "announcements" will be on the same frequency as the "standard frequency signal" just transmitted, and will contain a statement of the measured frequency. An announcement of the next frequency to be transmitted will then be given. There will then be a four-minute interval while the transmitting set is adjusted for the next frequency.

The complete schedule has been so planned that a wave meter may be accurately calibrated over a range of 150 to 1,700 kilocycles, if all of the transmissions are received. With sensitive receiving apparatus it should be possible to receive these signals anywhere East of the Mississippi River.

Detailed information for the use of these signals is given in Bureau of Standards Circular Letter No. 92, which may be obtained upon application to that bureau.

The complete schedule of standard frequency signals to be transmitted follows:

SCHEDULE OF STANDARD FREQUENCY TRANSMISSION FROM WWV

Eastern Standard Time	Oct. 20	Nov. 5	Nov. 20	Dec. 5
	Kilocycles			
11:00 to 11:08 P. M.....	166.5 (1800)*	500 (600)	150 (1999)	500 (600)
	220	580	190	700
11:12 to 11:20 P. M.....	(1363)	(517)	(1578)	(438)
	275	640	240	900
11:24 to 11:32 P. M.....	(1090)	(468)	(1249)	(333)
	315	700	290	1100
11:36 to 11:44 P. M.....	(952)	(428)	(1034)	(273)
	375	760	360	1300
11:48 to 11:56 P. M.....	(800)	(394)	(833)	(231)
	425	833	430	1500
12:00 to 12:08 A. M.....	(705)	(360)	(697)	(200)
	500	920	500	1600
12:12 to 12:20 A. M.....	(600)	(326)	(600)	(187)
	666	1000	570	1700
12:24 to 12:32 A. M.....	(450)	(300)	(526)	(176)

*Wave length in meters is given in parentheses.

Radio Round the World

WASHINGTON, D. C.—As a means of international communication, radio is spreading its invisible circuits throughout the world with increasing rapidity. During the past month plans for ten gigantic stations in as many countries have been reported to the communication experts of the Department of Commerce.

In Europe practically every country is negotiating for large commercial stations. A transmitting plant at Warsaw, Poland, will be opened for business within a few weeks; Italy has a new station at Coltano; Goetberg, Sweden, started up recently; while in Holland, a station at Kootwijk went on the air a short time ago, transmitting especially to the Netherlands Indies.

The French Wireless Company is building a 100 KW station, estimated to cost over \$400,000, near Belgrade, Yugoslavia, for the government. This first big Balkan station will insure the immediate dissemination of news and information to the world. Russia has granted this French company a five year contract for the construction of several wireless stations.

The British government has adopted a new radio policy, it is understood, which will permit private or commercial radio concerns to erect and operate high-powered stations

in the United Kingdom and the colonies. The government post officials, however, will not relinquish any part of the existing radio chain, but in addition will probably continue with the plans for a high-powered station at Rugby, England. The Marconi Company and the Eastern Telegraph Company have applied for licenses, the former having an agreement with the Union of South Africa and Canada for the establishment of stations capable of communicating directly with England. The Eastern Company hopes to link India with England by radio.

Difficulties in good radio transmission in Japan are expected to be overcome and bigger and better radio communication established as soon as rehabilitation is well underway. Recent advices from Nippon indicate that a land line from Tokyo to Iwaki has been strung, making through communication to the stricken city possible with the outside world for official and emergency traffic. Radio codes are prohibited temporarily for commercial messages in an effort to save errors and repetition.

China is perhaps the most backward of the Far Eastern nations to accept radio, but due to political handicaps there this country is relying on cable communication; there is, however, the U. S. Naval Radio Station at Peking which has a circuit with Cavite direct.

Dr. Rogers' Unique Indoor Aerial

By S. R. Winters

BY reasons of its multitude of wires and beauty of form, a loop antenna designed and built by Dr. J. Harris Rogers, of Hyattsville, Maryland, bears resemblance to an elaborate musical instrument. In reality, however, it represents perfection in technique and attractive appearance in the construction of an indoor aerial.

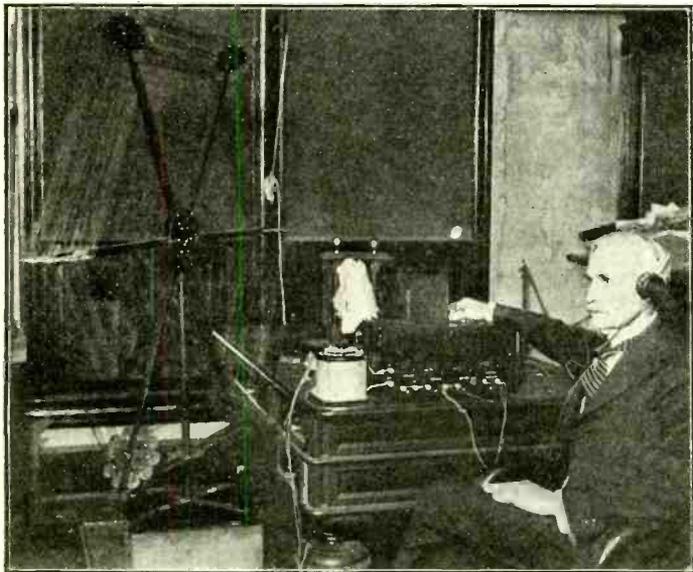
The network of wires and the manner of their arrangement around a framework give a combination effect of cage and loop or coil antennae. There are 10 convolutions or windings of wire, each convolution consisting of 12 single wires. If all the wire entering into the construction of this indoor antenna formed a continuous wire extending in a straight line, its length could be measured in fractional mileage instead of feet. Like a wheel, six spokes or wooden supports extend radially from the axis. At the upper terminus of each spoke is a circular rim composed of 10 tiny disks through which the copper wires are threaded singly.

From the supporting base, which is readily placed in a stationary position on the floor, there is projected a round wooden stick on which the hub of the framework is mounted. This arrangement serves both as a support and as a means for revolving the coil at vary-

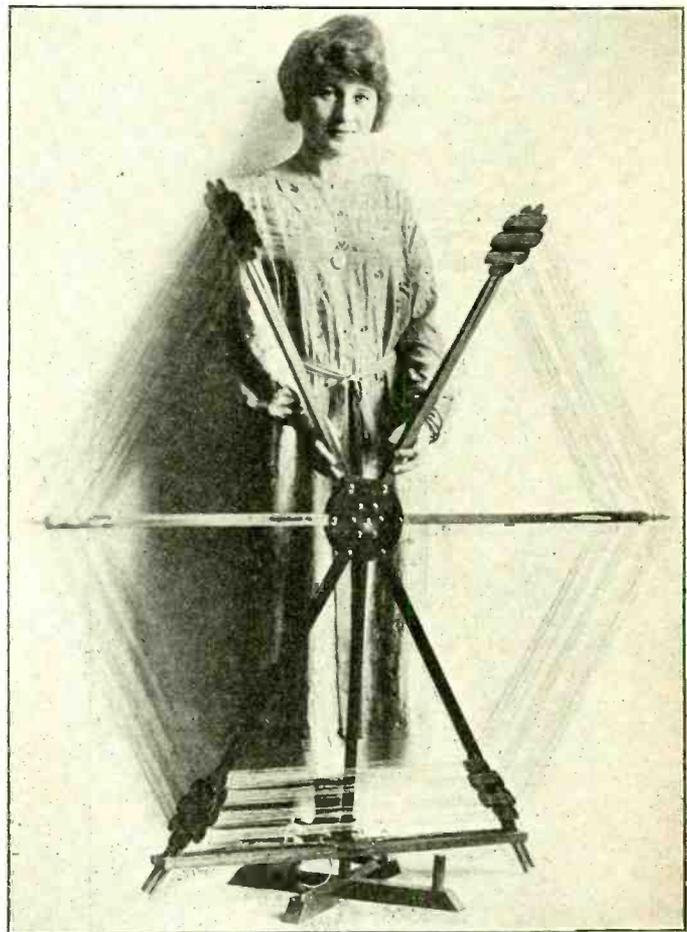
to a relative degree, interference usually encountered from a broadcasting station located in a different direction is reduced or eliminated.

This device of Dr. Rogers, the discoverer of the underground and underwater systems of wireless signalling, represents an achievement in indoor aerials. Special attachments are provided at the base of the coil for instantly connecting it to any standard radio-telephone receiving equipment.

When atmospheric disturbances do not interfere, by use of this indoor aerial in conjunction with six stages



Dr. J. Harris Rogers and the new loop antenna he recently invented. The new design aids materially in tuning.



Method of weaving the wires through Dr. Rogers' loop antenna. The loop consists of 120 turns of wire.

ing angles so that the directional characteristics of the loop antenna may be advantageously used. When the coil is turned to a plane parallel to the direction of the wireless transmitting station from which communications are to be intercepted the clearness of the radio signals is appreciably strengthened. Similarly,

of amplification—three of radio-frequency, two of audio-frequency, and a detector—music and speech transmitted from high-powered stations may be heard distinctly. In fact, with sufficient amplification signals from the high-powered European stations may be heard in Washington.

Do Not Be Fooled!

WHEN demonstrating receivers to buyers, some unscrupulous dealers use six volt tubes with high plate voltages, or operate loud speakers with hidden power amplifiers. The unknowing buyers hear so much from their friends about the new "dry cell tubes" they naturally tell the dealer in the beginning that they want a "dry cell set." He demon-

strates the set using the six volt tubes, which give more volume than the small tubes, creating the impression in the mind of the buyer that he will get the same volume. If you intend buying a set for use with dry cell tubes, insist that he demonstrate it with the tubes you intend using. Do not be flim-flammed. Keep your eyes wide open.

Solving a Domestic Radio Difficulty

By Anna Leo

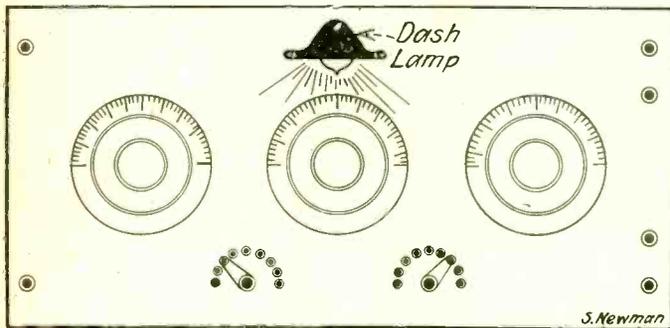
PUT that light out, John! I just can't get this baby to sleep with that horrid old light shining right in his face," complained Mrs. Radio Nutt.

"Well, but Mary, I do so want to hear the rest of that play that XYZ is broadcasting. I'll put the light out in just a minute," he impatiently answers.

"I do wish we could contrive some kind of a small lamp that would be big enough to tune by and yet not keep the whole household up all night," she whined.

How natural this all sounds! But my husband has solved that question and now the meter bills for electricity will not be so big, for he has discovered that an ordinary shaded dash lamp from an automobile can be mounted on the upper center of the panel and light up all the controls. Its tiny beams cover the panel and suffice for accurate tuning. No more crying babies from light shining in their eyes from daddy's or mother's craze for radio!

This dash lamp is attached by two tiny screws to the panel and the wires behind lead to the storage battery, which furnishes current for lighting purposes. Auto accessories dealers will now take notice of the increased demand for dash lamps this winter over last summer.



Attach an automobile dash lamp to your radio set this way and save electric light bills during DX vigils.

Omit the Impossible

FANS who build their own sets strike some fancy circuit that seems to them to be "it," but even at that they do not seem satisfied, partly because they reason something like this: "Well, if it will do this on one tube, what will it do on two or three radio-frequency?" In nine cases out of ten radio-frequency can be added to the simpler single circuits or double circuits unless they are of some form that prevents it. Sets like the Westinghouse, Sr., or other compact sets that were not meant for radio-frequency cannot be accommodated to admit it. Confine your imagination to normal activities. Radio-frequency at its best should not incorporate regeneration, and vice versa. Regeneration in itself is a form of radio-frequency amplification.

Do not think that just because a set functions wonderfully on a single tube, and brings in distance fairly well, that it can be accommodated to incorporate radio-frequency. Circuits like the Flewelling, Hartley, Cockaday, Ultra Audion, Colpitts Oscillator, and any of a hundred other circuits of the like type function very fine, and it is a constant wonder to most people that they cannot add radio-frequency. It cannot be done, so do not attempt it, as you will meet with failure.

Broadcasting Statistics Up to Date

AN interesting compilation of broadcasting statistics has been made by P. C. Kullman & Co., the wireless brokerage house, 110 Nassau street, New York City. This is part of their commendable efforts to "put radio telephony on the map of the world." The data developed by this firm are used in circular letters addressed periodically to government officials in over 100 foreign countries. The letter just issued contains the following information about broadcasting stations in Europe and the latest epitome of figures for the United States:

Great Britain

City	Station Call	Wave Lth. Meters
London	2LO	369
Manchester	2ZY	385
Birmingham	5IT	420
Cardiff	5WA	353
Newcastle	5NO	400
Glasgow	5SC	415

France

Paris (Eiffel Tower)	FL	2600
Paris (Compagnie Francaise de Radiophone Emissions "Radiola")	SFR	1780
Lyons (Ecole Superieure des Postes et Telegraphes)	YN	3100

Holland

The Hague	PCGG	1050
The Hague (Heussen Laboratory)	PCUU	1050
The Hague (Velthuyzen)	PCKK	1050
Ijmuiden	PCMM	1050
Amsterdam	PA5	1050

Belgium

Brussels	BAV	1100
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Germany

Berlin (Koenigswusterhausen)	LP	Daily 4000 Sunday 2700 4000
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Denmark

Lyngby	OXE	2400
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Czechoslovakia

Prague	PRG	1800
Kbel (near Prague)	...	1000

Switzerland

Geneva	HB1	900
Lausanne	HB2	1350

The latest official figures for the United States (exclusive of Canada, which has 63), are as follows:

United States

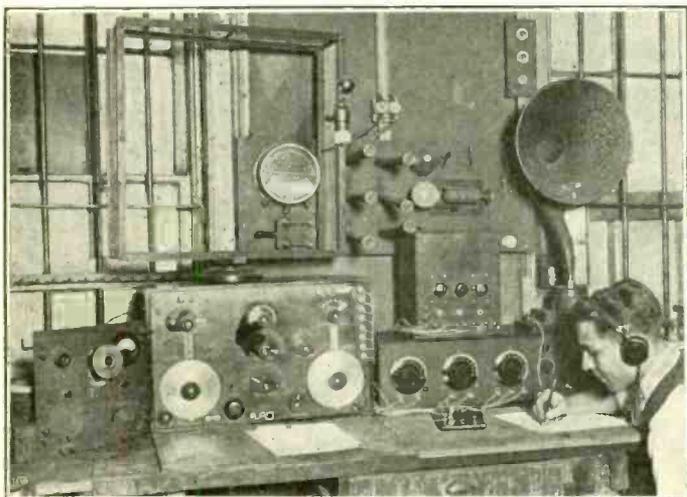
Trans-Oceanic Stations	12
General Public Service Stations	45
Point-to-Point Commercial Stations	140
Limited Public Point-to-Point Stations	58
Technical Training School Stations	127
Experimental Stations	281
Broadcasting Stations	563
Aeroplane Stations	2
Ship Stations	2,723
Special Amateur Stations	178
Amateur (licensed) Stations	16,570
Receiving (unlicensed) Stations (estimated)	3,500,000
Radio Audience (estimated)	11,160,180

Another Commercial Appearing Amateur Station

THE amateur radio station owned and operated by Sidney Kasindorf, the Bronx, New York City, while it may not be the acme of perfection, most surely approaches close to this margin in working ability.

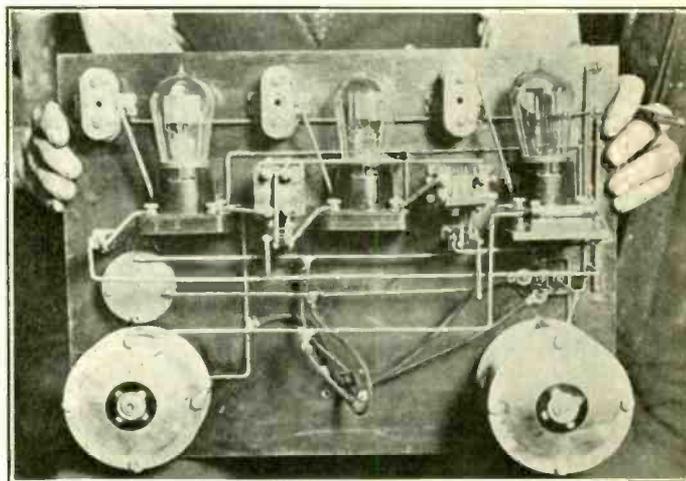
The illustration shows the interior of the station with its owner listening to one of the elusive 5s or 6s, or maybe 3s or 4s, who can tell? From left to right, the apparatus grouped on the table is: A ten watt CW and phone transmitter. Directly next to this is the commercial naval type receiver, which is used for ship and all work up to 3100 meters. On the right is the five tube neutrodyne receiver with amplifier and horn. This receiver works on the loop standing over the naval type machine. The various meters and resistances on the board over the amplifier, are used for charging the batteries and for plate current for the operation of the transmitters, one of which is shown.

Mr. Kasindorf is a great believer in the efficiency of a well constructed apparatus, as the second illustration shows. This is a three-coil honeycomb receiver with two stages of amplification which he has just completed. Amateur builders should look carefully at this piece of fine construction and copy its good points. Note the fact that even though straight line wiring has been used, the wires are all well insulated with varnished cambric, and that the apparatus is not crowded, but each thing has been planned out with forethought. Note also that the panel is not shielded, but by careful construction and understanding the manner in which everything should be placed, this is entirely eliminated. Simplicity of construction, the use of the best parts, and good careful work are the chief attributes of a real DX receiver, and Mr. Kasindorf most surely should get Mars, if these alone count for real distance.



(C. Kadel and Herbert—Both Photos)

View of the station of Sydney Kasindorf, whose call is 2ATV. With all these receivers, he takes no chances on losing calls because of interference or weak signals. Mr. Kasindorf "getting one down."



Interior view of the extremely efficient three honeycomb coil set built by the owner, Sydney Kasindorf. Note the extremely simple wiring and the manner in which the apparatus is laid out for efficient wiring.

Radio on ZR-1 Perfect

By Washington R. Service

THE chief purpose of the American-built ZR-1 as an aerial naval scout was demonstrated to the edification of all during the recent test flights when practically every move of the giant Zeppelin was sent to Admiral Moffet by radio. This great helium airship is to be used for scouting and reporting to her base what she sees, one naval expert explained recently, adding that her radio worked perfectly for both short and long distances.

On the day of the initial flight over her home at Lakehurst, N. J., Commander McCrary sent the first radio message to Admiral Moffett, Chief of Naval Aeronautics, who was on the ground far below the great airship. The message was picked up in the field radio shack and delivered to the admiral within a few moments. On the recent trip to New York and return Admiral Moffett, then at his desk in the Navy Building in Washington, was advised periodically by radio of her progress. "It is of special interest," Secretary Denby said in an interview, "that the Navy Department was in constant communication with the ZR-1 by

radio." Her position was accurately reported at frequent intervals and full information was given of operating conditions aboard.

In this connection, it is of further interest to realize what this will mean when she journeys farther afield on exploration work. Admiral Moffett has reiterated the program planned after her trials are completed, including a flight to the North Pole, if practical. This it is now hoped can be undertaken by next spring. Such flights to hitherto inaccessible parts of the world for exploration and discovery, Admiral Moffett has no doubt can be made with success, if she is handled carefully. Continued communication with the Navy Department would insure quick aid from airplane in the event of accidents. Further flights are planned in the immediate future to cities of the east, and it is expected that the Capital will be among the cities soon to be visited. Radio will again serve in these flights to keep the ZR-1 in touch with headquarters either at Lakehurst or Washington.

sunk deeply. One slot for a switch should be cut directly below the coil mounting and one between the rheostats. See Figs. 1 and 2.

When all the holes have been drilled the panel may be "grained." This is done by sandpapering the face of the panel lengthwise with fine sandpaper, applying a light oil and then sandpapering again. The surplus

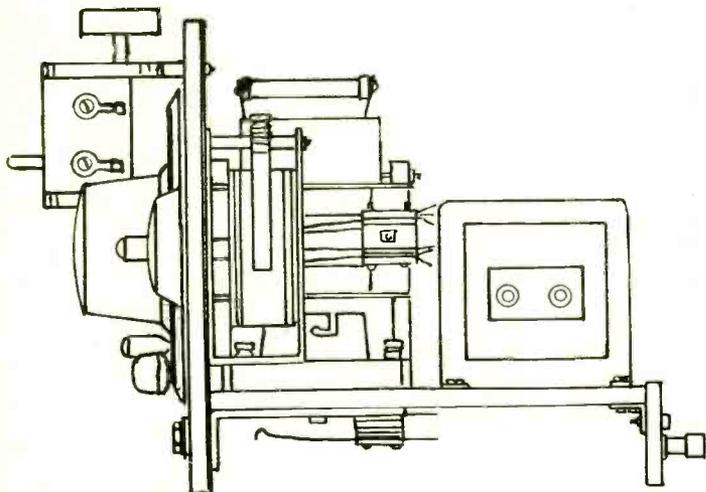


Fig. 3. Side view of the panel and baseboard showing how the jacks are inverted to form a support for the base, and the method of arranging the battery terminal board on the rear.

oil should be wiped off. The work of graining will be found to be easier if all of the holes in the panel are counter-sunk a trifle before the panel is sandpapered. An indicator for the dial may be made by deeply scratching the panel in the correct position and then filling the scratch with white enamel.

A piece of nickel-plated zinc, attached to the back of the panel and grounded, is used as a shield against the effects of body capacity when the set is being tuned. This shield is cut to the same size as the panel and has

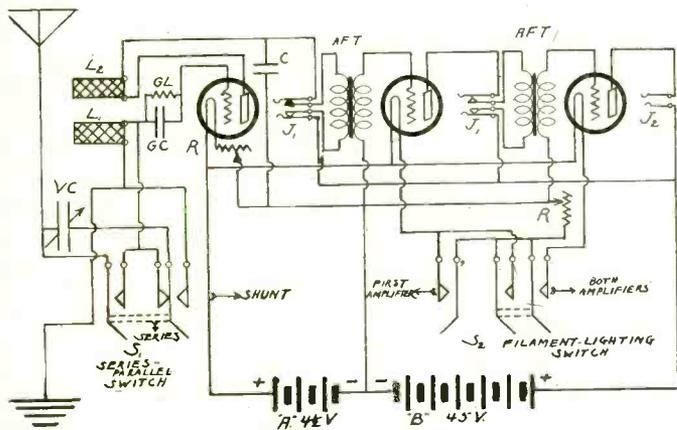


Fig. 4. Circuit diagram for the receiver. It is the single circuit, with several refinements, foremost of which is the all-wave range by use of the honeycomb coils.

holes drilled in it corresponding to the holes in the panel. However, the shield should be cut clear of all metallic parts of the instruments that are not supposed to be grounded. If nickel-plated zinc cannot be procured shim brass, thin sheet copper or tinfoil (glued to the back of the panel) may be used. The zinc is superior in appearance to any of these, however.

The two-coil mounting and variable condenser may now be fastened to the panel. The rheostats are screwed flat to the back of the panel and on top of the shield; one connection to them is thus made by the shield. After the hard-rubber handles on the switch arms have been unscrewed the telephone switches may

be attached, directly upon the shield also, as no electrical connection is made to their frames. The jacks (cut the shield clear of these) are fastened to the panel upside down. It is upon the jack frames that the shelf, supporting the tube sockets and transformers, is to rest.

This shelf is a piece of 3/4" 3-ply wood 11 3/4" long and 5 7/16" wide with a piece cut out of one corner so as to clear the variable condenser. The wood should be stained and then attached to the frames of the first and last jacks by means of two switch points which pass through both the shelf and the frame of each jack. The holes for these switch points should be drilled 1 3/8" from the back of the panel. Cut off the switch points so that they are no longer than absolutely necessary.

Bolt the shelf to the jacks and screw the transformers to the shelf in the positions shown in Fig. 2. Screw the middle tube socket in place and then fasten the other tube sockets in such a position that their centers are exactly above the switch points that secure the shelf. Be sure that none of the contact springs of the socket can touch the switch points even when tubes are inserted in the sockets.

The five binding posts to which the external connections to the set will be made are bolted to a piece of bakelite 1 1/4" x 6". This piece is attached to the shelf

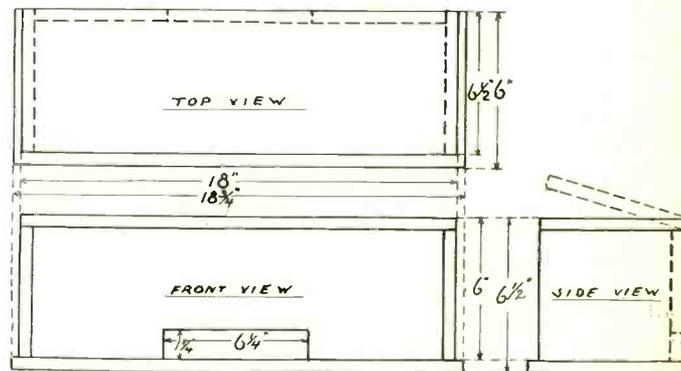


Fig. 5. Dimensions for constructing the cabinet for the receiver described herewith.

directly back of the middle of the panel by two angle brackets. See Figs. 2 and 3. In Fig. 2, reading from left to right, the proper connections for the binding posts are: First, aerial; second, ground; third, positive 4 1/2 volts; fourth, negative 4 1/2 volts and negative 45 volts; fifth, positive 45 volts.

The hook-up is shown in Fig. 4. Use 1-16" square copper bus wire for making connections. It is also advisable to cover the wire with varnished cambric "spaghetti" tubing; if this is not done, be sure that the wires do not cause a short circuit or ground at any place. Wires from jacks to transformers, etc., are run

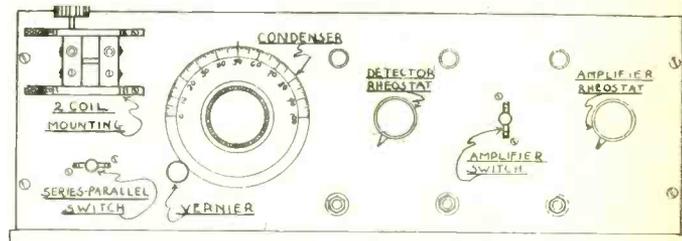


Fig. 6. Front view of the completed receiver showing everything in place. Note the simplicity and well-balanced appearance of the set as designed.

through holes in the shelf and the wires should be insulated from the wood at these points by "spaghetti" tubing. The grid leak and grid condenser, as well as

(Concluded on next page)

"Radio World" and the British Wireless Press

By a London Reader

IT may interest you to know that I am a regular reader of RADIO WORLD which reaches me every week through my news agent.

Your paper is the only wireless publication worth reading. That is why I have it on order and why I look forward to receiving a fresh copy every Friday.

How did I come to know of RADIO WORLD, you ask?

My introduction was through the pages of the English weeklies and monthly wireless publications. You see, being keen, I subscribed to all the weeklies and monthlies—sixpenny and shilling issues—and was particularly struck with the vast amount of "scissors and paste" they used. This was emphasized more strongly by their references to RADIO WORLD, and, being a business man, I concluded that RADIO WORLD must be a few decades in advance of our times, or else, our journals were asleep. So rightaway I ordered a copy. It came in due course and half an hour after it arrived I cancelled all the rubbish I had on order—by which I mean the weekly and monthly British wireless scissors and paste merchants—and ordered up a number of back numbers of RADIO WORLD which had details of receivers the like of which none of our so-called technical editors, inventors of S100 circuits, etc., could not even dream about.

I also find that much abuse has been made use of. Several of your celebrated receivers have been "improved" beyond recognition. A "Flewelling" has been described which fails, so much so that a friend of mine made three, none of which will function. I have made one to your original circuit—stuck to the design all through—used .005 condensers which our "experts" all agree are of no use, and it went off like a gun the very first time, and several experts have marvelled at its volume with a dull emitter valve.

Another paper keeps on publishing pages of "wonderful circuits" which I find are all "scissored" from RADIO WORLD.

You are ten years ahead of us with your ideas and the English wireless press is getting all its information from your pages.

I am getting all my friends to order your paper. By

so doing we get six shillings worth of information per month for half a crown, which is the difference between what I paid before by reading home papers and what it costs for RADIO WORLD besides, and a big one, getting the latest news in its original and not mutilated state.

Some of our weekly wireless papers are so damned conscientious that they say they never publish or recommend a circuit until they "try it out." When you publish a jolly good thing, they try it out by varying it around a dozen and one ways until they evolve a "great" improvement and dish it up as something very wonderful and improved, instead of being straightforward and honest and giving credit for an invention where it is due.

So you see why I have cut out all the piffle which is a waste of time to read and why I get the genuine article which is a pleasure as well as an instruction.

I have not yet found any "errors" in your circuit drawings or "corrections" in the next issue. One of our weeklies is so unreliable that every week it offers apologies for inserting wrong circuits and errors, etc. This is a regular feature and quite humorous. It comes up every week in every issue, which proves how careful and conscientious are the members of its technical staff. I suppose this is one reason for not publishing any circuit until said circuit has been actually constructed and tested. Floreat RADIO WORLD!

Own a Wave Meter?

MANY fans own wave meters, some bought, some home-constructed and calibrated from a purchased instrument. This last method of checking is very poor, as a little error in the calibration can cause a great difference in the operation. The Bureau of Standards, Washington, D. C., maintains a radio research service department where you can send your wave meter and have it accurately checked against standard oscillating wave meters which are accurate. The bureau will calibrate it and check it for you for a small charge and then you will be sure it is right.

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the phone condenser, are held in place by their connecting wires.

The telephone switch under the coil mounting is connected so that when it is in one position the condenser is in series with the primary coil; when in the other it is shunted across the coil. The switch between the rheostats has three positions. When it is in center position and the amplifier rheostat is turned on, neither amplifier should light. When it is thrown up the first amplifier tube should light; when down, both amplifiers should light. The connections for these switches are diagrammatically shown in Fig. 4. In connecting up the switches it will probably be found that there are more contact arms available than are needed. These may either not be used or may be so connected that they make double contact when the switch is thrown.

After the set has been hooked up the condenser dial should be attached to its shaft, the other knobs attached to their proper instruments and the vernier

screwed in place. The set is then completed except for the cabinet.

Specifications for a cabinet are given in Fig. 5. If the builder of the set has not the necessary wood-working tools it is a good plan to have a cabinet maker fashion the cabinet of some good wood, such as black walnut or mahogany. The top is hinged and an aperture is cut in the back for the piece of bakelight with the binding posts to project through.

This set is very easy to operate. For 400 meter work a 35 or 50 turn honeycomb coil should be used for a primary inductance (fixed coil) and about the same size tickler (movable coil), depending upon the aerial used. The proximity of these two coils to each other controls regeneration. Tuning is done by means of the condenser. Never turn the detector tube rheostat more than half way around, nor the amplifier rheostat more than two-thirds of the way, when both amplifiers are burning. Always burn the filaments as low as possible; this prolongs their life.

A Two Tube Loud Speaking Receiver

By Byrt C. Caldwell

THE general opinion seems to be that a three or four tube receiver at least is necessary to obtain reasonably good results for the loud speaker. The writer has built, and is using at the present time, a two tube set, which gives wonderful results on the loud speaker, up to stations 150 miles away, and also gives wonderful distance results. Before describing the set, I will give some of the results which I have obtained.

Using only an aerial, with no ground of any kind, WNAC, a 50 watt station, five miles away comes in so loud that speech is clear and distinct, and is easily understood on the third floor of the house, with the set on the third floor with wires leading to the first floor where the loud speaker is located. It is really too loud when you are in the same room as the set. WGI, ten miles away, comes in almost as loud and WBZ, 90 miles away, Troy, 140 miles, and WGY, Schenectady, 160 miles away, all come in loud enough to fill an ordinary room satisfactorily. WDAP, Chicago, 850 miles away, and music from PWX, Havana, Cuba, can be heard all over the room. It is a

The B battery consists of four 22½-volt block batteries, with a connection at 45 volts for the detector tube. The grid battery is made from two 3-volt flashlight batteries soldered together. The binding posts for the grid battery are on the side of the cabinet.

When the set was built, the writer took the greatest care to place the apparatus so that the shortest possible connections could be made. The wiring of this set

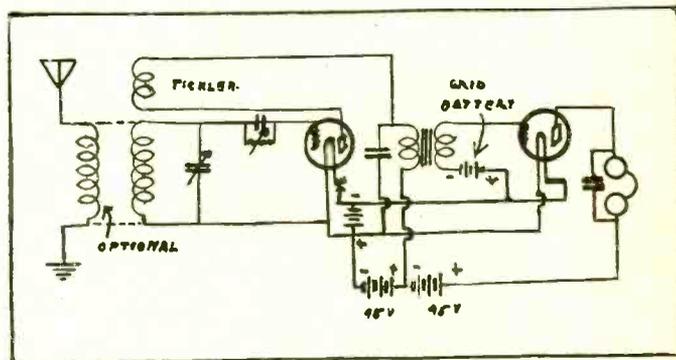


Fig. 2. Circuit diagram used in the receiver pictured and described.

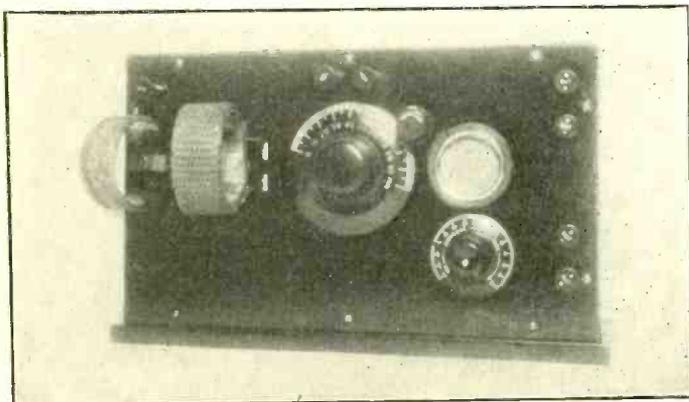


Fig. 1. The complete two-tube loud speaking set.

regenerative set of the honeycomb type and employs one step of audio-frequency amplification.

Fig. 2 show the simple hook-up which is used. The diagram shows the arrangement of the apparatus and the photograph shows the lay-out of the panel. The inductances which are used are L35, L50 and L75. The 35 and 50 turn coils are used for the stations having a wavelength lower than three hundred meters, and the 50 and 75 turn coils are used for the higher wavelength stations. The panel is 7"x12". The inductance coils are mounted on the left hand side of the panel. The condenser, which has a capacity of .0005 mfd. and is of the mica type, is to the right of the coils, and the fixed plate is connected to the grid leak (variable) and this is connected directly to the grid binding post of the tube socket. A vernier attachment is used on the dial of this condenser. It is especially valuable for this condenser when it is used near its maximum capacity, as the capacity curve of the condenser shows that, due to the mica dielectric, the capacity increases rapidly as it approaches the maximum. The tubes used are both UV199s. The audio-frequency transformer has a low ratio. No rheostat is used, but a potentiometer is employed, not to vary the grid voltage, but simply to cut down the volume when it is too great. The apparatus is all mounted in a very small space, excluding the inductances. The filament battery consists of three 1½-volt dry cells connected in series.

would probably be condemned by most broadcast fans as a beginner's job. The writer, when he made the set, wired it with neat right angle bends, with copper lugs soldered to the bus wire and fastened under the binding posts. He then rewired it, making every connection as short as possible, and soldering the wire directly to the binding posts. The result was greatly improved reception. Howls were greatly reduced and the signals were received with greater volume and clarity. Others would do well to take a lesson from this.

A word about operating a loud speaker at a distance from the set. Do not try to use a gas or water pipe as

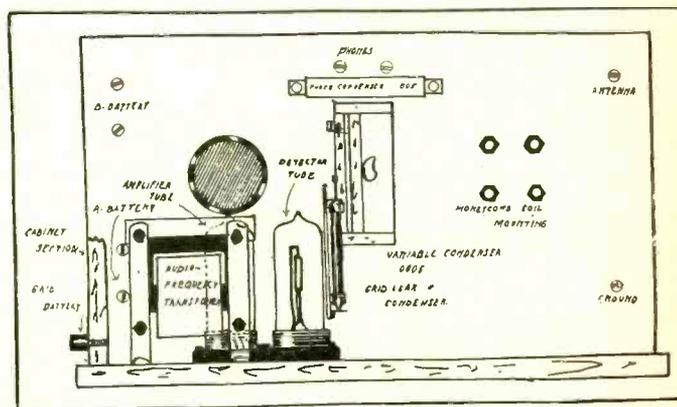


Fig. 3. Suggested layout for efficient wiring of the apparatus.

one of the conductors. Two well insulated wires must be used. They should be fairly large. No. 18 annunciator wire serves very well. When they are very long, the tuning of the set is changed considerably. When the writer tuned the set in for the greatest volume, and then connected the loud speaker, which is at a distance of about 50' from the set, the signals were barely audible in the room, but when the tuning condenser was reduced slightly, the signals roared in with full volume. The loud speaker used is not a power loud speaker. It is simply a receiver connected to the phonograph by means of one of the many phonograph attachments advertised.

Radio News Pictures Range From

Captions by Rob



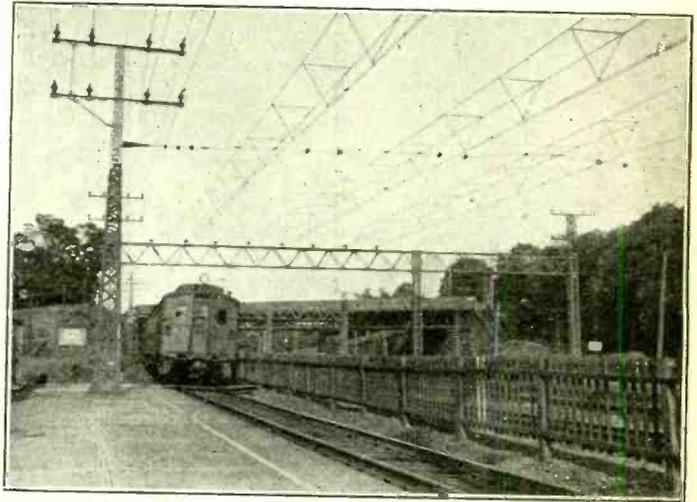
(C. Radio Corporation of America)

Mr. Wakamantsu, chief engineer of the Haranomachi radio station, the receiving unit of the Iwaki radio plant, Japan. The receiving unit is located 178 miles from this station, but through remote control is operated as one station. It was due to the untiring efforts of Mr. Wakamantsu and his staff that the world was constantly advised of the latest developments of the great Japanese disaster. Through the Haranomachi station messages were received from the United States and other foreign countries, advising of immediate relief, and strengthening the morale of the terrified survivors.



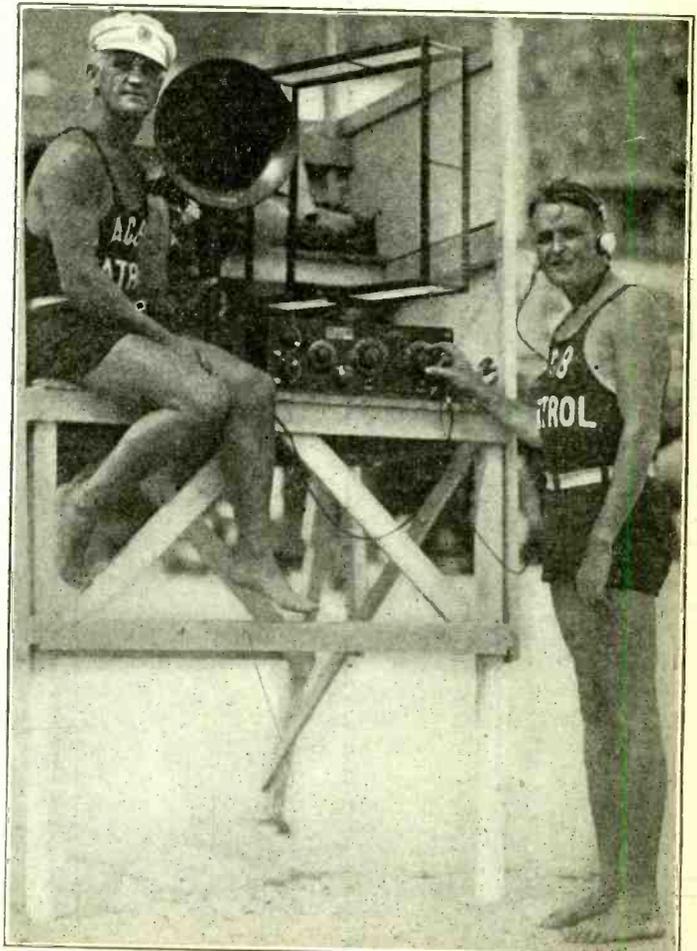
(C. Atlantic Foto Service)

Though beaches are almost deserted and people are thinking of getting fur coats out of the camphor, these three sturdy enthusiasts of Walton, Neptune and Radio, are undaunted by the cool weather. They are calmly waiting for the elusive finny members of the sea to get hungry, in the meantime listening in, when they will go in for a dip in the "briny." Woof! Woof! Brrr!



(C. Kadel and Herbert)

Here is the reason why fans who live near electric railroads are apt to get "static" all year round. Tests were recently carried out at Rye Beach, New York, to determine just what was causing all the disturbance and making receivers act like "bad boys" in general. It was finally discovered that the trouble originated around the high tension lines of the New York, New Haven & Hartford Railroad. Every time a train went by a brand of crackles and crashes resulted that would make any amateur rave and tear his hair—which probably accounts for the fact that many of the fans in Rye are rapidly becoming grey or bald. The only possible solution was found to be an inside antenna or loop, which eliminated the trouble, but the directional effect of the loops was nil in the vicinity of the high tension lines.

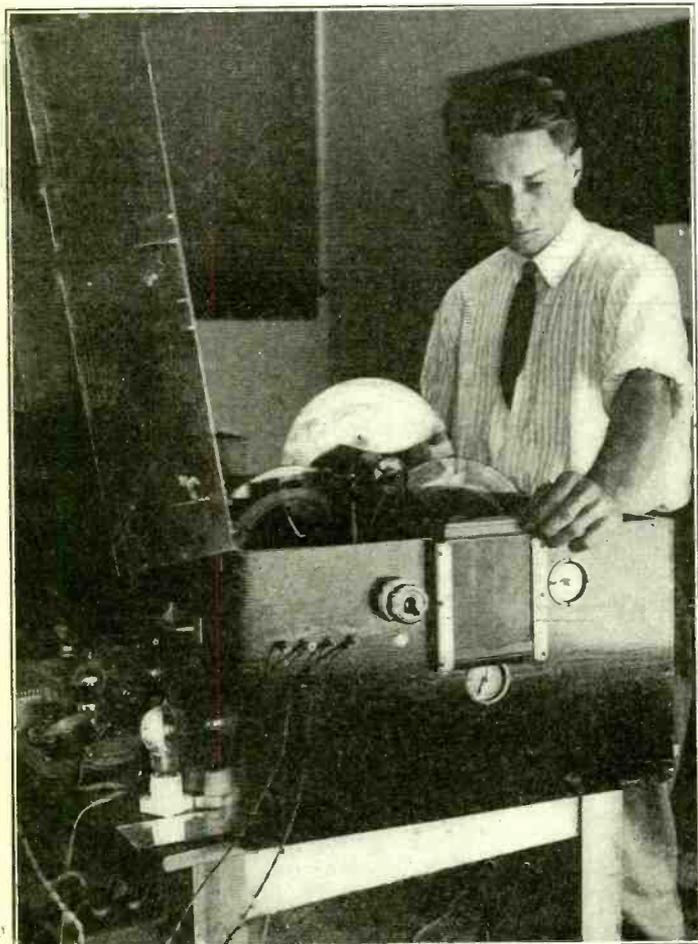


(C. Atlantic Foto Service)

Members of the Atlantic City Beach Patrol do not have much to do these cool days, so the tanned sons of Neptune while their hours away by listening in on a loop set which belongs to one of the life guards. It was presented to him by one of the residents of the resort. They have it located on their "look-out" and use it when not engaged in "dragging one out."

Snowy Japan to Balmy Seashore

by Bert L. Dougherty



(C. Fotograms)

Mr. Jenkins, well-known inventor of the device which made it possible to send photographs through the ether, has perfected a system of sending Japanese and Chinese symbols by the same method. The range of such a device in that way is boundless as by this means direct and personal communication may be had with the Orient. News and other matter can be transmitted in the original form. The illustration shows one of Mr. Jenkins' assistants operating the device.



(C. P. & A. Photos)

This should prove to the manufacturers of phonograph records that their sales will not be damaged by broadcasting their music. Here we have Peter Larantonda, of Greenwich Village, New York City, who, although a lover of music both "canned" and otherwise, has found that the records make good panels. It is a three-tube, three-circuit regenerative receiver. Note the novel grid leak in the center, using the gilt of the record label.



(Photo by FADA)

Wesley Barry, the cleverest and most freckled young "reel star" in film-dom, is also a rabid radio fan, spending most all his time with a pair of phones over his ears. He became interested in radio some months ago, when he delivered an address from one of the Newark stations, and since that time has been known as "the radio fan of the movies."



(C. Fotograms)

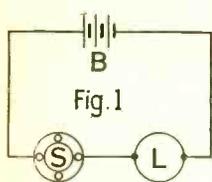
This is the oscillograph, the apparatus which checks up the volume and clarity of speech, music and all programs which are broadcast from WJZ. The oscillograph proper is the box on the extreme right with the four-sided mirror in front of the opening. The mirror revolves and by means of a little beam of light, the actual voice vibrations are seen on the revolving mirror, and the volume and tone can be checked.

Simple Tests for Genuineness of UV-199 Radiotrons

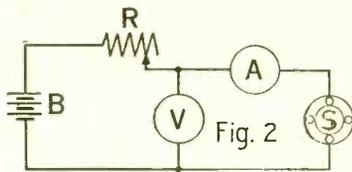
THE wide use and great popularity of the UV-199 radiotron have led to numerous attempts on the part of unscrupulous manufacturers to counterfeit this tube. In external appearance some of the imitations bear such a close resemblance to the genuine tube that it is very difficult to detect the difference. Even the carton markings, the instruction sheets and the trade-marks etched on the tube itself have been copied very closely.

However, in spite of the resemblance in appearance, the electrical characteristics of the counterfeit tubes are very different from those of the genuine UV-199. So far, none of the manufacturers of the illegal tube has been able to duplicate the 60 milliampere filament of the UV-199, and most of the counterfeits require as much as one-fourth of an ampere. Since the voltage of this filament can easily be made three volts or less, the user of such a tube is often misled by the apparently satisfactory operation when the tube is first lighted, but he soon finds that his dry battery is quickly exhausted and often the tube itself fails in a few hours.

Of course, the easiest way of determining the current re-



B - Three New 6" Dry Cells connected in series
S - UV 199 Socket
L - 50 Watt 110-120 Volt Mazda Lamp



R - 30 Ohm Rheostat
A - Milliammeter
V - Voltmeter
S - UV 199 Socket
B - Three 6" Dry Cells

Layout of apparatus for making tests to determine the genuineness of vacuum tubes.

quired by the filament is to use a milliammeter and a voltmeter, but since such instruments are not in common use among radio experimenters another simple method described herewith may be used which gives a rough approximation of the filament current.

Connect three new six-inch dry cells in series with the tube to be tested and an ordinary 50 watt, 110-120 volt Mazda vacuum lamp. Fig. 1 shows the proper connections. If the filament of the tube being tested does not take more than 60 milliamperes, it will light up almost to normal temperature. But if the tube is not a genuine UV-199 and the filament requires appreciably more than 60 milliamperes, the resistance of the Mazda lamp will rise due to the higher current flowing through it, and the voltage on the tube will be so low that its filament will not light. In making the test, be sure that the tube is left in the socket for about 30 seconds to allow the Mazda lamp filament to heat up to constant temperature.

When the proper electrical instruments are available, an even better test is to use a voltmeter and milliammeter connected exactly as shown in Fig. 2.

At three volts the current through the filament of a genuine UV-199 radiotron lies between 55 and 65 milliamperes.

For this test high quality instruments *must be used*, as otherwise the test is worthless.

A voltmeter having a full scale reading of five is recommended. For the milliammeter use an instrument having a full scale reading somewhere between 100 and 250 milliamperes.

RADIOGRAMS

Senatore Guglielmo Marconi, the radio inventor, has been made a member of the Fascista organization in Milan, Italy. He was admitted at his own request.

* * *

Col. Samuel Reber, U. S. A., retired, who was in Japan on a special mission for the Radio Corporation of America when the recent earthquakes occurred, has been reported safe.

* * *

Joseph Clarence Ward, 79, telegrapher at General Grant's headquarters during the Civil War, and the man credited with having taught Thomas A. Edison the Morse code, is dead at Visalia, Cal.

* * *

Billy B. Van, the comedian, is giving weekly receiving parties in his dressing room at the George M. Cohan Theatre, New York City. He has an individual radio outfit installed. Jean Tennyson serves tea.

* * *

The Soviet Government, according to a press dispatch from Riga, has ratified a five-year agreement with the General Wireless Telegraph Company of Paris which provides that the latter will erect thirty wireless stations in Russia in that period.

* * *

Pending the establishment of a permanent radio station at Tulleur Bay, Madagascar, a temporary receiving station with the call FTL has been established. This station receives on a wave length of 600 meters from 9 to 11 a. m. and 7:30 to 9:30 p. m. daily.

* * *

E. B. Mallory, manager of the Westinghouse Electric & Manufacturing Company's radio sales department, who is located in New York City, has accepted the invitation to be the chairman of the Radio Communication Committee of the American Marine Congress which will be held in New York City, November 5-10. The Congress will be held in connection with the American Marine Exposition. Mr. Mallory is now chairman of the radio section of the Association Manufacturers of Electrical Apparatus.

* * *

Japanese efforts to operate a radio-telephone service out of Kobe may have to wait until operators who can speak English as well as Japanese are secured. The service of the Japan Sea Port Radio Telephone Company has been tested thoroughly by the Columbia Pacific Shipping Company, which reports that when connections were actually made it was of great benefit, but that on account of the inability of the radio telephone company to get operators who could speak English, it was necessary for them to put interpreters aboard ships where officers were wanted on the air. This shipping company decided to dispense with the service until efficient English speaking operators were secured.

New Broadcasters

Call	Station	Class	Frequency Kcys	Wave Length Meters	Power Watts
KFJU	Central Power Co., Kearney, Neb.	"A"	1280	234	10
KFJX	Iowa State Teachers' Col., Cedar Falls, Ia.	"A"	1310	229	50
KFJB	Marshall Electric Co., Marshalltown, Iowa ..	"A"	1210	248	10
WTAN	Orndorff Radio Shop, Mattoon, Ill.	"A"	1250	240	100
WTAL	Toledo Radio & Elect. Co., Toledo, Ohio....	"A"	1190	252	10
WJAK	White, Rev. C. L., Greentown, Ind.	"A"	1180	254	30

Transferred From Class "C" to Class "A"

WIK	K. & L. Elec. Co., McKeesport, Pa.	"A"	1280	234	500
WKAA	Paar, H. F., Cedar Rapids, Iowa	"A"	1160	268	100
WOAL	Woods, Wm. Evans, Webster Groves, Mo..	"A"	1050	286	100

Here Are Good Broadcast Programs

Station WOR (405 Meters),
Newark, N. J.

SEPTEMBER 29

- 2:30 P. M.—Bessie Gray, soprano of New York—Louise Egner at the piano.
- 2:45 P. M.—“We Are Digging Our Graves With Our Teeth,” a talk on dietetics by Minnie Magnette Fink, M. D.
- 3:00 P. M.—Bessie Gray, soprano, of New York.
- 3:15 P. M. to 4:00 P. M.—Hillside Dance Orchestra.
- 6:15 P. M.—Baskovsky, violinist, assisted by Mrs. Patz Baskovsky.
- 6:30 P. M.—Fred J. Bendel, Sporting Editor of the Newark Morning Ledger, on “Sporting News Up-to-the-Minute.”
- 6:45 P. M.—Baskovsky, violinist.
- 7:00 P. M.—Edna Dulfer Lambert, contralto.
- 8:00 P. M.—Madelaine Hauff, soprano, of Atlanta, Ga.
- 8:15 P. M.—Zimble Trio of New York—courtesy Concert Management, Henry Rose, New York.
- 8:45 P. M.—Herman Heidrich, electrical “old timer,” will give the first of a series of three talks on “Origin and Development of the Storage Battery.”
- 9:00 P. M.—Madelaine Hauff, soprano.
- 9:15 P. M.—Zimble Trio.
- 10:00 P. M.—Program of Popular Music by Jimmie Shearer, well-known song writer, and assisting artists.

Regular Program Features of Station WFAA

STATION WFAA (Working for all alike), operating on 476 meters, includes in its programs the following regular daily features. The time given is Central Standard:

- 10:30 a. m.—United States Weather Bureau report and forecast and C. A. M. A. A. highway condition bulletin for the Southwest, followed by Dallas produce market quotations, early cotton market report and Wall street review.
- 2:30-2:45 p. m.—Dallas live stock market, late general markets, sports, news.
- 3:30-4:00 p. m.—Agiograms, health bulletins, Texas market news, sports, news.
- 4:30-5:00 p. m.—Sports, news.
- 5:30-6:00 p. m.—Household hints, sports, news.
- 6:15-6:30 p. m.—Bedtime story and fairy tale, told by Miss Mary C. Toomey.
- 6:45-7:00 p. m.—Sports news and information bulletins.
- 9:30 p. m.—United States weather report and forecast.

Facts About Station WLAG

WLAG, Minneapolis and St. Paul, Minn. 417 meters. 4,000 miles. Cutting & Washington Radio Corporation. Slogan. “The Twin City Station in the Land of Ten Thousand Lakes.” Club—“Tooth Brush.” Daily except Sunday 9:30, 10:00, 10:30. 11:30 a. m.; 1:30, 2:30, 4:30 p. m. market reports, news bulletins and announcements. 10:45 a. m. household hints; 5:30 p. m. to 6:00 children's program; 12 m., 2:00, 4:00. 5:00. 6:00. 7:30. 10 p. m. lectures and talks. 12:30, 2:35, 8:30 musical programs. Wednesday and Saturday, late musical programs 10:30 to 12 or 1 a. m. Sunday, church services 10:30 a. m. and 7:45 p. m., musical program 3:30 p. m. Announcers: Eleanor Poehler, managing director; Earle R. Buell, Paul Johnson.

Station WRC (469 Meters),
Washington, D. C.

SEPTEMBER 28

- 10:00 A. M.—Foreign Exchange Quotations prepared by The Washington Loan and Trust Co.
- 6:00 P. M.—Children's Hour by Marietta Stockard Albion.
- ARMY NIGHT
- 8:00—Song Recital by Louis Annis.
- 8:15—Piano Recital by Jerome Williams.
- 8:30—Song Recital by Dorothy Mansfield.
- 8:45—Violin Recital by Arsenio Ralon.
- 9:00—Song Recital by Albert Shefferman.
- 9:15—Song Recital by Rose Pollio.
- 9:30—A Talk on Army Matters.
- 9:40—Concert by the United States Army Band, W. J. Stannard, Conductor.

SEPTEMBER 29

- 10:00 A. M.—Foreign Exchange Quotations furnished by the Washington Loan and Trust Co.
- 3:00 P. M.—Fashion Developments of the Minute prepared by Harper's Bazaar.
- 3:10—Readings by Mary Bagnam.
- 3:20—Song Recital by William Shanahan.
- 3:30—Farm Home Reports.
- 3:40—Current Events prepared by The Review of Reviews.
- 3:50—Song Recital by Mary Ballister.
- 4:00 The Magazine of Wall Street.
- 4:10—Piano Recital by Pauline Graff.
- 6:00—Children's Hour by Marietta Stockard Albion.

Station WBZ (337 Meters),
Springfield, Mass.

IN order that the many persons interested in the horse races and the major contests at the Eastern States Exposition now in progress at Springfield, Mass., and who will not be able to attend may know the results of these events, Westinghouse Radio Station WBZ has arranged to broadcast this information every night at 9:00 o'clock.

The results will be collected at the end of the day and the WBZ announcer will read the information in the order in which the events are decided.

The most important events in which the public is interested are the horse races. Sportsmen from all over New England bring their horses for these events. The races are hotly contested and are probably the greatest drawing card.

Alaskan Radio Stations Closed Until Next Season

THE following-named stations closed until next season on the dates set after their names: Becharof (KUDV), August 9; Carlisle (KOV), August 16; Clarks Point (KHG), August 4; Daly (KDJT), August 11; Egegik (KMF), August 8; Ekuk (KMG), August 12; Hawk Inlet (KKAI), July 16; Ikatan (KXW), August 20; Koggiung (moored vessel, KUBK), July 25; Koggiung (KVV), August 11; Kvichak (KHB), August 16; Libbyville (KMT), August 18; Nahnke (KHT), August 16; Nahnke (KMK), August 11; Nelson Lagoon (KXV), August 12; Nushagak (KKA), August 5; Pilot Point (KUDD), August 5; Port Moller (KWR), August 19; Ruby (moored vessel, KDRH), July 26; Snag Point (KHF), August 9; Ugashik (KMU), August 5; Unga (KVI), July 21; Warren (KDJU), August 15.

Station WGI (360 Meters),
Medford Hillside, Mass.

SEPTEMBER 29

- 6:00 P. M.—New England Weather Forecast furnished by the U. S. Weather Bureau. New England Crop Notes furnished by V. A. Saunders, Statistician. Late News Flashes—Early Sports News—Boston American.
- 6:15 P. M.—Code Practice, Lesson No. 123.
- 6:30 P. M.—Boston Police Reports, Boston Police Headquarters. Amrad Bulletin Board.
- 7:30 P. M.—Evening Program:
 1. “This Week's Judge,” furnished by the Judge Publishing Company.
 2. Program of late releases by National Association of Broadcasters of which AMRAD, WGI, is a member, by Uncle Eddie and Uncle John—Oh, Boy!
 3. Twenty-sixth of a series of talks on New England Business Problems, by Arthur R. Curnick, of the New England Business Magazine.

SEPTEMBER 30

- 4:00 P. M.—Twilight Program:
 1. “Adventure Hour,” conducted by the Youth's Companion.
 2. Concert Program by the Edison Laboratory Phonograph.
 3. Stories by Arturo.
- 8:30 P. M.—Evening Program:
 1. Talks on “World Unity,” under auspices of American Federation of Churches.
 2. Evening Concert Program of vocal and instrumental numbers.

Well-Balanced Program from
WOC

THE program from Station WOC, Davenport, Iowa, for September 29, broadcast on 484 meters, on central standard time, is as follows:

- 9:00 A. M.—Opening Market Quotation.
- 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.
- 12:15 P. M.—Closing Stocks and Markets.
- 3:30 P. M.—Educational Program—Lecture by C. C. Hall.
- (Musical numbers to be announced.)
- 5:45 P. M.—Chimes Concert.
- 6:30 P. M.—Sandman's Visit.
- 6:50 P. M.—Baseball Scores and Weather Forecast.
- 9:00 P. M.—Dance Program (one hour)—P. S. C. Orchestra.

Popular music release through the National Association of Broadcasters, of which WOC is a member.

U. S. Marine Band Concert
Broadcast by WCAP-WEAF

A RARE treat was enjoyed by the radio audience on the evening of September 20 when a concert by the United States Marine Band, given in the Sylvan Theatre, Washington, D. C., at the foot of the Washington Monument, was broadcast jointly by WCAP, Washington, and WEAF, New York, stations of the Bell Telephone System.

The numbers of the program were well balanced, the transmission was excellent and the modulation was perfect. The trombone solos of Principal Musician Clark caught the fancy of the local audience as was attested by its hearty applause. Several snappy marches were included among the encores.

Answers to Readers of Radio World

I have constructed the single tube receiver, the hook-up of which I am sending you. When I touch the phone cords I get capacity effect so badly that the signals will not come in at all. It even happens if the phone cords touch my face or any part of my body. What can I do to stop this?—Walter Huson, Nitwood, Ill., Box 135.

Place the phones on the other side of the B battery, thereby putting them between the plus terminal of the battery and the plate. Place a small capacity condenser across the phones and B battery, running it from the plate side of the phones to the minus side of the B battery. This should help you out of your troubles.

What determines the fundamental characteristics of a receiving tube? An amplifier? How are they measured? Should a tube be a special make for use with English apparatus?—John Kelleman, 141 West 4th Street, New York City.

Your first questions take entirely too much space to explain in these columns. We refer you to "The A B C of Vacuum Tubes," by

In numerous articles the writer always states that "the best of material must be used." How can a beginner at the game know whether the material he is purchasing is the best.—F. P. Satterfield, Detroit, Michigan.

Standard parts are well advertised in the magazines. Do not buy any parts that are not backed up by guarantees and you will always be sure that you are getting good material.

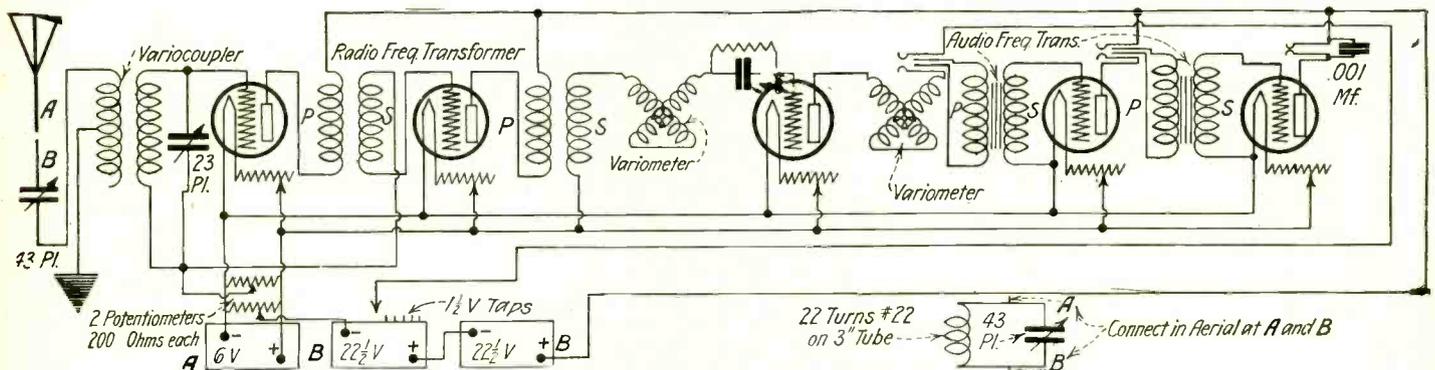
Will you kindly send me a circuit diagram for the following parts: 1 variocoupler, 2 variometers, 1 43-plate condenser, 1 23-plate condenser, 2 radio-frequency transformers, 2 single-tube units, 1 detector and two-stage unit. I have all these parts as enumerated in the Atwater Kent apparatus and wish to use them. Will you show me how to add a wave trap to my radio-frequency receiver?—John Salzlein, 984 Bedford Ave., Brooklyn, N. Y.—Abraham Cuhnze, Abilene, Texas.

The circuit diagram you wish is herewith printed, with a wave trap as suggested by

In RADIO WORLD, August 25, you have an article relative to adding a stage of radio-frequency amplification to an R-C receiver. I have constructed it and used a WD11 tube and a Radio Corp. transformer but cannot seem to get it to work well. What can you suggest as a remedy?—Homer Ives, 425 Southworth Street, Williamstown, Mass.

In the first place a WD11 tube will not function well as a radio-frequency amplifier. Use either a UV199 or UV201A or UV201. Also, take note of the filament-ground connection in the detector. Inside the set, the A battery connection is grounded to the shield. Watch the diagram and see that this does not interfere. This is explained in the footnote under the diagram as follows: "When using this circuit do not ground the negative side of the A battery. Remove this ground by removing the connection of the ground on this post." The diagram below the one you mention shows where this ground is placed.

In RADIO WORLD, June 23, you give a diagram of the DeForest D7A receiver. If



Circuit diagram asked for by John Salzlein, with the addition of a wave trap, as suggested by A. Cuhnze. It is a receiver consisting of two stages of radio-frequency (transformer coupled), detector and two stages of audio-frequency amplification. Regeneration is caused by the use of variometers in the plate and grid circuits of the detector tube.

E. H. Lewis, for a full and detailed explanation of the method and means of determining these. It can be obtained from the Columbia Print, 1493 Broadway, New York City. Outside of the socket being changed, you could use the English apparatus with American tubes.

What do you consider as the best all around single-tube set for volume and selectivity, not considering the reflex circuits? Will an antenna constructed according to the following plan shown on the paper, be satisfactory?—J. A. Terstege, 1458 Chase Street, Terre Haute, Ind.

Considering your specifications, the best circuit would be the double-circuit honeycomb receiver, with tickler feedback. More volume could be had by employing the single circuit, but for a combination of both volume and selectivity, the triple-circuit honeycomb is the best. Your plan for an antenna will do, but it is advisable to run the wire in a straight line instead of doubling it back over itself as you have it.

Can you inform me where I can obtain a wiring diagram for a detector and two-stage amplifier box using jacks and having external jacks and connections?—H. C. Haas, 221 Cascade Avenue, Colorado Springs, Colo.

A very complete article on a detector and two-stage amplifier with external connections appeared in RADIO WORLD, May 13, 1922. It has panel layout plans and is complete.

A. Cuhnze. Trouble might arise from the variometer in the grid lead, causing screaming and general trouble, as is the case with some radio frequency amplifiers that incorporate the variometer for regeneration. In that case, remove the grid variometer and obtain regeneration by the use of the plate variometer. Watch your leads and keep the apparatus (variometers and coupler) separated at least four to six inches, but otherwise make your leads as short as is possible.

I have constructed the Armstrong regenerative circuit, using honeycomb coils, and find that I have to use a DL150 in my primary circuit in order to get WEAf and all broadcasters above 450 meters. This is not supposed to be true. How can I fix it? I use a .0005 variable in the antenna lead.—Lester Harris, Newburgh, N. Y.

If your antenna is correctly proportioned (100-150 feet long) you should have no trouble in getting waves up to 550-600 with the DL50, provided the condenser in the antenna circuit is shunted around the coil. Do not place it in series, or if you feel that it is sometimes necessary, connect it by means of a series parallel switch, as shown in RADIO WORLD, August 4, page 20. The natural wave-length of a DL150 coil not shunted or in series with any condensers, is 315 meters, and this is cut down when placed in series with a condenser. For broadcast work the coils 25, 35, 50, 75 should prove all that are necessary for work up to 750 meters, when using .0005 condensers in parallel.

this circuit was carefully constructed could I expect more than from a standard detector and two-stage receiver? I desire a long distance receiver to handle a loud speaker. What make transformers should I use? What dry cell tubes would you recommend for use with this circuit? What is the capacity of the condensers across the secondary of the radio-frequency and detector?—L. R. Bossart, RR No. 1, Ostrander, Minn.

Most naturally you will have better results with the DeForest than with the regulation detector and two-stage set. In the DeForest you are using radio-frequency, detector and audio-frequency, and this circuit will make possible loud speaker reception on long distance stations. We cannot recommend through these columns any makes of competitive apparatus. Use the best you can buy. Would suggest using the UV199 throughout. The condenser you mention should be .0015 mfd.

What is the difference between a hook-up and a circuit diagram?—Kenneth Carlton, P. O. Box 16, Liberty, N. Y.

There is no difference between a circuit diagram and a hook-up. They both mean the same thing.

I have constructed a wave meter to check up on wave lengths and need to have it calibrated. I cannot do it myself. Where can it be done?—A Radiophan Reader.

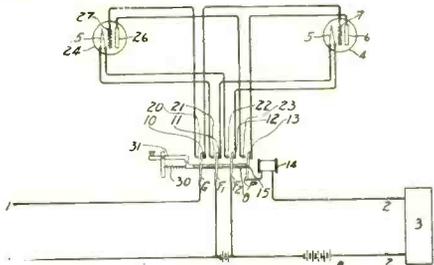
If you send it to the Bureau of Standards, Radio Division, Washington, D. C., it will be accurately calibrated and checked for a nominal charge.

Latest Radio Patents

Switching Mechanism for Vacuum Tubes

No. 1,462,057: Patented July 17, 1923. Patentee: P. I. Wold, East Orange, N. J.

In certain electrical circuits in which it is desirable to maintain continuous action it frequently occurs that a piece or pieces of apparatus may be included which are subject to deterioration of one kind or another, in which case it is necessary to replace the deteriorated element by another. Sometimes this deterioration may



Means of switching tubes.

amount to a complete and sudden deterioration of the element rendering it totally useless, and at other times the deterioration may be a gradual one in which after a certain stage has been reached, it would be desirable to replace it by a new element. With such circuits it is ordinarily necessary to maintain a continuous supervision over the elements in order to replace them at the proper time.

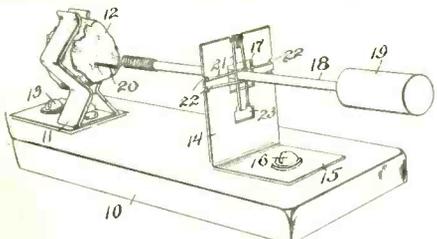
This invention relates to a means for the replacement of a piece of apparatus subject to such deterioration by another piece of the same character to insure continuous operation. One of its objects is to make the action automatic, such that the replacement will occur whenever the element falls below a certain standard of operation. More specifically the invention relates to and has as its object the provision of means for replacing a vacuum tube of the thermionic type in any circuit in which it may be contained, if and when the tube has deteriorated below a certain standard.

In the case of vacuum tubes used as amplifiers or as detectors in various types of electrical circuits, the deterioration may be due to any one of a number of factors, but probably the most important one is the practical destruction of the element due to the burning out of the filament.

Mounting for Stems of Crystal Detectors

No. 1,463,554: Patented July 31, 1923. Patentee: A. N. Pierman, Newark, N. J.

This invention relates to a mounting for the stems of crystal detectors, which



New means of flexibly supporting the stem of a crystal detector.

stems require a limited degree of adjustment, but which adjustment should be freely possible both in tilting the stem to various angular positions, and also to permit free rotation of the stem.

It has been customary to use ball and socket joints with a sliding stem in them, and the object of this invention is to pro-

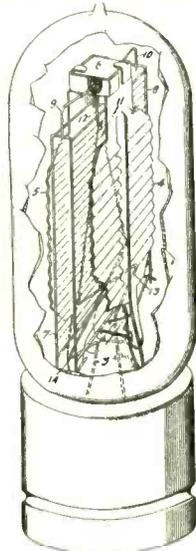
vide a more easily operated stem having less friction, but as good electrical contact, and one that can be much more cheaply constructed.

* * *

Filament Support

No. 1,461,232: Patented July 10, 1923. Patentee: S. Thronsen, Chicago, Ill.

This invention relates to electron discharge devices and has for its object to



Method of supporting the elements of a vacuum tube.

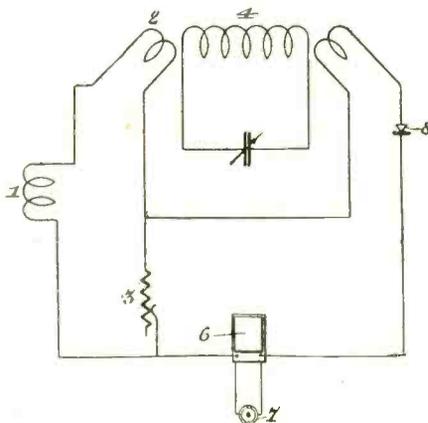
provide a means whereby the filament therein may at all times be kept under the proper degree of tension to prevent vibration thereof. This invention is particularly applicable to electron discharge devices of the audion type where other parts, closely related to the filament, are contained within the evacuated space, and where absence of vibration is necessary not only to lengthen the life of the filament, but as well to maintain the space relation between the filament and the other electrodes, upon the maintenance of which depends the proper functioning of the device.

* * *

Wave Meter

No. 1,460,636: Patented July 3, 1923. Patentee: P. J. Armagnat, Paris, France.

The present invention has for its sub-

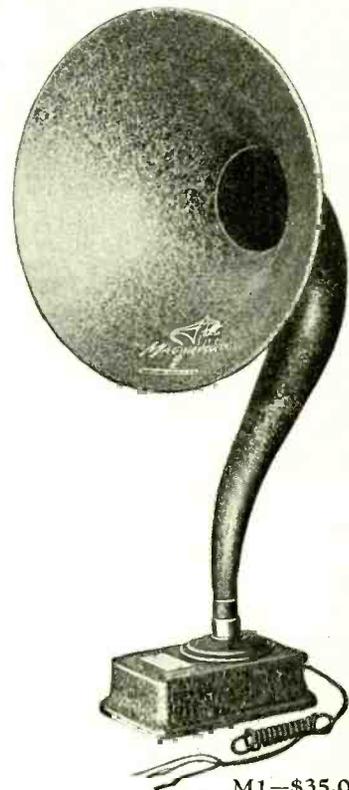


Design of a new wave meter.

ject a method of measuring the lengths of electric waves.

The method in question rests on the comparison of an electro-motive force, obtained by a double induction, with the difference of potential produced at the terminals of a resistance by the oscillating current to be measured.

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.

The Magnavox Company

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

"Saving money by NOT advertising gives the sheriff and auctioneer most of their business."—F. S. C.

Radio Merchandising

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

Telephone Lackawanna 6976

WBZ Has New Idea in Program Arrangement

STARTING out with the idea that the local broadcasting station in a town or city is the one which the radio fans ought to patronize, Station WBZ, Springfield, Mass., is endeavoring to make its offerings so fine and worth while that the public will listen to its programs with the regularity with which they attend the theatre or go to the movies.

Because of the idea that the improvement of programs in general will place broadcasting on a better basis, L. H. Rosenberg, program director for Station WBZ has evolved the plan for a "definite purpose station." Everything which is to be broadcast from this Westinghouse station in Springfield will have a certain definite idea back of it. Thus, the interest of the listener will be maintained, and radio fans who listen will have a definite goal to work for.

In Springfield Mr. Rosenberg found a wealth of cultural material. Thus, if there is a dearth of artists and men of prominence in the locality, ordinarily available in big cities like Chicago and New York, this deficiency is amply made up by the great number of schools and colleges, whose resources in these respects are unlimited. The old colleges and universities, such as Worcester, Wellesley, Harvard, Amherst, to mention but a few, form part of the great cultural background of which New England is so proud. Arrangements have been made with some of the colleges through the Massachusetts Extension University for the broadcasting of a series of lectures. It is planned to have these lectures sent out in the form of a course, and to grant college credit upon their successful completion. This will be a decided departure in broadcasting.

The course on short story writing, by Prof. Eesenwein, which was announced some time ago is now in progress, and will furnish the experimental material with which to decide further broadcasting of this nature. Many innovations, both in concert, classical, and instrumental music will be made, so that very shortly, WBZ will be running on its new idea program, and will be "practising what it preaches."

Radio Trade Notes

Thomas F. Maher, 101 Bodine street, Long Island City, N. Y., is in the market for a small stock of radio supplies and two moderate price sets.

The Western Electric Company is building another large manufacturing plant at Kearny, N. J.

TELEPHONE NUMBER CHANGED

The telephone number of RADIO WORLD has been changed to

LACKAWANNA 6976

Live Ohio Farmer Makes Radio Work for Him

B. J. WOODMANSEE is an Ohio farmer, but he's no rube. This man believes in doing business in the most modern way and so has installed a large radio receiving set on his farm at Highland, Ohio. Watermelons, corn, cucumbers, muskmelons, and other edibles are offered for sale to the people who pass his place in automobiles and to those he reaches through the following cleverly prepared circular:

"Free Radio Concerts For You. Just a nice ride to Woodmansee's Melons, Highland, Ohio. Continuous radio concerts, lectures, market reports, bands, orchestras from the Crosley Radio Station, WLW, Cincinnati, from 9 a. m. to 10 p. m., Monday to Saturday. Sunday, Sunday School Lesson, 8:30 to 9:30. Church services, 9:45 to 11:30 a. m. 2 to 4 p. m. and 6 to 10 p. m. sacred concerts and services by radio. Come and visit all over the United States and enjoy the best talent of the country on Woodmansee's shady lawn."

On the reverse side of this circular, Mr. Woodmansee has given a list of prices of his produce. On a recent Sunday, more than 5,000 people visited his farm and enjoyed the program as broadcast by radio. He says that he has the largest business he has ever had and thinks the radio concerts are the greatest means of bringing people to his farm. He claims radio may be used by any business to stimulate it and advocates the purchasing of receiving sets that are of sufficient merit to be able to receive concerts.

Of particular interest to Mr. Woodmansee, are the market quotations as broadcast from the WLW station. These reports are sent out at 10:30 a. m., 1:30 and 3 p. m., and sometimes there are special announcements of produce reports at other hours.

Radio World Answers Queries Quickly

As RADIO WORLD comes out every seven days, its answers to inquiries from readers are naturally more up-to-date than any of those in the monthlies.

Send your inquiries to our Technical Department, which will try and give you quick service.

DX Nite Owls, Attention!

THE DX season is nearly 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 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.

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:

Joseph A. White, Jr., York Road and Ainsley Ave., Melrose Park, Pa. (Will buy a loop receiving set. Wants best regardless of price.)

Rees Evans, Box 29, Ardmore, Oklahoma.
H. W. Bussman, 42 Beach St., Buffalo, N. Y.
E. T. Smallwood, 1884 Alcatraz Ave., Berkeley, Calif. (Builds receiving apparatus and small transmitters.)

Covert Radio & Electric Shop, Covert, Mich. (Retailers.)

Ford Williams, Front St., Addison, N. Y.
Jack Miller, 805 New Bern Ave., Raleigh, N. C.
A. W. Schrage, 7108 Seventh Ave., Brooklyn, N. Y.

F. S. Renshaw, LAAC, Los Angeles, Calif.
Thomas F. Maher, 101 Bodine St., Long Island City, N. Y. (Will lay in small stock of parts and two moderate price sets.)

R. O. Ward, Winter Park, Fla.
Thos. Bracken, 48 Main St., Cohoes, N. Y.
Charles H. Marks, 856 Third Ave., North Troy, N. Y.

C. I. Smith, 280 Fourth Ave., North Troy, N. Y.
A. C. Vandervoort, 4 East Sunnyside, Troy, N. Y.

Reflex Radio Co., E. T. Powers, manager, 3547 Flora Ave., Kansas City, Mo.

Aubrey Williams, General Delivery, Iron Mountain, Mo.

Fred Embree, 2038 Sangley Ave., Indianapolis, Ind. (Wants wholesale prices.)

General Electric to Build Radio Station at Denver

DENVER, Colo., has been selected as the site of a powerful radio broadcasting station by the General Electric Company, according to an announcement by Martin P. Rice, director of broadcasting for that company. Work on the Denver station will be started as soon as the new General Electric Company station at Oakland, Calif., gets on the air, some time in December.

Denver will have the third and last station in the G-E program of broadcasting stations. The first, WGY, at Schenectady, N. Y., has been in operation for the past eighteen months, and has won a reputation for exceptional quality. Oakland, the second station, is the first to be housed in a structure erected exclusively for broadcasting equipment.

Both the Oakland and Denver stations will be modeled after WGY, so far as equipment is concerned. They will have the same power and sending radius as WGY, which, under favorable atmospheric conditions has been heard on a single transmission in every state in the Union, in England, Hawaii and countries of South America.

Coming Events

NATIONAL RADIO WEEK, November 25 to December 1, 1923.

AMERICAN RADIO EXPOSITION, Grand Central Palace, New York City, October 6 to 13, 1923. J. C. Johnson, general manager.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, Pacific Coast convention, Del Monte, Cal., Oct. 2-5. F. L. Hutchinson, 33 West 39th Street, New York.

RADIO WORLD brought results at a lower cost than any of the leading radio publications. Advertisers reach 74,000 at \$4.00 an inch in RADIO WORLD, The National Illustrated Radio Weekly.

FRANK A. D. ANDREA, Inc.

Manufacturer FADA Radio Equipment

1581 JEROME AVENUE

NEW YORK CITY

Sept. 7, 1923.

RADIO WORLD,
1493 Broadway,
New York City.

Attention of Mr. F. S. Clark

Dear Mr. Clark:

I am only too glad to tell you of the results of my advertising in RADIO WORLD during the past summer months.

Starting with our advertisement in an April issue of RADIO WORLD to introduce the new FADA "One-Sixty" receiver, utilizing Professor Hazeltine's circuit, I have found that the cost per inquiry of our advertising in RADIO WORLD has been less than the cost per inquiry using four other national radio publications, also one national boy's publication and one popular scientific publication.

As an illustration, 169 replies were received from one advertisement in RADIO WORLD during the month of April alone, which sold me without question on the pulling power of your weekly. This despite the fact that formerly I had been somewhat of a "man from Missouri."

Cordially yours,

F. A. D. ANDREA, Inc.,

(Signed) K. H. Stark,

Sec'y and Advertising Mgr.

KHS:RS

Movie Magnates Are Jealous of Radio— One Exception

JUST as the advent of the motion picture was looked upon by the operators of the legitimate theatre as a menace to their welfare and business future, so the coming of the radio into thousands of homes is regarded as a menace by some of the producers and distributors of motion pictures.

In one of the largest producing-distributing concerns in New York, radio is taboo. Any reference to radio or the showing of this form of amusement, is strictly avoided in their productions, and the publicity department is not allowed to mention it in any of the copy which leaves their hands.

Other distributors of motion pictures have accepted the radio in the same manner in which the far-seeing theatre operators saw the movies—as a new form of amusement and disseminator of entertainment and knowledge to thousands in a form which was so different from their productions as to be a negligible factor in their business.

Mr. E. W. Hammons, president of the Educational Film Exchanges, Inc., has just installed in his home in New Rochelle, N. Y., a radio receiver of the most improved type—a four-tube reflex receiver which brings to his home the programs of half of the United States—and is an ardent radio fan.

"I do not consider radio a menace to the future of the motion picture industry," said Mr. Hammons at a recent convention of branch managers of the Educational Film Exchanges, at which the radio set was presented to him by the exchange managers. "Radio appeals only to the ear; motion pictures appeal to the eye. Literature—books, magazines and all other amusement forms of fiction—perhaps consume more of the public's time than either the movies, radio or the legitimate stage, but no one has regarded it as a menace, nor did publishers regard the advent of movies or radio as inimical to their interests.

"I will say, however, that radio will compel

the motion picture theatre operator to pay more attention to programs he sets before his patrons. People will listen to good music from the air rather than sit through a poor motion picture program, and motion picture programs will need to be selected with greater thought. Good comedy and novelty subjects add spice and variety to the program; it is these short subjects which give the program the diversity that will offset any tendency on the part of the public to forsake their motion picture entertainment in favor of radio."

Speakers at Radio Trade Association Meeting

L. A. NIXON, secretary of the Radio Trade Association, in announcing an open meeting for the radio trade conducted under the auspices of this association for October 9 at 3:00 p. m. at Grand Central Palace, New York City, has issued the following program:

- Summarizing the Year in Radio.
- H. Gernsbach, editor, *Radio News*.
- Forecasting the Coming Year.
- H. T. Melhuish, sales manager, Radio Corporation of America.
- The Manufacturers' Needs.
- H. H. Eby, H. H. Eby Company, Philadelphia, Penna.
- The Broadcasters' Position.
- W. E. Harkness, manager, radio department, American Telephone & Telegraph Co.
- The Jobbers' Problems.
- Benj. Gross, president, Radio Stores Corp., New York City.
- What the Retailer Wants.
- Harold M. Schwab, Harold M. Schwab, Inc., New York City.
- What the Public Wants.
- Major J. Andrew White, editor, *Wireless Age*, New York City.
- Henry M. Shaw, president of the Radio Trade Association, will conduct the meeting. Other speakers may be announced at a later date.

Broadcasting Program for Radio Week

THE following tentative broadcasting program for National Radio Week has been announced by the program committee:

SUNDAY, November 25.—National Radio Sunday, at which time the attention of the public will be called to the wonderful church services broadcast, and the use of radio sets for shut-ins advocated. Every station will be asked to feature its religious programs on this day.

MONDAY, November 26.—Radio and the Stage. Showing what radio has done for the amusement world—programs featuring popular performers and calling attention to what radio has done for plays and music.

TUESDAY, November 27.—Government Day. The possibilities of radio as a factor in government have never been properly realized. Prominent national, state and city, government officials will be asked to address the radio audience.

TUESDAY AFTERNOON will be devoted to the children.

WEDNESDAY, November 28.—Radio and Music. A contest for Wednesday night may be announced later.

THURSDAY, NOVEMBER 29.—Thanksgiving Day. Sports Day. Thanksgiving Day football games will be broadcast from many stations. An added feature may be chosen for this date.

FRIDAY, November 30.—Education Day, with special feature in the line of orchestra music, especially for the smaller stations.

SATURDAY, December 1.—Radio in the Home. Radio for Pleasure. Programs especially designed for home radio parties, heavy on dance music, etc.

Radio Demonstrations at County Fairs

THE National Radio Chamber of Commerce, 165 Broadway, New York City, has issued a comprehensive schedule of county fairs covering most of the eastern and middle western states at which co-operative demonstrations of radio receiving sets will be given for the benefit of the rural population who attend such events.

The Chamber of Commerce offers the fullest co-operation to radio manufacturers, jobbers and dealers in arranging terms with the local authorities. Tresham D. Gregg is the secretary of the chamber.

Radio Week Committee at the Radio Show

THROUGH the courtesy of C. J. Johnson, manager of the American Radio Exposition which will be held at Grand Central Palace, October 6th to 13th, the radio week executive committee of the Radio Trade Association will have a special table where a representative of the committee will be prepared to answer all questions in regard to Radio Week. Radio Week will be held November 25th to December 5th, the program and publicity details of which are being arranged by Radio Trade Association.

New Radio and Electrical Firms

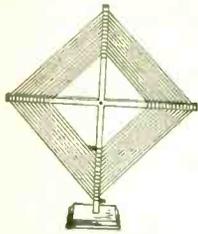
Wright-Morrison Battery Co., Poughkeepsie, N. Y., \$15,000; F. and A. Wright, G. Morrison. (Attorney, J. Hallheimer, 33 West 42d St., New York City.)

Famous Electric Co., Queens, N. Y., \$10,000; H. Schmidt, R. Barth, B. Weichsler. (Attorney, L. Buxbaum, 826 Broadway, Brooklyn, N. Y.)

PATENTS

promptly procured. Trade Marks designed & registered. **FREE INVENTION REPORTING BLANK** Phone Vanderbilt 7313

FREE MANUFACTURERS PATENT CO., INC. 520 FIFTH AVE. NEW YORK



\$1.25 Loop Antenna

Post Paid in U. S. A. A highly efficient complete indoor aerial.

Write for literature describing Radio Cabinets and other products.

Robbins Woodworking Co. LIBERTYVILLE, ILL. 502 SECOND ST.



ON APPROVAL FOR 30¢ ZOBEL-STEIN LABORATORIES 322 9th ST. BROOKLYN, N.Y. SOUTH 2650

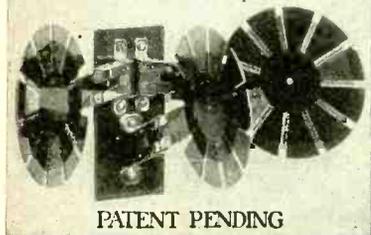
PADEREWSKI KNOWS QUALITY HE SELECTED



- 4 REASONS WHY**
1. Large Heavy Base Eliminates top heaviness.
 2. Combination Rattan Reed and fiber strengthens horn and gives beautiful quality without distortion.
 3. No adjustment necessary; will work perfectly on any good two-stage set.
 4. Guaranteed against mechanical defects of any kind for one year.
- Dealers and Jobbers Write for Territory Discounts.

BEL-CANTO MANUFACTURING CO. 417 East 34th Street, New York City Phone: Vanderbilt 8959

THE GOODMAN



The Niftiest Short Wave Tuner on the Market Only \$6.00 & PP on 1 lb. Send for pamphlet.

L. W. GOODMAN DREXEL HILL, PA.

Mr. C. H. Jenkins, Audubon, N. J., writes:—"On July 13th, tuned in WBAP, Fort Worth, Texas, (478 meters), with the GOODMAN, while WDAR (396 m.) and WOD (509 m.), powerful local stations, were broadcasting dance music."

"B" BATTERIES

Depleted "B" Batteries are usually the cause of your trouble in receiving. Eliminate it by buying your "B" Batteries freshly tested and passed by our laboratories—sold direct to the consumer at the following low prices—guaranteed in every respect!

	Large	Medium	Small
22½ Volt plain	\$1.25	\$1.00	\$0.70
22½ Volt variable	\$1.38	\$1.13	\$0.75
45 Volt plain	\$2.50	\$1.75	—
45 Volt variable	\$2.75	\$2.00	—

Any type of batteries made to order—send money order including postage—or order for C. O. D.

SPECIAL OFFER—We offer our customers a 0-50 standard Voltmeter listed at \$2.75 for \$1.87 with any order for batteries amounting to \$9.00 or over.

ROSENDAL & CO., Chemical Engineers, 2 Stone Street, New York

WGY Told the Farmer and the Farmer Tolled the Bell

MANY stages of amplification and three different wave lengths are used to get Arlington time signals to the farmers in the vicinity of Medusa, Albany County, N. Y.

C. J. Waldron, a Medusa resident, lives next door to the church. He has added a few feet to the length of the bell rope and every noon, after tuning in WGY, the General Electric Company station at Schenectady, N. Y., he sits in his rocking chair with phones on head and bell rope in hand, waiting for the long Arlington note which marks twelve o'clock. At the long note he pulls the bell rope and the bell, which is a big one, broadcasts the time signal miles around.

By the time the farmer gets the signal it has passed through three different wave lengths. Arlington broadcasts on 2500 meters wave length. WGY receives the signals on a special apparatus and then amplifies the received signals and rebroadcasts on 380 meters. Mr. Waldron again amplifies the signal for the farmers. The wave length of the bell tone has not been measured.

Electric Flashlights Taken under Water

A METHOD whereby flashlights can be taken under the water or a brilliant burst of light of very short duration can be provided in the absence of high-tension current has been perfected by Prof. Kyoji Suyehiro, of the Tokyo Imperial University.

Mercury is drawn through the hairfine bore of a glass tube, to serve as the filament of the lamp. When a low-voltage current is turned on, the mercury is heated to the explosion point almost instantaneously, and as the tube bursts there is produced a brilliant mercury arc light. This endures for a small fraction of a second, and then dies.

The new mercury light is used to take instantaneous photographs in the study of metal vibrations, the rolling of model ship hulls from beneath the surface of the water and for other purposes demanding a very bright light for a very brief period of time.

The First Radio Earthquake Message from Japan

ACCORDING to the Radio Corporation of America the message received by its radio station at San Francisco giving the first news of the earthquake in Japan read as follows:

"Conflagration subsequent to severe earthquake at Yokohama at noon today whole city practically ablaze numerous casualties all traffic stopped."

From the very beginning the superintendent of the Japanese radio station, Taki Yonemura, and his operating staff labored heroically in dispatching with the utmost speed, all messages that reached the station from the interior. Yonemura not only supervised the operators at his station but, knowing English, was unexpectedly called into service as a translator of the messages which were sent over the radio circuit from Japan.

SEND NO MONEY **Guaranteed!** **\$3.98** **Money back if they do not satisfy after 5 DAYS TRIAL**

SEND no money! Order by postcard and pay postman on arrival. If they do not excel any other phones you ever used regardless of price, return them and your money will be refunded at once.

GUARANTEED ONE YEAR

AMBASSADOR LONG RANGE PHONES

TOWER N.F.G. CORP., 98 BROOKLINE AVE., BOSTON, MASS., DEPT. A

THE ORIGINAL PEANUT TUBE WELSH PEANUT TUBE W. T. 501

Resembles a peanut in size and shape. A Sensation Last Season—A Real Business Getter This Year

LOWER COST **BETTER RESULTS** **List Price \$2.00**

Sockets ... 40c Adaptors ... 75c

Operates either on storage battery or three dry cells. Sent by parcel post prepaid on receipt of price if your dealer has not stocked them.

WELSH ELECTRIC LAMP CORP. 69 BOYLAN STREET NEWARK, N. J. BEWARE OF IMITATIONS

ROCKY MOUNTAIN RADIO PRODUCTS

Crystals Any Style of Radio Material at Lowest Prices!

NEW K-D SPRING LOOP AERIAL LIST PRICE **\$1.00** **WIRE**

Distributors Bus, Aerial, Magnet **WIRE**

Write for Discounts **Rocky Mountain Products Co.** 9 Church St., New York

PROTECT THE HEART OF YOUR RADIO SET

Vacuum Tubes are costly and extremely delicate. B battery or any other excessive current applied for only the fraction of a second to the filament leads will burn out your tubes. You have probably already had this experience and it is apt to happen again at any time. A burnt out tube means money lost—the set out of commission—inconvenience to you.

Why Take These Chances When RADECO SAFETY FUSES

will absolutely protect your tubes. Applied in an instant to the filament terminals. Will fit any standard tube or go in any standard socket. Fully guaranteed. 50 cts. each. Sent Postpaid. Delay may be costly. Write now. Specify type of tube used.

DEPT. 5 **Radio Equipment Company** 630 Washington Street Boston, Mass. New England's Oldest Exclusive Radio House Distributors of many other successful Radio Specialties. Dealers:—Write for proposition and full details.

Radio News Vital to the Associated Press

THE first news dispatches received at San Francisco direct from Tokio after the recent earthquakes were relayed from Tokio to the Iwaki radio station by courier under a system set up by the Associated Press and through wireless orders, as soon as it became evident that ordinary means of communication had failed in the face of the great holocaust.

Carriers were sent from Iwaki station, 155 miles to Tokio. The Associated Press correspondent, meanwhile, is believed to have started couriers northward to the radio plant, as not enough time had elapsed for a round trip to have been made under the difficult conditions existing from the capital to the radio plant.

The courier system, however, was only one of a number of means utilized to get intelligence of the catastrophe for the benefit of the Associated Press member newspapers, cablegrams coming by a round-about way, wireless to Iwaki, wireless to vessels in the vicinity of Japan and the sending of Associated Press staff men from their stations in China and elsewhere in the Far East being some of the other methods utilized.

Electricity Used in New York State Shows Big Increase

THE use of electrical energy in New York State for the present year shows that for each month in the first half of 1923 there was an increase over the consumption for the same month in 1922, according to figures given out by the United States Geological Survey.

The total increase in kilowatt-hours was approximately 780,000,000, or 22.3 per cent more than the total consumption for the first half of 1922. The production through June of last year was 3,497,000,000 kw.h., and for the same period this year, 4,277,000,000 kw.h.

This increase of more than one-fifth in the consumption of electricity for light and power is accounted for by a 23.5 per cent increase in the number of meters installed by the central stations of the State, which number rose from 1,450,000 on July 1, 1922, to 1,790,000 on July 1 this year.

A statement by the New York State Committee on Public Utility Information analyzing these figures, says: "The percentage increase in the use of electrical energy corresponds almost exactly to the increase in the number of meters installed while the average sales a meter remained approximately the same. From this it seems fair to assume that wherever electric service is available, that service is being used fully, either for domestic lighting and apparatus, or industrially. The installation of new meters totalling more than 20 per cent over last year's total emphasizes the steadily increasing demand for electrical energy, which is being met in New York State by improvements and additions in production capacity and facilities for transmission and distribution that will cost nearly \$100,000,000 during this year."

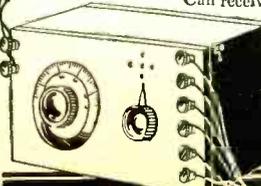
FREE VACUUM TUBE RADIO SET

Can receive 100 miles and more.

RUSH your name to learn how you can get a Vacuum Tube Radio Set.

ABSOLUTELY FREE Don't delay, write to day for FREE RADIO PLAN.

HOME SUPPLY CO.
Dept. 978
131 Duane St., N. Y. C.



"Your Modulation's Fine"
BROADCAST listener's impression of an amateur phone station talking to a brother amateur:

"Hello 2HAM Hello 2-H-A-M H-e-l-l-o-o twooooo H-A-M. This is 2Bug calling. This is 2 B-U-G calling. Come back, old man. 2 B-U-G signing off.

"Hello 2-B-U-G Hello toooooo-bee-youuuuuu-Geeeee— Good evening, O.M. Say, old man, your modulation is fine this evening. I say your modulation is fine this evening. It certainly has improved. I say it certainly is fine. How do you get me this evening? I say, HOW DO YOU GET ME THIS EVENING? Come back, O. M., and let me know. I say, er er. Come back and let me know."



Defiance Laboratory
MICA
TESTED PHONE COND.
001 MFD

Mica Condensers

Absolutely the lowest priced on market.
Tested and Guaranteed.

.00025	.....	20c.
.0005	.....	20c.
.001	.....	20c.
.00025 and 1/2 Meg. G. L.	.....	25c.
.00025 and 1 Meg. G. L.	.....	25c.
.00025 and 2 Meg. G. L.	.....	25c.
.0005 and 1/2 Meg. G. L.	.....	25c.
.0005 and 1 Meg. G. L.	.....	25c.
.0005 and 2 Meg. G. L.	.....	25c.

At your dealers or by mail direct on receipt of price.

DEFIANCE LABORATORIES
65 WEST BROADWAY N. Y. CITY

LEARN RADIO

Get into the world's greatest field of profit and pleasure. Big money-making opportunities. Easy to learn. Trained men are in demand—mechanics, operators, designers, inspectors. Quality for these high salaried positions, or make big money in your spare time. Unlimited possibilities on land and sea.

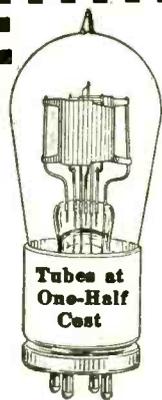
I WILL TRAIN YOU AT HOME TO BE A RADIO EXPERT

You, too, can learn, quickly and easily, to design, construct, install, operate, repair, maintain and sell all forms of Radio apparatus. No previous experience necessary. My methods are the latest and most successful in existence.

FREE Wonderful home construction tube receiving set, of the latest design. **Write Today** "Radio Facts" **FREE**

A. G. Mohaupt, Radio Engineer, AMERICAN RADIO ASS'N, Dept. 99B 4513 Ravenswood, CHICAGO





IT HAS HAPPENED TO ALL OF YOU IN A FRACTION OF A SECOND!

WHEN the filament burns out, at least \$5.00 goes with it to put the set in operation again.

WHY not save nearly one-half the cost of a new tube by sending us your burned out or broken tube to be repaired?

WE REPAIR EVERY TYPE OF tungsten wire filament receiving tube. All our tubes are TESTED and GUARANTEED to function as well as when new.

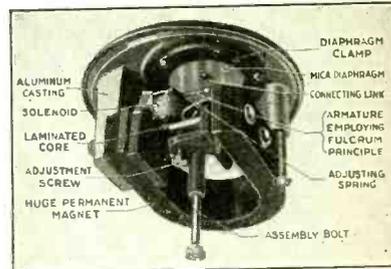
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New Zealand Subscriber Makes Suggestions to DXers

EDITOR, RADIO WORLD: The writer is a regular subscriber to RADIO WORLD and always reads the page you devote to the distance records and descriptions of hook-ups set aside for the DX NITE OWLS.

To my mind, these columns would be much more interesting if your contributors would, when sending records of the stations heard, state the mileage covered, or the station in miles farthest away.

This information is very necessary when one is trying to make up one's mind which circuit is the best to make up out of the multitude that are offered.

I have tried to check up some of the distances covered, but find it practically impossible, with the very little information I am able to get.

Yours truly,
W. H. HAMBLIN.

12 Argyle Street,
Herne Bay, Auckland,
New Zealand.

French Are Building First Big Wireless Station in Balkans

WORK has been started on a new 100-kilowatt radio station at Rakovica, about four kilometers from Belgrade, and on a receiving station at Laudon Trench, a suburb of that city. The station is being built by the French Wireless Telegraph Company and the total expense is estimated at 38,000,000 dinars (\$402,800 at rate of exchange of September 1). On its completion the entire installation will be taken over by the State and the operating personnel will become employees of the Department of Posts and Telegraphs, the company maintaining one engineer as a technical adviser.

This particular station will be the first high-power radio installation in the Balkans, and because of the greatly increased facilities which it will afford for the dissemination of news and the rapid dispatch of information, it should soon become well known internationally, says Consul K. S. Patton in a report to the Department of Commerce.

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**More About Crystal
Detectors**

EDITOR, RADIO WORLD:—I noticed an article by Paul Thorne, on page 12, RADIO WORLD, September 15, referring to reception of radio broadcast programs with crystal detector. He says: "In every case I heard the concert distinct and loud." So he is undoubtedly referring to broadcast programs and not to C. W. telegraphy. I can't understand why he considers that a crystal will not receive distant radio broadcast programs or any other radio-telephony. It certainly is a well known fact that a crystal will receive interrupted C. W. and also modulated C. W. (radio-telephony). Of course I fully understand that a crystal is useless to receive C. W. telegraphy and undamped waves. But in radio-telephony or broadcasting the undamped waves or carrier waves are modulated either by the human voice or music, or buzzer, and the crystal detector will most certainly respond.

If Paul Thorne wants to be convinced that a crystal detector will receive radio-telephony, I'll demonstrate it to him and I will not have to inquire among my tube set neighbors to find out if someone had the station on at the exact moment.

And even if he is referring to undamped waves as used in C. W. telegraphy, there is nothing remarkable about the effect he notices. As a practical radio operator, while in the vicinity of two C. W. transmitters I've often noticed that they heterodyne each other and that a crystal receiver could then pick them up. But Mr. Thorne is referring to a radio broadcasting program for he distinctly says he heard the concert. He says that he is out of the amateur stage. Personally, I wonder what he thinks the radio operators did before they had tubes? I've been a practical radio operator for almost nine years—eight in the navy and one in the merchant marine service—and in all that time I generally used a crystal only. This is because that it is only in the past four years that tubes have come into general use. Some people imagine that without at least two stages of audio-frequency amplification that they cannot get anything but local stuff and as for the crystal—why that is impossible! But believe me, if one has a good antenna, an efficient tuner, a good crystal detector will play its part, especially as it is inexpensive and requires no batteries. A crystal set requires no further outlay than the initial cost.

Yours truly,
PAUL V. HEINE.
226 Schermerhorn St., Brooklyn, N. Y.

EDITOR RADIO WORLD:—Having read the article by Philip Keansby in RADIO WORLD, August 25, and Paul Thorne in the September 15th issue, and being an ardent crystal radio fan, I wish to say a few words in regard to re-radiation from tube receivers assisting crystal sets to receive long distance stations.

I have had a crystal set for a year and have built fifteen or more efficient crystal receivers of all types. I had a crystal receiver when there were only two tube receivers in this city. These two tube receivers were located over one-half mile from me, and I received long distance broadcasters as far as 1410 miles away, when I knew that the owners of the tube sets were in bed. I do most of my listening in after 10:30 p. m.

Now if there is anything to tube set radiating, please tell me how I could receive seven stations in three minutes time on my crystal set last night merely by turning the dial of the 43 plate condenser? Here are the stations I received, the place on the dial and the distance from me: First, WDAP, Chicago, 20°, 575 miles; second, WSB, Atlanta, 45°, 850 miles; third, WDAF, Kansas City, 50°, 200 miles; fourth, WJAZ, Chicago, 58°, 575 miles; fifth, WMC, Memphis, Tenn., 65°, 460 miles; sixth, WOAW, Omaha, Neb., 78°, 230 miles; seventh, 9XM—? Testing.

These stations were received in 3 minutes' time from 11:15 p. m. to 11:18 p. m. The nearest tube receiver to me is over five city blocks distant with antenna pointed in the opposite direction from mine.

Re-radiation helped me to receive these stations. How come?

I wish to say that I don't believe that there is anything to re-radiation. If a radio fan having a crystal set is persistent and has patience he will get results. I get them where others fail and no tricky set either, just a simple variocoupler, variable condenser receiver.

Yours truly,
RICHARD B. WILBUR.

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THE demand for electrical energy that last year required a total production of more than 50,000,000,000 kilowatt-hours in the United States alone, and that has necessitated expansion and improvement in the electrical central stations of the country that will cost more than half a billion dollars during the present year, has resulted in the harnessing of many power-sources. Steam, and the energy of running water, are the most common generating sources of electricity, but the development of machinery and the demand for current where there are neither central stations nor transmission lines have produced strange generating plants.

In northern Florida, where there are numerous artesian wells, these have been set to work, since water, whether it runs up or down, will turn a turbine, and the result is a hydro-electric plant apparently defying the laws of gravity. The water, coming from a higher source under the ground, rushes out with enough force to operate the turbine, which in turn runs a generator.

Live steam from borings near hot springs is being used in California to provide pressure for engines that run generating apparatus, and in Italy more than 10,000 electrical horsepower are produced by steam drawn from the flanks of Mount Vesuvius.

There has recently been approved by the Electricity Commission of Great Britain a plan to build a huge tidal retaining basin off Mersea Island, where the tides are of unusual strength. The basin, or lake, will be filled by the incoming sea at high tide, and this water, flowing through turbines as the ocean recedes, will produce hydro-electric power as it discharges into a lower basin which is kept empty at high tide by water-gates.

In England, too, successful experiments have been made with windmills in generating electrical energy. On the coast, where the wind is almost continuous, huge windmills have been set over wells, from which they pump water into elevated tanks, and this water, running out through turbines, acts as a small water-fall. The gearing of the wind-mills directly to the generator has been found undesirable because of the variations in speed.

J. B. S. Haldane, distinguished British scientist and author of "If You Were Alive in 2123," predicts the eventual use of wind as the chief source of power in the near future.

Sun-motors, which concentrate the heat of the sun through a series of mirrors, have been made to produce electrical energy, and yet another use of sun-power has recently been reported from Italy, where it is receiving serious consideration. The difference in temperature between the surface and under-surface water of tropical seas is more than 30 degrees, and it is planned to make use of this form of sun-power by using the warm surface water to evaporate a liquid of low boiling-point, whose vapor will drive turbines as steam does, and then to condense the vapor with the colder water pumped from below the surface. Plans are being discussed for the construction of a huge reinforced concrete raft that will support electrical equipment for a 100,000 kilowatt plant.

Wave-motors, which utilize the force of the waves to produce electricity have been operated along the Atlantic coast; bicycles geared to generators which charged storage batteries have been used, and numerous other devices. What sources of electrical energy the future may bring forth can only be guessed, but until transmission lines from great central stations carry power to every corner of the world no source of power for local use will be overlooked.

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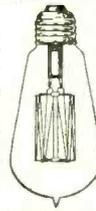
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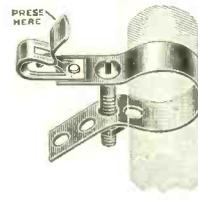
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LONG ISLAND CITY, N. Y.

To Radio World readers who may have missed recent numbers

The newsstand sales of Radio World have increased so rapidly for several weeks past that some of our readers were disappointed to find their regular newsdealers had sold out their supplies. This is for you; if you are among the disappointed ones: Send 15c. per copy and we will mail you any of the recent issues that you may have missed, so that you can complete your files.

RADIO WORLD

1493 Broadway New York

To the DX Nite Owls

and anyone else interested in radio! If you missed RADIO WORLD, dated Feb. 24, with the famous Flewelling Circuit, get it now and get your EARS WET! Send 15c or start your subscription with that number. RADIO WORLD, 1493 Broadway, New York.

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

This department is intended for everybody who wants quick action on short announcements covering the buying, selling, exchanging or general merchandising in the radio and other fields. Readers of RADIO WORLD will find that it pays to read these columns every week. Advertisers will get an eight-day service here—that is, copy received for this department will appear in RADIO WORLD on the news-stands eight days after copy reaches us.

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).

STOP EXPERIMENTING—GET RESULTS with circuit used in leading WD11 tube set on market. Paragon of simplicity in design and construction. Circuit and specifications, 50c. OKAYED SUPPLIES CO., ELWOOD, IND.

FRENCH COLONIES FREE—Beautiful picture set, including Native Chiefs, Tigers, Pictorials; 2c postage. Empire Stamp Company, 351 Lippincott St., Toronto, Canada.

WESTINGHOUSE R. C. 3 tube set, like new, for sale cheap. O. Lyshang, 6 Althea St., Dorchester, Mass.

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

CHEAPEST TO BUILD—Easiest to tune. Get particulars Rokay Single Control Hook-up. Describe your set. Rokay Electric Company, Ingomar, Ohio.

LONESOME! MAKE NEW AND TRUE FRIENDS. Confidential. Write DOLLY GRAY AGENCY, Box 186B, Denver, Colo.

SAVE \$20.00—Our unwired regenerative receiver contains the best of material mounted on panel in handsome oak cabinet. Value that will surprise you, and the price is only \$14.00, prepaid. C. E. Janson, 28 Bellevue St., Lowell, Mass.

SECOND-HAND Westinghouse R. C. Regenerative receiver, consisting of detector and two-step amplifier, \$65.00. Three Erla Radio Frequency Transformers, \$6.00; Crosley two-step amplifier, \$14.00. All of the above is good as new and will work with all standard bulbs. Address Randolph Whitehand, Albany, Georgia.

EVERY RADIO FAN should have these two books, "101 Receiving Circuits" and "Six Successful Receiving Sets." By M. B. Sleeper. They are the most up-to-date radio books for the fan who likes to make his own, and will help you out and save you many times their cost. Both books are full of illustrations. Price, 50c. each, with 10c. extra for postage, or both for \$1.00 sent prepaid. COLUMBIA PRINT, 1493 Broadway, New York City.

SUPER-SIMPLICITY CIRCUIT—1,000 to 1,500 miles on one tube, one control, 150 to 25,000 meters. No rheostat, storage battery, vario coupler, variometer, 3-coil mounting, variable inductance, tape or radio frequency. Nothing to guess about. Complete hook-up and particulars, \$1.00. No checks. Build your own. Save 50% and get better results. RADIO EXPERIMENTAL LABORATORY, Box 194A, Berkeley, Calif.

MOTORCYCLES AND SIDECARS—Their Construction, Management and Repair.—By Victor W. Pagé. Describes fully all leading types of machines, their design, construction, maintenance, operation and repair. Shows all new improvements in motorcycle construction and gives the most complete instructions ever published for starting, driving and repairing all types of motorcycles. There is a complete exposition of modern starting methods and a full explanation of the operating principles and repair of the new automatic electric lighting systems. The care of the generator, storage battery, automatic cut-out and other parts is clearly expounded. All types of change speed gears and clutches are fully outlined, also full instructions for their use. A complete new chapter has been added on the thorough overhauling and repairing of motorcycle engines, all processes are fully described and illustrated. The reader is told what parts wear, how to detect depreciation and how to make all repairs and adjustments necessary to make the engine as good as new. 693 pages, 371 illustrations. New Revised and Enlarged Edition. Price, \$3.00. THE COLUMBIA PRINT, 1493 Broadway, New York City.

IF YOU WANT TO TUNE out local Broadcast and receive long distance stations with volume and clearness, send 35c. coin only, for our new hook-up. We tune out powerful local stations nightly. Results will surprise you. BERT, THE RADIO MAN, 847 Hopkins St., Cincinnati, O.

FOR SALE—Parts for approximately 5,000 beautiful head-set phones, also complete set of dies and tools for manufacture. Equipment of bankrupt manufacturer, which will be sold to liquidate debt to this company. Actual worth between \$4,000 and \$5,000—will sell for \$1,000 cash to include everything. Wonderful opportunity to start manufacturing. Quick action required. FEDERAL ENGINEERING CO., Detroit, Mich.

WESTERN ELECTRIC loud-speaker phone unit with cord, to use on any phonograph. Regular price, \$15.00. First check for \$7.50 gets it. Guaranteed. R. O. WARD, Winter Park, Fla., Box 427.

RADIO MONEY SAVERS—Blue prints and instructions for making your own insulators, switches, leaks, etc., 50c. RADIOPLAN CO., Harwich, Mass.

THE SHEBOYGAN COIL tunes sharper than any other. Only the turns needed are in the circuit—no dead ends. It can be made in tube, spider-web or any other form. Fine for loading. Drawings sent for \$1.00 M. O. E. GUEHNA, 118½ North 8th Street, Sheboygan, Wis.

WANTED—Paragon RA-10 Receiver and DA-2 Amplifier. State best offer. Ted Boston, Marion, Ky.

SACRIFICE! Three-circuit tuner, detector, three-step audio. In cabinet. Gets both coasts. \$75. Seller attending college. ROBERT RALSTON, Tarkio, Missouri.

15c. LETTERED BINDING POSTS, complete set eight, 60c; two sets, \$1.00. Prepaid, same day. Stamps accepted. Everything in radio. Ask for quotations. List for stamp. Kladag Radio Laboratories, Kent, Ohio.

GET OUR PRICES on Plate and Filament Heating Transformers. L. Werts, 409 St. Julian St., Pekin, Ill.

FOR SALE—De Forest Portable Radiophone Transmitter. 5-watt bulbs; new, \$100 net F. O. B. P. O. Box 33, Red Bank, N. J.

60,000 MILES ON A HOME-MADE RECEIVER. With a 2,600-mile range. 100 station log and hook-up for the asking. Send addressed envelope. Maitland Roach, 2905 Columbia Ave., Philadelphia, Pa.

RADIO SET—Extremely sensitive tuner and one step in 8x18 walnut cabinet. I hear Kansas City Star; Omaha, Neb., etc. Atwater Kent parts. Complete with two WD11 tubes and phones, \$70 prepaid. Address, Garth Showers, Tannersville, N. Y.

DETECTIVES NEEDED EVERYWHERE—Work home or travel. Experience unnecessary. Write, American Detective System, 1968A Broadway, N. Y.

WIRING A HOUSE. By Herbert Pratt. Shows a house already built; tells just how to start about wiring it; where to begin; what wire to use; how to run it according to insurance rules; in fact, just the information you need. Directions apply equally to a shop. Sixth edition. COLUMBIA PRINT, 1493 Broadway, N. Y. C. Price, 35 cents.

WOULD YOU LIKE TO RECEIVE RADIO LITERATURE? Are you in the market for radio goods of any kind, either as a consumer, a distributor or a retailer? If so, send us your name and address on a post card and we will see that your name reaches the right people so that you will receive pamphlets, circulars, etc., regarding the goods you want. Address SERVICE EDITOR, RADIO WORLD, 1493 Broadway, New York City.

FOR IMMEDIATE DELIVERY—Tubes, Loud Speakers, Westinghouse Receiving Sets, Phones, Condensers, Rheostats, Variocouplers, Variometers, Transformers, Sockets, Dials, Switch Points and Levers, Cabinets, Panels and full line of parts. George Kinsman, 4625 No. Hermitage Avenue, Chicago, Ill.

FOR SALE—Three Radio Corporation, 200 to 5000 meter radio frequency transformers, like new, fine for superhetrodyne, \$5.00 each. Fine Phonograph attachments, needle operating kind. Guaranteed good as Magnavox, \$10.00 each. Any of above sent post paid, collect, on receipt of \$1.00. Everything sold on money-back guarantee. RAYMOND MOORE, Box 404, Lakeside, Ohio.

OLD MONEY WANTED—\$2.00 to \$500.00 EACH paid for hundreds of Old and Odd Coins. Keep all old money. Send 10 cents for New Illustrated Coin Value Book, 4x6. You may have valuable coins. Get posted. We pay CASH. CLARKE COIN COMPANY, Ave. 83, Le Roy, N. Y.

LEARN THE RADIO CODE in 3 hours or less by the Corydon Snyder Code Method. Money back if not satisfied. 50 cents postpaid, or particulars for stamp. Corydon Snyder, 1161 So. Ridgeland Ave., Oak Park, Ill.

MAGNAVOX TYPE R3. Latest nationally advertised reproducers. List \$35. Introductory offer, \$25. The factory sealed carton is your guarantee. Radio Central, Dept. W, Abilene, Kansas.

ALL ESSENTIAL PARTS FOR building Neutrodyne Receiver, complete instructions, etc., \$21.50 C. O. D. Reinartz tuning coils, \$1.50. R. Schwartz, Buchanan, Mich.

FREE APPARATUS FOR SECURING SUBSCRIPTIONS FOR "RADIO." Write today for complete list of premiums and our special subscription offer. "RADIO," Pacific Bldg., San Francisco, Calif.

VACUUM TUBES REPAIRED. Reasonable. Send for our price list. Vacuum Electric, Station C, Toledo, Ohio.

150 FUNNY PARODIES on latest songs, 25c. Book catalog, 2c. R. W. Collins Co., 197 Fulton St., Brooklyn, N. Y.

THE AMATEUR ELECTRICIAN explains the "How and Why" of electricity with plans for making and operating wireless, telephones, electric bells, toys, novelties, etc. Over 70 illustrations, 64 pages. Only 10c. R. W. Collins Co., 197 Fulton Street, Brooklyn, N. Y.

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.

20,000 GERMAN marks, \$1; 10,000 Austrian crowns, \$1; 1,000,000 Russian rubles, \$1. All 3 for \$2. AMERICAN SALES CO., Box 1278, San Francisco, Calif.

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.

MODEL MAKING—By Raymond Francis Yates. A new book for the mechanic and model maker. This is the first book of its kind to be published in this country, and all those interested in model engineering should have a copy. The first eight chapters are devoted to such subjects as Silver Soldering, Heat Treatment of Steel, Lathe Work, Pattern Making, Grinding, etc. The remaining twenty-four chapters describe the construction of various models such as rapid fire naval guns, speed boats, model steam engines, turbines, etc. 400 pages. 301 illustrations. Price, \$3.00. The Columbia Press, 1493 Broadway, New York City.

BIG ADVERTISING VALUE IN RADIO WORLD'S FALL BUYERS' NUMBER OUT NEXT WEEK!

Last Form Closes Sept. 27

- 1 At four dollars an inch (yearly contract rate) 74,000 radio-buying readers learn of your goods—a greater number of eyes than four dollars can reach in any other radio advertising medium.
- 2 Radio World gives **quicker results**—i. e., advertising copy received by Thursday p. m. is published and on the news-stands the following Wednesday morning.
- 3 A Weekly has greater **reader interest**—the Saturday Evening Post, Literary Digest, Iron Age, are Weeklies. Radio World, the big success of radio, is published every week.
- 4 Advertising is a gamble. Life itself is. A gambler bets his money on past performances. Radio Corporation of America tried out **Radio World**, then gave us a yearly contract. Magnavox tried us for small space thirteen times, and have just renewed for fifty-two times, using pages. The Federal Telephone & Telegraph Company investigated us from every angle for weeks, then gave us a fifty-two consecutive issue order. A four-time trial of Radio World almost invariably ends with a fifty-two time contract at \$120 per page net or \$4.00 an inch.

DIAGRAMS AND DESCRIPTIVE MATTER ABOUT THE LATEST ARM-STRONG, FLEWELLING, REINARTZ AND OTHER FAMOUS CIRCUITS, together with other special features, will make **Radio World's** FALL BUYERS' NUMBER a great cash producer for advertisers.

DATE OF THIS IMPORTANT ISSUE—OCTOBER 6

(LAST BLACK FORM CLOSSES SEPTEMBER 27)

Special service and value to advertisers in Radio World's **FALL BUYERS' NUMBER**: All advertisers who give us copy for quarter page or more space in Radio World's **FALL BUYERS' NUMBER** will, on request, have their announcements appear in **two colors at the price of one**—in case copy is in our hands by September 24.

Write, wire or phone now for special positions

RADIO WORLD, 1493 BROADWAY, NEW YORK CITY

TELEPHONE LACKAWANNA 6976

Sensations of Modern Radio!

FRESHMAN PRODUCTS

Ever since Radio first became generally popular, Freshman Products have been universally recognized for their precision-like accuracy, mechanical perfection, scientific correctness and unusual durability. Freshman Products are used and endorsed by hundreds of thousands of radio experts and fans throughout the world.

Highest Quality Mica Condensers



Through the accuracy and dependability of Freshman Condensers, hook-ups and circuits have been perfected which have completely revolutionized the art of Radio Reception.

These little Storers of energy and recifiers of Radio Current are the very heart of a well-built radio set.

The proper fixed condensers will make all the difference in the world in the reception, clarity and selectivity your set affords.

Capacity	Each	Capacity	Each
.0001	\$.35	.0025	\$.50
.00015	.35	.003	.60
.00025	.35	.0035	.70
.0002	.35	.004	.75
.0003	.35	.005	.75
.00035	.35	.006	.75
.0005	.35	.007	1.00
.0006	.40	.008	1.00
.0008	.40	.01	1.00
.001	.40	.015	1.50
.0015	.40	.02	2.00
.002	.40	.025	2.50

The FRESHMAN is so designed that constant equal pressure is exerted on the condenser plates over the entire area. They are the only condensers that do this and therefore the only condensers that avoid noises, which are due to variable pressure on the plates.

All Freshman Products at your dealers—otherwise send purchase price and you will be supplied without further charge.

NEW TYPE Variable Resistance Leak



ONLY THE KNOB SHOWS ON THE PANEL

This device is especially built for use as a tuning instrument. Its construction is such that it will withstand unusual usage. Fully guaranteed. **Absolutely no pencil markings.** Can be mounted on any panel in a few seconds. It will enable you to get stations you have never heard before.

Complete with either .00025 or .0005 Freshman Condenser.... **\$1.00**
Without Condenser **.75**

Troublesome Static Overcome



ANTENELLA
NOW ONLY **\$1.25**

No aerial or antenna needed

Eliminates aerial, outside wiring, lightning arresters, and other inconveniences inductive to static. Plug Antenella in any lighting socket and you can enjoy Radio in any room in your house. No current consumed.

Chas. Freshman Co. Inc.
Radio Condenser Products
106 Seventh Ave. New York

Resistance Leaks

The largest and most Complete line in the World



Every tube and every circuit requires a different leak resistance. You do not know what value is necessary until your circuit is tested. Freshman Variable Resistances give an unbroken range of 180 degrees from 0 to 5 megohms. Absolutely no pencil markings.

Base Mounting Type with either .00025 or .0005 Freshman Condenser **\$1.00**
Without Condenser..... **75c**



FRESHMAN "FIX-O"

FIXED RESISTANCE LEAK COMBINATION 4 IN ONE

Freshman Condenser .00025 Leak Mounting
Freshman Resistance Leak
Safe-T Handle

Price Complete **65c.**



FRESHMAN FIXED

RESISTANCE LEAK with SAFE-T handle

The only Resistance Leak using no carbon, graphite or lamp black. Guaranteed to remain permanently constant.

Furnished in any value of Resistance from 1/4 Megohm up..... **30c**



FRESHMAN NOISELESS

TESTED MICA CONDENSER and LEAK MOUNTING

The Freshman Condenser is so designed that constant equal pressure is exerted over the entire area of the condenser plates and the mounting is part of the condenser itself, which makes this new product the only True and Perfect Leak Mounting on the market.

Combination Condenser .00025 and Leak Mounting **40c**

Ask your dealer or write direct for our FREE DIAGRAMS of the Neutrodyne, Flewelling and other circuits.