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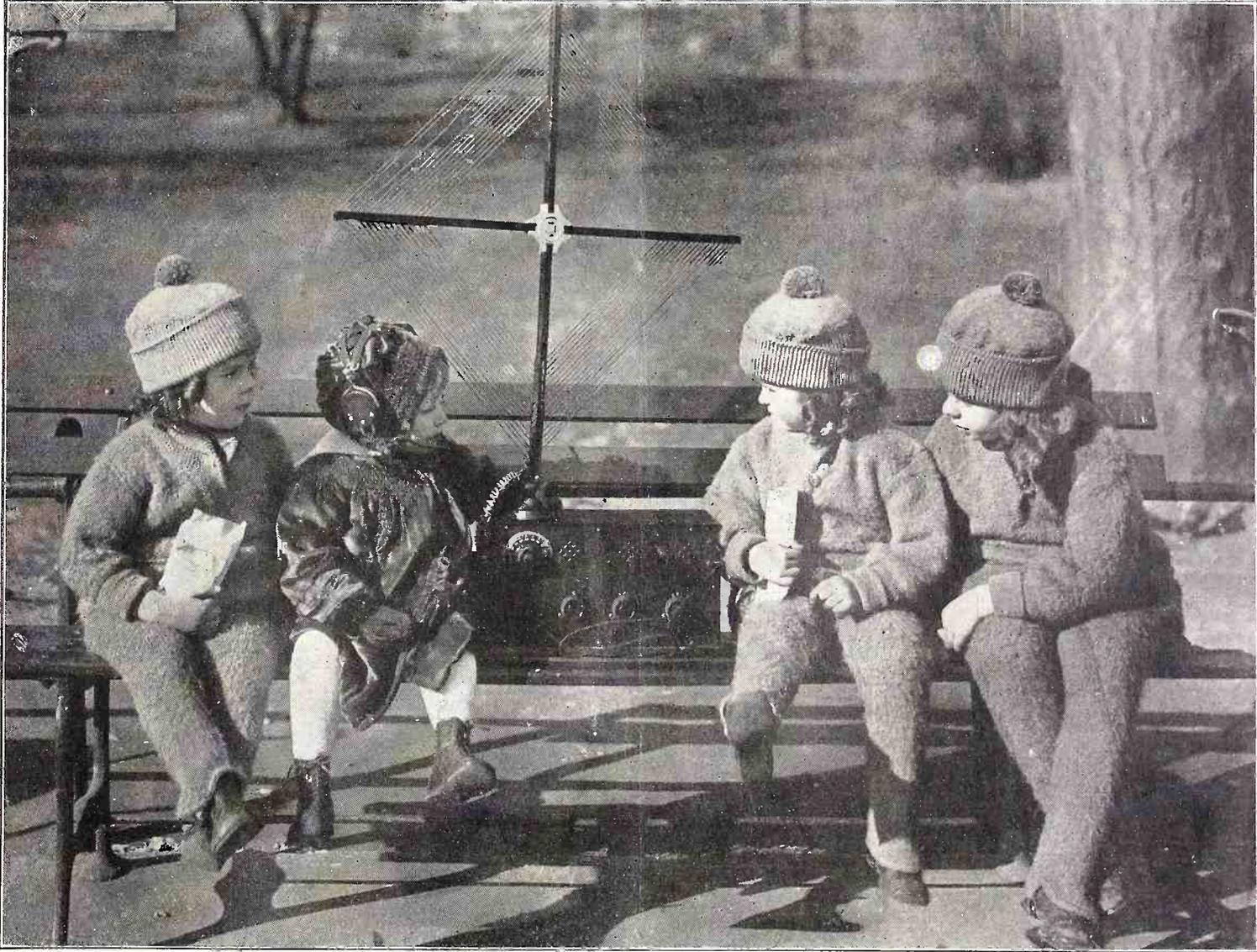
RADIO WORLD

Title Reg. U. S. Pat. Off.

ILLUSTRATED

EVERY WEEK

RADIO AMUSES YOUNGSTERS AND RELIEVES GOVERNESSES



(C. International Newsreel)

Governesses of the present younger generation do not have to imagine that their charges will be wandering all over the park, when they bring their portable loop set along. The kiddies take turns with the phones, and the governess sits back safe in the knowledge that she can peruse her book or do her knitting without wondering where "Lolita or Eugenia" are now.

SUMMARY OF BROADCASTING PROGRAMS



"For the ear to desire pleasant sounds is natural."
Mencius-

There are no sounds more pleasant than the music brought by the

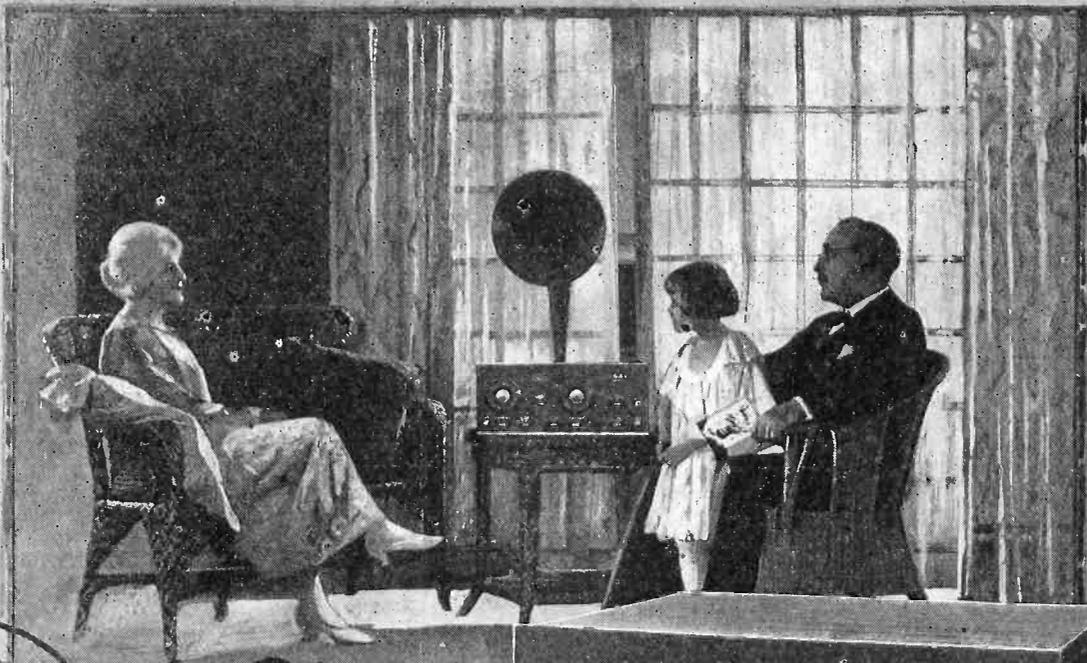
GREBE

Broadcast Receiver -
Doctor Mu.

REGENERATION and Tuned Radio Frequency Amplification find their first successful combination in this Receiver. The 20-foot silk-covered wire, readily concealed behind the picture moulding, is the only antenna required.

The attractively finished walnut cabinet has compartments for all necessary batteries.

Write for "GREBE Radio in the Well-Appointed Home"



GREBE RADIO



A. H. GREBE & COMPANY, Inc.
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Type CR-12

RADIO WORLD

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December 8, 1923

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How to Stop Re-radiation on Single Circuit Receivers

A Means of Curing the Worst Pest of Present Day Radio Reception Without Rebuilding the Receiver

By C. White, Consulting Engineer

FEW people realize how well the single circuit regenerative receiver adapts itself into a good transmitter when it is allowed to oscillate. It is quite true that such oscillations are relatively weak when compared to those of a regular five-watt transmitter, but when there are hundreds of such little transmitters in operation it is hard to imagine the magnitude of the interference they cause. Those of us who happen to live in densely populated apartment house cities fully realize the great extent to which this type of interference destroys quiet reception. It is mostly due to inexperienced or careless operators of single circuit regenerative receivers trying to tune in by the zero beat note method by allowing the receiver tube to oscillate.

As has been set forth in nearly every radio publication, it is not necessary to use this method to tune in since it is easily possible to pick up even a very weak station by keeping the detector on the point of oscillation, but not allowing it to "spill over" and disturb nearby friends. Yet there are many fans who operate single circuit receivers and would really like to rid their sets of the trouble of disturbing others. At the same time they are desirous of improving the range and selectivity of their sets.

To these fans who are anxious to take their receivers off the "pest list" and generally improve them I am offering this solution. It will be noted that there need not be a single wire changed in the original receiver. This fact will especially appeal to those who are averse

to changing the wiring of their present receiving set but would like to improve it by simply adding another cabinet in front of the one the present receiver occupies.

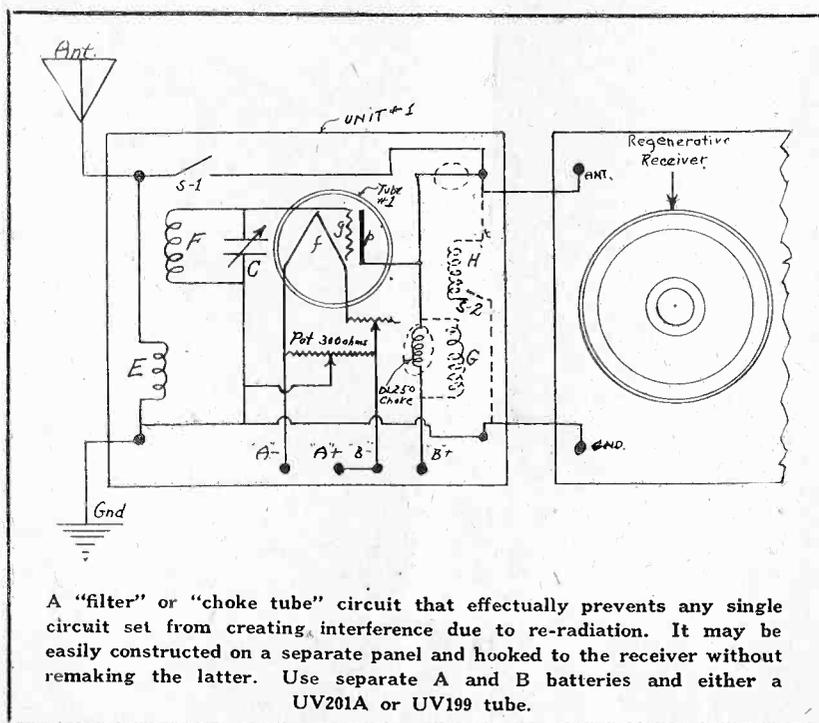
The addition of this extra tube in front of your set will absolutely check re-radiation of energy, owing to the fact that this tube acts as a check valve, preventing any energy from passing from the plate to the grid circuit, although a good path is offered from the grid to the plate. Therefore it is immaterial just how much

the detector tube in the set oscillates. There will be no wave radiated from the antenna, owing to the fact that this excess energy will be literally absorbed by tube No. 1 before it gets that far. Then again, tube No. 1 acts as a radio-frequency amplifier, thus increasing the carrier wave strength of the received signal. This means that weak or distant signals will be amplified before they are rectified by the detector, which means easier tuning and more volume.

Local signals will be little amplified by this tube, owing to the reason that strong signals are not amplified by a

radio-frequency stage to the same relative extent as a weak signal, partly due to the fact that a great deal of the signal which is already strong jumps over or through the tube just the same as it would across the plates of a condenser. The addition of the tuning element E-F and the condenser C greatly enhances the selectivity of the outfit enabling interfering stations to be separated, although the actual difference in wave-length be only a few meters. A

(Concluded on next page)



American Radio Agenda Developing

By Washington R. Service

WORK on the agenda of the United States for the forthcoming Inter-American Electrical Communication Commission scheduled for January or February in Mexico City, is progressing rapidly. The Inter-Departmental Committee on Electrical Communications under the direction of Leland Harrison, Assistant Secretary of State, has organized a special sub-committee which is attacking the practical and operating problems having to do with international radio communications. Representatives of commercial radio interests will soon be called in for conference, it is understood.

Judge S. B. Davis, Solicitor of the Department of Commerce, and representative of that department on the Communication Committee, has been designated as head of the radio sub-committee and has appointed two sections, one on technical problems and another on mobile radio.

Dr. J. H. Dellinger, of the Bureau of Standards, is chairman of the section on technical radio problems and is assisted by Lt.-Cmdr. H. P. Le Clair, U. S. N.; Maj. L. B. Bender, Signal Corps, and C. F. Egge, of the Post Office Department. This body of experts is considering such problems as frequency, wave length, allocation, means of preventing radio interference, and standards of technical operation, as well as the gathering of technical data relative to radio transmitting stations.

The section studying questions affecting mobile radio

operation is headed by Commander D. C. Bingham, Asst. Director of Naval Communications, who is aided by the following: L. L. Lee, head of radio, U. S. Shipping Board; W. D. Terrell, Radio Supervisor, Department of Commerce; E. B. Calvert, U. S. Weather Bureau; Lt. F. A. Zeusler, Coast Guard, and E. C. Wynne of the State Department. Questions affecting international rules regarding the operation of radio on board ships, aircraft, etc., will be studied by the mobile committee. Among the subjects to be covered are: distress calls and matters pertaining to safety of life at sea, time signals, hydrographic and meteorological information of international interest.

Advice and suggestions from representatives of commercial companies will be sought on the matters under consideration, including standardization of practice and operation, in which agreements with other American republics are desired.

Upon the completion of the two surveys by the United States Government Radio Committee, a comprehensive report to the full communication committee will be made, and in event of approval, it will form the basis of the United States agenda to be carried to the Pan-American conference early in 1924 in Mexico. Later on, the agreements arrived at there may be presented to the World Conference on Electrical Communications in Paris, by accredited representatives of the New World.

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radio-frequency choke coil (DL250) forms a return path for the direct plate current while it effectively chokes out all radio-frequency currents, thus forcing them around through the receiver. Owing to the reason that the tuning circuit of most regenerative receivers of the single circuit style consists of a condenser in series with an inductance of some kind or other it is impossible to supply the plate current from the "B" battery for tube No. 1 through this tuning network. Hence a radio-frequency choke coil was resorted to. If your tuning circuit is not of the series type just explained, or if you are in doubt as to its actual nature, *do NOT* employ the DL250 radio-frequency choke coil, but use the special coupling coil G-H, omitting those connections and parts of the original circuit which are encircled with dotted lines. Then again, if you are unable to secure the DL250 coil or you do not wish to use a radio-frequency choke coil this second alternative circuit will work perfectly for all cases. By opening the switch S-2 and closing S-1 the amplifying unit is thrown out of the tuning circuit of the receiver and the set can be operated independent of it. When tuning in this combination for the first time you will no doubt find it better to cut out the amplifier by means of the two switches and locate the station on the receiver dial, then cut in the unit and try tuning C until the station is again relocated on the dials. A little experience will soon show you how to manipulate the various controls to obtain maximum volume as well as quality. This outfit or combination affords the use of regeneration with radio-frequency amplification.

There is nothing very difficult in assembling this unit for addition to present regenerative receivers. The coil unit E-F is wound at home on a 3½" Formica tube about 3½" long with No. 22 S.C.C. magnet wire. The coil E has eight turns of wire, then ¼" or ½" of tubing is left bare and the coil F is started. F has 50

turns in all and is shunted by the variable condenser C which has 11 plates. It will be found necessary or advantageous to equip C with some sort of a vernier or sharp tuning dial. If the second method of circuit arrangement is decided upon it will be necessary to wind up the unit G-H which is similar to E-F. The coil G has 50 turns and H has eight. Of course, you can substitute a standard variocoupler in place of the fixed coupling coils G-H if you have one on hand, and in so doing be sure to have the rotor connected as if it were G and the stator as if H. But for those who have not a coupler handy the fixed coupling coils will be much cheaper and serve just as well for most cases.

RADIO WORLD, November 17, 1923, carried an article by the author setting forth a method and changing the connections and arrangements of apparatus in a single circuit tuner in order to make a non-regenerative radio-frequency receiver. Many fans tried out this new arrangement and found it most satisfactory; in fact, all my personal friends have been bringing single circuit receivers to my house for me to rewire for them and they are more than satisfied with the results so obtained. But I know there are quite a number of fans who would hesitate to change any connections in their present receivers. This fact is especially true with those fans who are owners of deluxe and well manufactured sets. So for those fans this addition to their set will mean not a single change in the original. To those of a more experimental nature I would advise that they try out both methods of hook-up as shown. There is one important fact to bear in mind and that is *SEPARATE "A" AND "B" BATTERIES MUST BE USED*. A UV199 tube with 45 to 60 volts on the plate will amply play the part of tube No. 1 in this amplifier since only dry cells need be purchased for the "A" battery.

This forms a practical solution to the ever-growing pestiferous squeals of the single circuits. It is not difficult to either operate or to construct.



(C. International Newsreel)

One of the exhibits at the Chicago Radio Show was this ordinary line telephone receiver. It is one of the many entrants in the contest of radio sets built by children of the public schools of Chicago and won a special honorable mention for its uniqueness and good work. A crystal detector of the small dust-proof type is used in connection with a small fixed coil and the head receiver.

Radio Enters Building Specifications

RADIO is fast becoming indispensable as a household service, not unlike permanent features such as light, power and heat. Radio receiving sets are now considered by architects as fixtures, and the details of wiring, battery space and antenna installation are being written into specifications.

One of the first radio homes—that is, with facilities for radio built into the house—is that of Mr. L. E. Whittemore, Secretary of the Governmental Inter-Department Radio Advisory Committee. Before construction was begun, Mr. Whittemore explained his radio requirements to the architect, who included in the plans all radio facilities required by this engineer and enthusiast.

A non-metallic conduit pierces the study wall for a lead-in wire; another goes below to a special space in the cellar reserved for the batteries, while a third is for the ground lead. Another piece of conduit pipe will carry leads from the set to a floor or wall socket in the living room, where a loud speaker may be installed if desired.

Besides fixtures for erecting an aerial on the house top, the owner plans to install two single, vertical loops in the north and west wall spaces of his study, the wires terminating in special sockets for an antenna plug connected with his set. This feature will give him certain directional selectivity, as he can use, at will, the loop facing east and west or one at 90° to it.

Danes Listen-In on U. S. Broadcasters

ENTHUSIASTIC radio amateurs in Denmark are always endeavoring to catch broadcasting from the United States, even though that country lies in a somewhat more unfavorable position to receive American radio messages than other European countries, Consul-General Letcher reports from Copenhagen.

Now that it has become dark during the American sending hours, however, conditions for picking up American stations are much better than during the summer evenings. Some of the Danish radio amateurs have lately made it a practice to listen in for Americans at about 3 or 4 o'clock in the morning. Recently several of these report "getting" different broadcasting stations in the United States. One station mentioned particularly was WGY, Schenectady. Orchestra music, soloists and speeches were plainly heard.

Interest in radio continues to increase in Denmark, the consul says, and it is estimated that there are now approximately 10,000 radio amateurs in the country.

Too Many Dialects for Broadcasting

DIFFICULTIES in broadcasting in India are many, the greatest arising out of the diversity of languages, says Vice-Consul Thomas in a dispatch from Calcutta. A projected super-broadcasting station in Delhi was considered impracticable when it was found that a news program of 500 words if translated into



(C. Western Electric)

How Miss Frances Keller taught "Polly" to speak other than cuss words. When the bird was given to Miss Keller it knew just three words, and ear muffs were en regle for all ladies present. To cure it of the obnoxious habit it was set in front of a loud speaker and now imitates various speakers and tries to imitate some of the bands, but is a rank failure at the latter. Anyway, it's a tip for some owners of bashful birds that refuse to utter a syllable.



(C. Underwood and Underwood Studios)

Ethel Grow, contralto, who sang for the unseen audience of WEAF recently, was so surprised at the number of letters she received that she really believes someone must have "tipped the fans off" and told them to write in. Fans are just ordinary human beings and appreciate good talent and programs as their replies and letters to the various stations always show.

the many languages of India would take 24 hours to transmit. Another difficulty with broadcasting is the enormous distances in the country.

The only possibility of establishing broadcasting which appears practicable to the Director of Wireless is the establishment of stations in the large cities, such as Bombay and Calcutta.

Wireless communication, however, is now possible between Rangoon and Madras, and similar communication is planned between Bombay and Karachi.

A number of native states have established small radio stations for communication between various parts of their territory. The Maharaja of Gwalior has four stations and is considering the establishment of 24 additional ones. There are at present four stations in Mysore State and several in Kashmir.

"Leviathan's" Life Boats Have Own Calls

TWO of the S. S. "Leviathan's" lifeboats, both 10-knot motor boats, have radio transmitting and receiving sets and calls of their own. Lifeboat No. 7 is WSNA in radio parlance and No. 68 is WSNB. The "Leviathan's" own call is WSN, her two tenders carrying an additional letter. This is a new departure in American shipping, planned as an additional sea safety precaution. If the "Leviathan's" radio apparatus should get out of order, or she should be sunk, her two motor boats could communicate with relief ships, within 50 miles, guiding them to the scene. Each of these radio-equipped craft carries a spark set and 1 K. W. gas engine generator.

Westinghouse Relaying Station at Hastings, Nebraska, Starts New Era in Radio Broadcasting

By Lloyd Jacquet

HASTINGS, Nebraska, is the place selected by the Westinghouse Electric & Manufacturing Company for the location of its first radio relaying station to serve as the connecting link of the pioneer station at East Pittsburgh, Pa.—KDKA—with the people living on the Pacific Coast and also the citizens of the western states.

The installation of the Hastings station KFKX, as its license reads, means that broadcasts from station KDKA will be picked up as easily and with the same apparatus in the furthest western states as KDKA's broadcasts are now received by people living a few hundred miles from East Pittsburgh.

The relaying station marks a great forward step in radio, almost as great a stride in radio progress as was made when the Westinghouse Company first started radio broadcasting with the establishment of its world's pioneer broadcaster, station KDKA, in November, 1920.

Always a pioneer in radio, the Westinghouse Company, because of its engineering genius, has now removed the limitations of distance in the broadcasting of programs. The transmitting station at KDKA is as fine and as modern as radio engineers can make it. It is possible to receive KDKA all over the country, but, naturally, the greater the distance away from the station, the more sensitive must be the apparatus. To pick up KDKA in California, for instance, requires very sensitive, high-priced apparatus. Knowing this condition, the Westinghouse Company by experimenting with short-wave relaying and relaying stations has made it possible to rebroadcast or relay its eastern concerts from Hastings, which will serve as a booster station to points on the Pacific Coast. Thus the same simple apparatus which can be used on the Pacific Coast to pick up local broadcasters can also pick up the relayed KDKA.

The station at Hastings is one of the marvels of the radio engineering world, for not only can it relay from KDKA in the East on one wave, but it can also transmit concerts direct from KDKA; or transmit concerts from its own locality. The ability to equip a station for this type of work calls for engineering genius.

KFKX, for example, can receive broadcasts from KDKA on, say 3200 kilocycle frequency (94 meters) and relay the same broadcasts to another transmitting station located on the Pacific Coast on 2800 kilocycle frequency (107 meters). Both these frequencies are much higher than are used in radio broadcasting and will not interfere either with radio broadcast traffic or amateur traffic. The next step in this plan would be to tie up with a western station to pick up the 2800 kilocycle frequency (107 meters) broadcasts and rebroadcast on the regulation broadcast wave lengths or frequencies.

KFKX can receive, also, broadcasts sent from KDKA on 3200 kilocycle frequency (94 meters) and transmit direct to its territory on 1050 kilocycles frequency (286 meters) which is its assigned broadcasting wave length. It can transmit also its own broadcasts from a local source on 1050 kilocycles, for the benefit of the people living in its territory or westward to the Pacific Ocean.

For this short wave relaying two special transmitters

are required, with special receivers to receive the high frequencies.

Hastings, Nebraska, and East Pittsburgh, Pa., have duplicate transmitters and receivers. The Hastings station is one of the finest in the world.

A feature of the high frequency broadcasters is the short antenna used. The antennae at Hastings and at East Pittsburgh are not over 35 feet long. This is much smaller than the antennae required for ordinary broadcasting. There is only 35 feet between flat top and counterpoise. The antenna and counterpoise consist of two small cages.

One of the difficulties attendant upon high frequency broadcasting is that every precaution must be taken to prevent any outside influences, such as vibration, that would change the frequency. The vibration of the ground or the swinging of the antenna would serve to throw the set off its frequency. To guard against the possibility of swinging, both the East Pittsburgh and Hastings high frequency stations' antennae, including the flat top and counterpoise, are stretched between cross arms rigidly attached to the tower instead of the more common swinging spreaders.

The down lead from the antenna to the counterpoise consists of copper tubing rigidly mounted on long high voltage porcelain insulators on the poles. The various inductances on the set are wound on rigid forms. Copper tubing is used to make all the connections.

The high frequency set at East Pittsburgh is located on the top of a nine-story building and naturally would ordinarily be subjected to jars. This set is therefore suspended on a system of springs and vibrations of the building cannot affect the operation of the set.

At Hastings, Nebraska, the set is located in an isolated building and is not subjected to any vibrations, so the precaution of suspending this set on springs has not been necessary.

The transmitting set at Hastings consists of three panels, as follows: the rectifier panel, the modulator panel and the oscillator panel. The rectifier converts the high voltage A. C. current received on the antenna to high voltage D. C. for the plate circuit. The modulator with its accessories impresses the voice frequency on this high voltage D. C. current before it goes to the oscillator. Finally the oscillator converts the high voltage D. C. currents into radio-frequency, in which form it is delivered to the antenna.

For local broadcasting a studio has been suggested in the main business section of Hastings, which will be connected with the station by means of telephone lines. The studio, if built, will compare favorably with any eastern studio and a special type of condenser transmitter will be installed to insure good tonal quality.

Because of the establishment of this station, Hastings, Nebraska, the little town in the Middle West, now has a radio station that compares favorably with any transmitters now in operation. In power, pick-up, tone and other radio qualities it ranks in efficiency with KDKA, acknowledged to be one of the finest broadcasters in the world. Station KFKX, whatever may be its fate, will always live in radio history as the first relaying and re-broadcasting station in the world to be established for practical daily broadcasts.

Radio Reception Successful in the Grand Canyon

By S. R. Winters

THE Aeriola Senior type of radio receiving outfit which is popular in homes and offices, has been frequently carried afield on automobile and camping trips, and in one instance figured in a balloon race, but for the first time it recently has been installed in the depths of a canyon. This compact, portable equipment for the reception of radio communication was used on the two and one-half months' expedition of a party of the Geological Survey, United States Department of Interior, in surveying 300 miles of the most turbulent water of the Grand Canyon of the Colorado River for the purpose of locating dam sites for the development of power and to prevent floods.

The predictions that radio waves could not be intercepted and messages received when the receiving set was hemmed in by walls of rock to a height of from 1,000 to 2,000 feet were completely upset. Each evening, during the extended trip through this mighty chasm, radio communications were received from KHJ, the broadcasting stations of the Los Angeles Times, a distance of approximately 400 miles.

The antenna, installed at different stopping points along the Grand Canyon, was usually 100 feet high. It consisted of a single wire fastened to a low, makeshift mast and then trailed up along a cliff of rough-hewn rock. After being insulated near the end, the aerial was tied by a rope to a projecting rock near the summit of the cliff. The ground wire was ordinarily placed in the water of the stream as that proved to be a more efficient ground than the rocky soil.

Four wooden boats were used in carrying the party and equipment down the dangerous rapids. The Aeriola Senior was enclosed in a water-tight box on the boat "Grand." Despite the fact that this frail craft upset and was submerged for a considerable period of time, the radio receiving outfit when recovered was not harmed in the least.

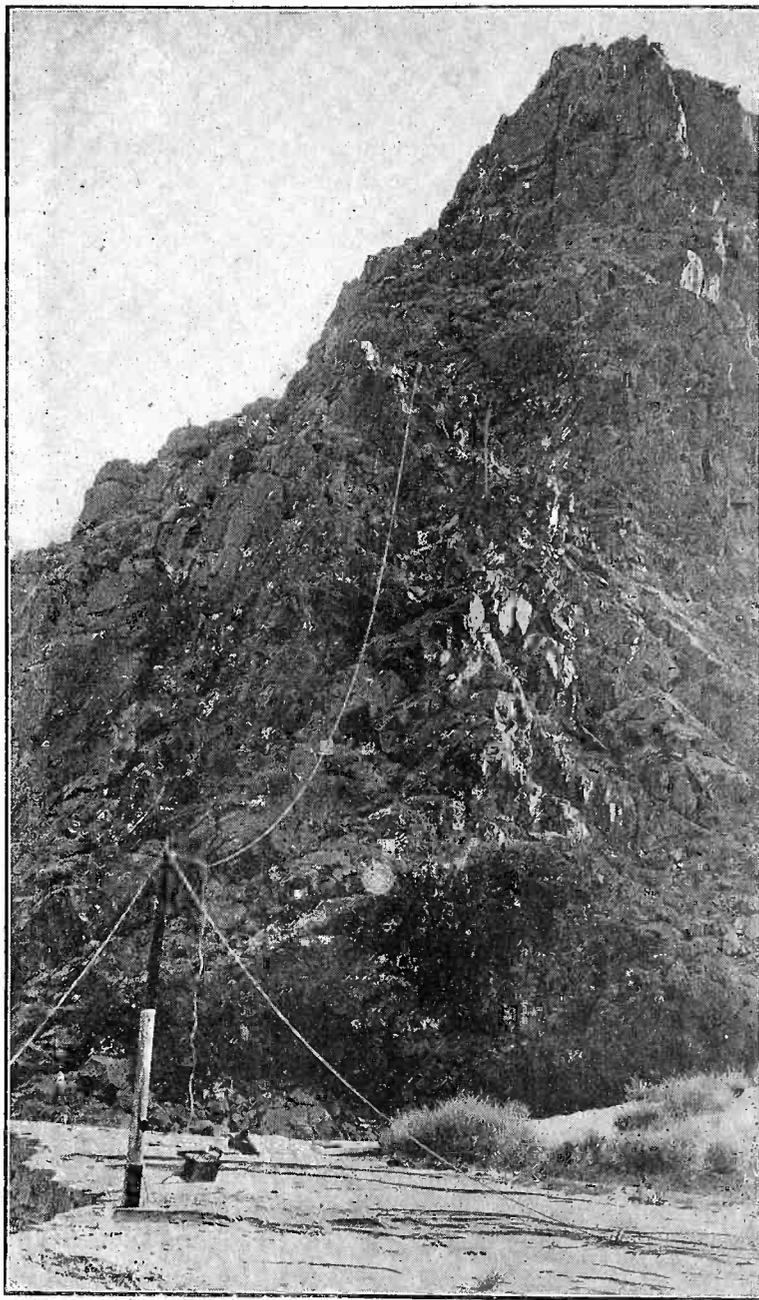
The exploring crew, unless completely exhausted by the rough trip, rigged up an antenna on making camp and connected up the receiving instruments for the reception of wireless messages, concerts, and other offerings of a broadcasting station. KHJ, at Los Angeles, California, could be heard even through thunderstorms and atmospheric disturbances. The news of the death of President Harding was heard, though the exploring party was approximately 600 miles from the broadcasting station. The earthquake in Japan was another event heard about by means of radio while these members of the Geological Survey were cooped up in canyon walls. The radio receiving outfit certainly lessened the loneliness of this trip.

On returning to Washington this humorous incident was related by Col. C. H. Birdseye, who was in charge of the expedition:

"On the evening of August 29, the party was joined by Colonel Crosby, Superintendent of Grand Canyon National Park, and a large party that had been made up to see the boats run Hermit Creek rapids, the roughest kind of a stretch of water. We camped at the mouth of Hermit Creek, where a good flow of drinking water was found. The influx of so many visitors threw the cook 'up in the air' and he threatened to leave the party at Bass Trail, the next stop. The party had been receiving radio messages about the impending coal strike, a threatened industrial and domestic calamity. Some of the members had vivid recollections of domestic troubles about cooks, but here was a 'labor situation' right in the canyon that looked bad.

Culinary service at once assumed a high value. However, as he was evidently to be lost to the party, a new cook was sent for."

Bedtime stories, results of two of the world series baseball games, and official instructions from the Washington office of the Geological Survey were among the programs



Receiver installed at Diamond Creek, Grand Canyon of the Colorado, one of the stops of Col. Birdseye's Geological Survey expedition. This shows plainly how the antenna was installed by fastening one end to the side-wall of the canyon and erecting a small mast to support the outer end. The receiver, which is an Aeriola Sr., is shown on the ground directly in the rear of the mast. It was through such country as shown that the expedition had to make its way, scarcely ever seeing more than a scrawny shrub and the tall steep sides of the grey rock walls that hemmed them in.

received by the party in the depths of the canyon. Messages were picked up from San Francisco, Salt Lake City, and on one occasion a communication was heard from a broadcasting station in Colorado Springs.

The use of radio on this perilous expedition marked a new departure—it was the first time that a radio receiving set formed alliance with surveying instruments in the depths of such a canyon.

An All-American Radio Chain

SIX radio transmitters, to be the most powerful on the American continent, operating from vacuum tubes and first to make use of the General Electric 20 kilowatt radiotron, are being installed by the United Fruit Company and the Tropical Radio Telegraph Company at points in Central America and the United States for the purpose of completing the links of an adequate communications system between the Americas. These transmitters will be located at New Orleans, La.; Miami, Fla.; Puerto Barrios, Guatemala; Tegucigalpa, Honduras; Managua, Nicaragua; Almirante, Panama.

The Tropical Radio Company operates the stations at New Orleans, Miami, Tegucigalpa and Managua while the stations at Puerto Barrios and Almirante are operated by the United Fruit Company.

The first of these six sets has just been completed at the Schenectady works of the General Electric Company for the Radio Corporation and sold to the United Fruit Company, and will be shipped within a few days to the Tegucigalpa station. The other five are scheduled to be completed and shipped at the rate of one a month and as about two months will be required to install each set it is expected all six will be in operation by the middle of next year.

The United Fruit Company established the first radio stations in Central America and was the first to establish commercial radio communications between Central America and the United States. It was shortly after the International Yacht races off Sandy Hook had been reported by radio that the first radio sending and receiving sets were purchased and installed at Port Limon, Costa Rica, and Bocas del Toro, Panama. This was in 1904 and service was inaugurated the following year. The operation of these two stations convinced the directors of the United Fruit Company that radio was practical and valuable in a business which handled such a highly perishable product as the banana. So the year following, or 1906, stations were opened at Bluefields and Rama, Nicaragua. All these stations, because of the lack of land communications, handled in addition to the Company's business a large share of the telegraph business of the general public between

these places and the United States and Europe. Other stations have followed since then until now, with the six new tube transmitter stations, there will be a total of nineteen, comprising what is known as the United Fruit Company's radio system. All stations of the United Fruit Company's system, including all their ships of the "Great White Fleet" are to be equipped with tube transmitters of a similar type.

The United Fruit Company has spent more than \$3,000,000 in the development of its radio system and upon the completion of new stations under construction its investment in radio will probably exceed \$4,000,000. Since 1911, the radio activities of the Company in all its branches have been under the immediate direction of George S. Davis, who is general manager of their radio telegraph department. He is also president and a director of the Wireless Specialty Apparatus Company, general manager of the Tropical Radio Telegraph Company and a director of the Radio Corporation of America.

In the operation of these transmitters, in some cases where stations are located in remote places, the primary power is generated at the station by gas or oil engine driven alternators supplying 220 volts. In other stations the power is obtained from the distribution system of the local power company. This power first goes to the service panel where complete apparatus for control, protection and metering is installed. Then it goes to the rectifier, which consists of a bank of transformers and six 12½ kilowatt kenetrons. Here the voltage is stepped up and rectified, to become 15,000 volts direct current. This high voltage is then used for plate power on the pliotron oscillators.

The frequency is controlled by means of a master oscillator employing one 1 kilowatt pliotron. The master oscillator provides a lower power radio-frequency supply which is then amplified to 20 kilowatts of power by means of one of the new water-cooled 20 kilowatt tubes. The amplified power is passed through a tank circuit which eliminates harmonics and is then fed into the multiple tuned antenna.

Keying is accomplished by means of a relay on the master oscillator unit. This relay may be controlled from any desired distance and is adapted to keying speeds of sixty words per minute.

Regulations for Radio Antennae

SOME regulations for outdoor antenna will probably be included in the next edition of the National Electrical Safety Code. A sub-committee on this subject held its first meeting at the Bureau of Standards recently under the chairmanship of L. E. Whittemore of the Department of Commerce. Other members of the committee are C. K. Ahearn, superintendent of fire alarm, Waterbury, Conn.; H. J. Burton, Consumers Power Co., Jackson, Mich.; L. W. Chubb, Westinghouse Electric & Mfg. Co.; J. K. Cook, New York Edison Co.; W. M. Craft, American Tel. & Tel.

Co.; J. H. Davis, B. & O. Railroad, and H. C. Wolf, Maryland Public Service Commission. Messrs. Guthrie, Doyle and Tesch of the Radio Corporation of America and Messrs. C. B. Jolliffe and M. G. Lloyd of the Bureau of Standards were also present.

The committee outlined proposals for the regulation of antenna construction which will be reported to the large sectional committee carrying out this revision of the electrical safety rules according to the procedure of the American Engineering Standards Committee, when it next meets.

Unnecessary Labor and How to Avoid It

OF LATE there have been several articles in various papers anent improving receivers. Of course in most cases this can be done very easily and the change makes such a decided improvement that it fully warrants it. However, if the set is more than a one tube set, and you are bothered by interference of local stations butting in on one another, the following trick will prove of value. Erect a single lead-in wire, about 40' long, well

insulated, and vertical if possible. Then when you want to do local work, and not have one station butting in on another, disconnect your regular long aerial, and stick the short one on. You will immediately notice the difference in the sharpness of the tuning, as well as the added clearness and there will also be less interference from re-radiation of nearby receivers. The volume is lowered some, but not enough to bother much.

The Autoplex—a One Tube Outfit That Really Operates a Loud Talker

By John V. Cull

CONTRARY to the opinion expressed by many so-called "radio experts" in the newspaper supplements familiar to the New York radio public, the autoplex, or simplified one-tube super-regenerative circuit, makes an excellent receiving set. Many of the opinions expressed have mentioned the fact that the set is noisy. True, it is noisy, but not obnoxiously so in the hands of one who knows how to tune it. Most of the trouble comes from the fact that a person hooks up the set, tries it for ten minutes and gives up in disgust. This is really because too much is expected of it. No radio receiver will operate satisfactorily unless it is tuned properly and this holds good especially in the case of the autoplex.

Competent experimental work on numerous sets has shown that remarkable results can be obtained with the circuit illustrated herewith, which is the authentic autoplex circuit. DX reception has been accomplished which will astonish "old-timers" who are used to one or two stages of radio-frequency amplification to accomplish any kind of distance. Amateurs in the Middle West using the autoplex have received signals from both coasts, in the majority of cases the signals being reproduced on a loud speaker with volume enough to be audible all over a small room.

The circuit of the autoplex as given herewith should be carefully followed and in the selection of instruments one cannot be too careful, and cannot afford to get anything but the very best. The variometers are very important. In their selection nothing but the best moulded bakelite type should be obtained and care should be taken to see that fairly large wire is used on both coils; that each coil has at least 60 turns of wire on it, and that the separation between the rotor and the stator is as small as possible. All these points, while seemingly trivial, are of the greatest importance when it comes to operating the set. Variometers wound on wooden forms almost invariably fail to give results. Those in which the composition consists of what is known as "mud," give rise to noises and effects which are very undesirable. Let me reiterate—use only the best of moulded bakelite instruments.

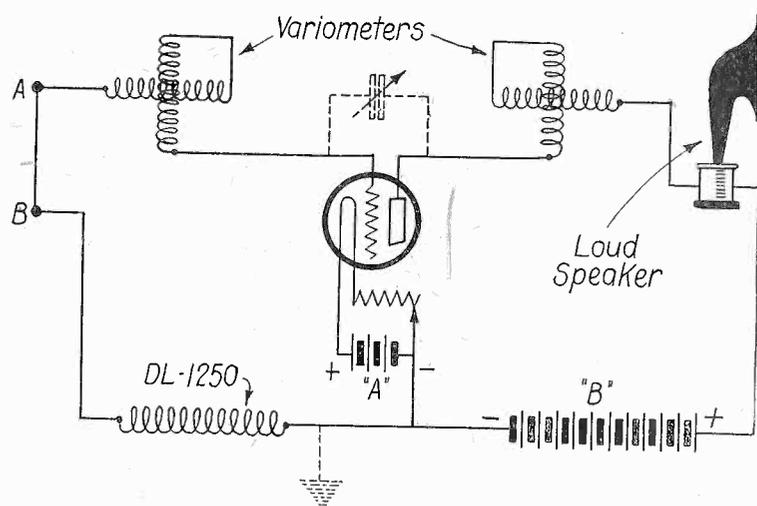
Any type tube may be used with good results, but for greatest satisfaction a UV201, 201A, VT1, VT2, or Western Electric 216A should be used. This is because of the larger elements in the tubes and the greater capacity afforded thereby. In cases where the dry cell tubes are used which have very small elements, it has been found by competent authorities to be desirable to connect a small variable condenser from grid to plate, as shown by dotted lines in the accompanying illustration. This variable condenser may consist of two pieces of bell wire, one end of each connected to the grid and plate, respectively, and the other two ends insulated from each other and twisted together, thereby forming a small capacity. A condenser, such as used in the well known neotroydne circuit, would also give very good results. Even in some cases it may be found that a three-plate vernier condenser, connected as shown, will work.

The "B" battery should, of course, be of the highest voltage possible to use on the tube and some experimenting should be done to determine the best operating point. Up to the maximum capacity of the tube,

the higher the "B" battery voltage the greater will be the volume obtained in the loud speaker.

The honeycomb coil used may consist of 1250 or 1500 turns and should preferably be of the duo-lateral type. It is sometimes found advisable when the set does not operate properly upon first trying it, to connect a small variable condenser with a capacity of approximately .0005 mfd. across the honeycomb coil.

When an aerial and ground are to be used, the former should be connected to point A and the latter as indicated in dotted lines. If a loop is to be used, the jumper from A to B should be removed and the loop connected to those two points.



A new variation of the super principle embodying two variometers and a high value inductance coil. Tuning for wave length is accomplished by the grid variometer while the selectivity and volume is controlled by the plate variometer. Best apparatus should be used. If added selectivity is wanted, the optional condenser should be used. This condenser also permits the use of small tubes such as WD's.

It has been found, however, that the autoplex circuit when operating at its greatest efficiency, will give good results when only a ground is used. Under such conditions it should be connected to point A and the jumper AB placed in the circuit. Sometimes 20 or 30 feet of wire thrown out on the floor of a room will act very well as a collecting agency without the use of a ground, in which case it should also be connected to point A. In other words, when only one device for collecting the incoming waves is used, it should be connected to the grid side of the honeycomb coil or the point A.

When the set is finally hooked up as shown herewith, the tuning should be controlled with two hands. First make an adjustment with the grid variometer and then follow up with the plate variometer, keeping both circuits at resonance. The resonance point is determined by a rushing noise heard in the phones or loud speaker and when the set is operating properly a very high pitch whistle will be audible. Sometimes, however, this whistle, while present, is so high that it cannot be heard, but in any case it is not objectionable and the operator soon becomes used to its presence. This whistle is, of course, the well known variation frequency found in all super circuits, but in the autoplex the advantage lies in the fact that it is practically above audibility or so close to the latter that it does not interfere. After a station is tuned in and the rush-

(Concluded on next page)

Want Sea-Going Weather Bureaus!

A PLAN to establish at least three sea-going weather bureaus in the North Atlantic depends upon whether a Congressional appropriation of about \$30,000 is forthcoming. This departure is based upon the results achieved by the French meteorological ship "Jacques Cartier" which is now on a Pacific cruise. The details of the scheme were worked out by the Shipping Board and the Weather Bureau, but money for the marine forecasters is needed.

The Shipping Board is to furnish quarters, subsistence and radio facilities for two men on three of its trans-Atlantic vessels. The Weather Bureau will furnish and pay the skilled observers. A minimum estimate for a year's salaries is placed at \$30,000, and it is understood that Congress will be asked to make such an appropriation.

If the plans carry through, three Government vessels would become floating weather bureaus, where data received by radio from other vessels on the North Atlantic would be compiled and forecasts broadcast periodically, just as is done in branch offices ashore. Such a service, it is predicted, would be of great value to ships at sea, sea ports and coastal regions.

The Weather Bureau and the Shipping Board have been in co-operation for some time, on marine meteorological reports. One new feature, just accomplished, is the scheme for all governmental vessels at sea to report on the weather twice daily to the Weather Bureau.

The masters of over three hundred Shipping Board vessels began making weather observations twice daily on December 1. This co-operation on the part of the meteorological service and the Shipping Board will mean much to the weather forecasters ashore, as it will insure numerous regular reports from ships at sea in various localities.

Orders to the masters of the Shipping Board fleet are to the effect that weather observations be taken daily at 7 a. m. and 7 p. m., 75th Meridian time, and sent to the nearest naval radio station as soon as possible, whenever the vessels are more than a hundred miles at sea. Off the South Atlantic Coast, when there are indications of hurricanes, observations are to be reported regardless of the distance off shore.

The Shipping Board and the Navy Department have agreed to handle such messages free. The observations will consist of direction and force of wind, state of weather, barometric pressure and pressure changes in past two hours, and notes on unusual conditions, such as signs of hurricanes or storms.

Ships in the North Atlantic, and Gulf and Caribbean Sea will transmit directly or through relays to "Government Observer, Washington." In the North Pacific, they will transmit to "Government Observer, San Francisco."

(Concluded from preceding page)

ing noise is still apparent, it can usually be cut down so as not to be annoying by slight adjustments on either one of the two variometers. Of course, the knack of tuning this set must be learned by experience and in any case should be carried out with two hands so that one adjustment can be followed by the other. This is important as the set is very sharp on some stations and the slight overbalancing of one circuit over the other results in no signals whatsoever.

It is well to keep in mind after starting to operate this set that the best results are not obtained until the knack of tuning is learned and the operator should dili-

The Radio Woman

OUR mutual friend, Brother Bill, who is home for the holidays after a trip from one end of the country to the other for a large radio concern, commented upon the immense possibilities of selling radio apparatus direct to the farmers of the middle west. He says that as the farms way out west are so large, and frequently miles or even a day's journey from a town or tiny village, that the ranchers or farmers very seldom get a chance to hear about radio outside of the regular channels of magazines or papers. The farms are up-to-date in every respect, having motor tractors and fancy cars, but most of them lack radio. Chance for a good pusher that is not afraid to tackle the job of house to house (miles apart, too) soliciting.

* * *

Did you log any foreign stations during National Radio Week? I tried, but was not successful. The main reason for it was that there is some one in our neighborhood who has a set that is simply killing the entire program of every station. I have investigated but cannot find what the trouble is. It must be a single circuit and the owner doesn't understand how to operate it correctly. I only wish that I could find him or her. I would show how it should be operated, and then if the party did not keep down within the "zone of quiet" I would call a meeting of the respectable fans of the neighborhood and have a fitting punishment for his sins suggested and acted on. Must be terrible to live in the city if all they say is the truth.

* * *

Friend husband arrived home the other evening in the highest of spirits, all mousy quiet and smiling like. Wouldn't say a word, and then for no reason asked me if I would get his old last year's smoking jacket for him. His smile gave him away, but I know that he is a big baby when it comes to "s'prises," as he is wont to say. So I assumed a bored "don't-you-ever-get-tired-of-being-waited-on" expression mixed with a cross "why-don't-you-do-it-yourself" tone of voice, and went upstairs, and made a lot of unnecessary noise, knowing that he was listening to my every movement. I thought after a while that I had better go downstairs, as the noise that I expected was not forthcoming, and my suspicions and curiosity were stronger than my intention to let him spring his "s'prise." I went downstairs, and found him peacefully reading the radio programs, nothing else. I started in to get cross until—I looked across the room and there stood a console grand model of a loop receiver in beautiful walnut. How in the world he ever managed to sneak it in so quietly I cannot for the life of me imagine. Haven't learned all its tricks yet, but get wonderful results so far. Just wait until Christmas morning! I am going to give the old dear the surprise of his life, and I'm not even going to tell you what it is.

gently apply himself to the process of learning the why and wherefore of each movement he makes. There are, as will be noted, only two controls and these can readily be mastered. If a loop is used the tuning is not complicated to any great degree and a very good directional effect will be observed. This latter is particularly advantageous in congested districts.

One of the best points of the autoplex is the fact that it amplifies weak signals from distant stations so that they are as loud as, and in some cases louder than, the local stations. This seems almost impossible, but a trial will show that because of the characteristics of this new circuit, this fact is true in all cases.

Radio Equipment for Government Mail Planes

By C. D. Wagoner

STEPS are under way, at the instigation of the Postoffice Department, to supply the government mail planes with voices and ears. The equipping of many of these planes with radio sending and receiving sets is expected to follow the completion of experiments which are now in progress with every indication of success.

The advantages are obvious when it is realized that



(C. Wide World Photo)

Jack Knight, the American air mail ace, fitted out with his radio microphone and receivers just before hopping off. The transmitter is attached with straps and a plate, much the same as a central operator's in a telephone central. The receivers are inside the helmet.

in time of heavy fog or severe snowstorms, especially at night, a pilot might stray out of his course and find difficulty in locating his next landing station, even though aided by the powerful electric beacon lights which have been set up along the route. If the pilots and the landing stations can talk to each other, the pilot can be accurately directed from the ground and thus always find his bearings.

There are also times when a plane has to make an unexpected landing, or when it is desirable to report to the land-

ing field the presence of unusual atmospheric conditions. It has happened several times that air mail pilots have been forced to land at remote and isolated spots in the Rocky Mountains. When this occurs, with a radio outfit installed the pilot can immediately call for assistance, instead of waiting hours and perhaps days for a searching party to find him. It is also an advantage to be able to transmit instructions to the pilot between stations, should occasion arise.

For all these purposes, as well as others, radio equipment on the mail planes will be invaluable, in the opinion of the department.

The feasibility of using radio sets, both transmitting and receiving, on the type of plane employed in the air mail service has been fully established by preliminary tests recently completed at Schenectady, N. Y. These tests, with a De Havilland mail plane, took place under the direction of radio engineers of the General Electric Company.

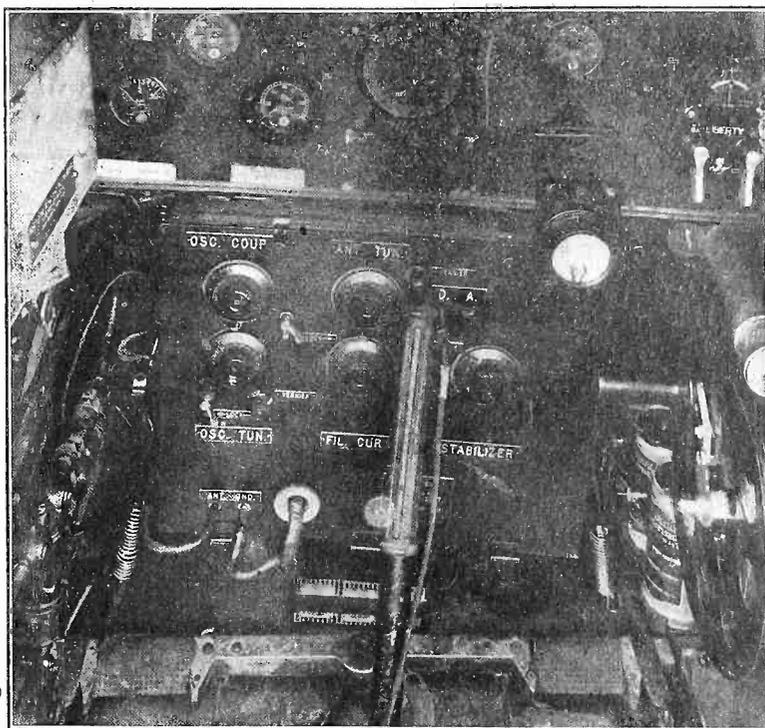
The radio equipment used in the tests was especially developed by the General Electric Company's radio department, in co-operation with C. F. Egge, general superintendent of the air mail service, and Eugene Sibley, radio traffic supervisor. It is held to be, without question, a big step forward in the commercialization of airplane radio.

Powerful and highly efficient, the equipment is at the

same time so simple that anyone can operate it successfully after brief instruction. In the Schenectady tests the pilot was unfamiliar with radio apparatus, yet on every trial flight the operation was entirely successful.

Mail airplanes carry only one man, the pilot, in order to conserve space for the "paying load," i. e., the mail. This means that the pilot must operate the radio equipment in addition to his duties in flying. Consequently the equipment must be practically as easy to operate as an ordinary telephone. That this requirement has been fairly well met was demonstrated by the tests at Schenectady.

The pilot, in order to talk, merely throws the switch handle, conveniently mounted under his seat, to the transmit position and turns a large knob—the antenna variometer—until the ammeter mounted on the board in front of him shows a maximum reading. That is



(C. Underwood and Underwood)

Mail-airplane transmitting and receiving control panel, located in the pilot's cockpit. The antenna is seen on the reel to the right. The transmitter has a range of over 200 miles, using five five-watt transmitting tubes.

the whole process of tuning the transmitter. After he has done that once he locks the knob in position and it is only necessary to throw the handle from "transmit" to "receive," as desired.

The receiver is of the super-heterodyne type, selected because of its sensitivity and high selectivity, the latter reducing engine noises and other interference to a minimum. While the seven-tube super-heterodyne receiver sounds complicated, in reality this one is very simple. Due to its special design, there are only two knobs necessary to adjust in tuning.

It is not possible to duplex on the plane, as with an ordinary wire telephone, although this may be done and in fact was done at the landing station. The pilot

(Concluded on page 14)

Amateur Radio Will Remove Political Barriers

By *Hiram Percy Maxim, President A. R. R. L.*

THERE are two big essentials to the advance of human affairs. One is transportation. The other is communication.

Until the year 1900 the private citizen was dependent upon wholesale forms of transportation. There was the railroad and the steamship, and there was nothing else, except, of course, for such special things as adventure and pleasure.

In the year 1900, the automobile became practical for the individual and the whole world, as far as there was a road, became open to the private individual. A profound change in human affairs was brought about. And now the limitation of the road is to be eliminated by the flying machine. The entire earth is about to be made available for private transportation.

Communication must accompany transportation. Radio gives this communication. But unless we have private radio for the individual, we are just where we were in 1900. We need individual, world-wide radio to match individual, world-wide transportation. That is what organized

amateur radio, in the form of the American Radio Relay League, has accomplished.

Amateur transmitting stations exist in the private residences of over 16,000 American citizens. Several thousand exist in the Dominion of Canada. MacMillan at the North Pole is in communication with any citizen on the North American continent by organized amateur relay. England, France, Holland, Argentina, Cuba, Mexico, Australia and New Zealand have several hundred amateurs, and private communication has begun to leak across the oceans from all of them.

From the American Radio Relay League will spring a World Amateur Radio League. What man dares to say what the effect of this international world-wide acquaintanceship will be? Political barriers will fall as they have fallen between the United States and the Dominion of Canada. The influence upon world peace will be profound.

That is where amateur radio is leading us. That is the destiny of the American Radio Relay League. What its eventual influence will be, only time can tell.

Army Radio Activities Handicapped

By *Carl H. Butman*

THE recently completed and highly efficient radio net of the Signal Corps, which connects every important army post with Washington, cannot be properly handled due to a shortage of personnel, General George O. Squier, Chief Signal Officer of the Army, states in his annual report just made public.

Referring to a shortage of approximately 40 officers and 150 men, General Squier says: "The result will be the improper maintenance of stations and unsatisfactory handling of important government business that may considerably over-balance the savings effected by attempting to operate with insufficient personnel." The reduction of funds for army operations and the attendant reduction in the allotment of personnel to the Signal Corps "has reached a point where true economy is no longer being realized," he explains. He also points out that no appreciable reduction in Signal Corps activities has been possible. In many cases, considerable increases in the activities have been necessary, notably in radio communication. "The corps is confronted today," General Squier says, "with many important problems whose solution depends largely upon the question of personnel."

Concerning equipment, the general says further: "The development of advanced types of radio equipment for military use is a necessary and a very important function of the Signal Corps. The very best equipment obtainable should be provided for the signal communications of troops in the field. In time of war, thousands of lives and the success of military operations may depend upon it. Equipment of this kind cannot be satisfactorily developed after war starts. With the rapid strides that are being made in the development of aircraft, comes an increased demand for radio control and radio direction finding equipment for use of the Air

Service. This is also an important and necessary function of the Signal Corps, as human lives depend upon it both in war and peace."

Discussing the radio net, the Chief Signal Officer says: "The steadily increasing amount of official traffic being handled by the War Department radio net, aggregating over \$7,000 per month at the close of the fiscal year, has served to indicate the essential weakness of the system. The critical shortage of enlisted operating personnel is most prominent, making impossible the maintenance of twenty-four hour service at several of the most important stations of the War Department net.

"The handling of this large amount of traffic has also brought to light certain inadequacies in radio plants, which could not be foreseen when the War Department radio net was initially established. These weaknesses are, to a large extent, being rectified by the installation at Fort Leavenworth, Kansas, of a modern semi-high-powered transmitter which will provide direct communication with Washington, with a similar new station at Fort Douglas, Utah, and with Fort Sam Houston, thus eliminating several intermediate relay stations and materially speeding up traffic. A large percentage of the traffic between Washington and Fort Sam Houston, Texas, has of necessity been handled heretofore by commercial telegraph, but with the completion of the Fort Leavenworth station, this traffic will all be handled by radio.

"The total traffic handled by the War Department radio net and corps area radio nets for the fiscal year amounted to \$65,701.63. Since the cost of operation of these stations is properly chargeable to War Insurance, the radio traffic handled represents in effect a clear saving of this amount to the government."

How to Make a Two-Stage Tuned Radio-Frequency Receiver

By A. E. Herron, A. I. R. E.

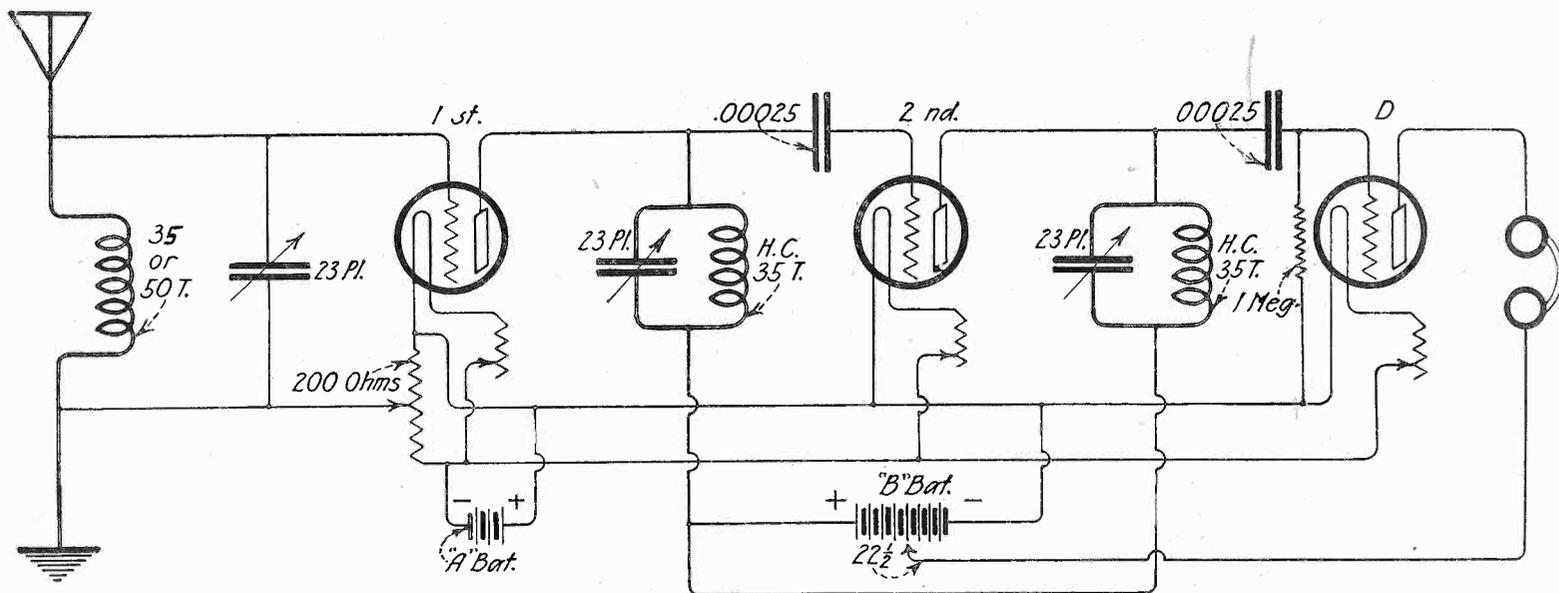
NO doubt nearly all radio amateurs, as well as radio manufacturers, in the last year or two have been experimenting with some form of tuned radio-frequency amplification. In these sets usually but one stage of tuned radio-frequency is used so that it may be simple to operate. However, any one understanding the tuning of one stage of radio-frequency will not experience much difficulty in tuning a two-stage tuned impedance radio-frequency receiver.

The set to be described has been in almost constant operation for several months. In the daytime, with an antenna 150' long, consisting of two wires, 40' above the ground, CFCA, the Toronto Star, can be heard regularly at Detour, which is but a little distance from Sault Ste. Marie, Mich. Chicago stations have been heard as far away as Buffalo consistently in the daytime. At night, almost anything in the country is possible. When it comes to daylight reception, though

is surprising. The same is true in the case of audio-frequency amplification. The first stage does not really amplify the volume so much, but the second stage makes up for its lack by more than tripling it.

If a distant station is picked up with a bulb receiver and then two stages of radio-frequency are connected to it, the volume will be increased so much that it will be beyond belief. This proves that radio-frequency is not only a means for increasing the sensitiveness of the receiver but also increases the volume to a great extent depending, of course, upon how many stages are added, and the type of coupling used between them.

The materials needed for the construction of a good two-stage radio-frequency receiver are as follows: Three 35 turn honeycomb coils; three 23 plate variable condensers; three rheostats; one 7"x18" panel; three sockets; two binding posts; one grid leak and condenser; one potentiometer; one base board, 6"x17"



Schematic diagram of a three-tube tuned radio-frequency receiver as described in the article herewith. The constants are marked and should be followed carefully.

it is not so easy to get long distance stations unless a very good radio-frequency is used.

It is impossible to get very good results over various wave lengths with a fixed frequency transformer as it is sensitive to only a very small band of frequencies. As the different broadcasting stations operate on bands varying from 1030 kcys to 500 kcys it is therefore impossible to cover all these efficiently with a transformer no matter what type it may be. With tuned impedance radio-frequency, however, it is possible to cover each band of frequencies efficiently as you can tune your radio-frequency circuits to the particular band you desire to use. The tuning is most commonly accomplished by a variable condenser shunting an inductance coil.

Those who already have one stage radio-frequency sets would do well to add another stage of the tuned radio-frequency, or preferably both stages should be tuned. A single stage of radio-frequency in connection with a single tube receiver is about equal in sensitiveness to a standard regenerative type receiver, but if a second stage of radio-frequency is added the difference

wood; one .00025 mfd. fixed condenser. These should be carefully connected up as per the diagram. A honeycomb of 50 turns instead of the 35 turns coil may be tried out for the antenna tuning inductance, especially if a small antenna is to be used with the set. For all practical purposes, however, with an antenna of regular proportions for the reception of broadcasting, the 35 turns coil will be the correct size.

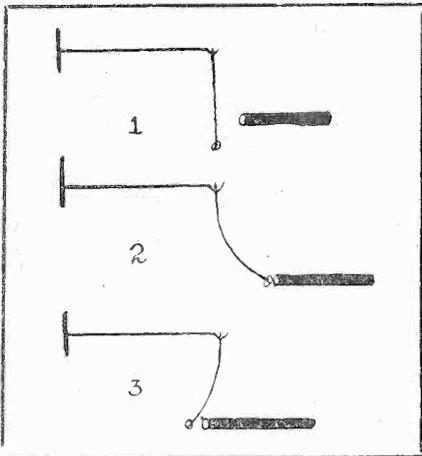
If the set is correctly assembled and wired, and the parts used are of good manufacture, excellent results will be obtained. The coils should be mounted in a regular plug so that if you should at any time desire to reach higher or lower wave lengths it may be accomplished without tearing the set apart. As far as that goes, by simply including a variometer in the plate circuit, and using coils from 1000 to 1500 it is very easy to get the high power trans-continental stations that send press. The variometer is necessary for this as they are all undamped wave stations. Plate coupling of the tickler type should under no consideration be used on the shorter waves, unless the constructor desires a set that is extremely unstable and hard to tune.

The Radio Primer

LESSON 1—ELECTRICITY: The term electricity covers a wide scope, as there are different kinds, although all the same in basic principle. The simplest form manifests itself in what is known as "static" electricity. Everybody has noticed that on a cold day you can walk across a carpeted floor, and when you touch a metallic object or another person's hand, a slight spark will be felt. This is static electricity, and is caused by the difference in polarity of your body and what you touch.

A simple experiment to show this form of electrical energy may be carried out by any person who wants to demonstrate it. The materials necessary are a small length of silk thread, a pith ball, and a length of rubber rod or glass rod. Tie the silk string to the pith ball and hang it on a convenient hook, where it cannot touch anything. For this purpose a brass chandelier or fixture in the center of the room is suitable. The thread need not be over a foot in length.

Place the rod near the pith ball. Nothing happens.



Graphic demonstration of the experiment described in Lesson 1.

Then rub the rod briskly with a silk handkerchief. Approach the ball again. You will note that the pith ball flies to the end of the rod, clings for a second and then sways away. Follow the ball with the rod, and instead of approaching or attracting it, it will repulse it. This experiment is probably the simplest illustrating the forces of static electricity and is graphically illustrated in the drawings 1, 2, 3.

1. Pith ball and rubber or glass rod. Pith ball hangs inert. No movement when approached by rod.

2. Rod after being briskly rubbed by silk cloth. Pith ball attached to it. Clings for a fraction of a second, then swings away. What has happened? When we rubbed the

rod with the silk cloth, we placed a charge of electricity on it. This charge was of different polarity from the pith ball. When placed near the pith ball, it attracted it. The pith ball absorbed the charge, became the same electrically as the rod, and then was repulsed. This illustrates the law of like attracts unlike. Like repulses like. The moment we brought the rod near the pith ball, its charge was given to the ball and becoming of like polarity, all our efforts to touch it with the rod will be in vain, as it will fly away from it. (Fig. 3.)

Now if we have two rods, one a glass and one a brass rod, and place them on opposite sides of the pith ball, and rub the glass one with silk, the pith ball will be attracted first to the glass rod, then to the brass rod, then back again to the glass rod. It gets a charge from the glass rod, flies to the brass rod and discharges its load, then goes back to the glass rod to return to the brass rod with another charge. This will keep up as long as there remains any static charge on the glass rod.

This experiment leads up to the law that applies to electro-static charges.

1. When two dissimilar unelectrified substances are rubbed together (silk and rubber or glass) one assumes a positive and the other a negative charge.

2. An unelectrified body on coming into contact with an electrified body becomes electrified with a charge similar to that on the electrified body.

3. Bodies with the same charge repel each other. Bodies dissimilarly charged will attract each other.

No New Broadcasters

THERE were no new broadcasting stations licensed during the past week by the Radio Section of the Department of Commerce.

Station WLAP, Arthur S. Schilling, Kalamazoo, Mich., was transferred from Class C to A and given the following wave length; 283 meters, 1,060 kilocycles. The transmitting power is 10 watts.

Special permission to broadcast was sent to the new Oakland Tribune 500 watt Class "B" Station on November 23, but the license will not be issued until next week, the Department of Commerce announced.

(Concluded from page 11)

must throw his switch back and forth to talk or listen, but that requires only a fraction of a second.

The new famous XL or thoriated tungsten filament tubes are used throughout and contribute largely to the successful operation and high efficiency of the apparatus.

The transmitter utilizes five 50-watt XL tubes similar to the UV203A, and the receiver utilizes seven UV199 tubes, which operate entirely on dry cells.

The high voltage necessary for the plates of the 50-watt transmitting tubes is supplied by a 52-pound, 700-watt dynamotor, operating from a 12-volt battery and delivering direct current at 1,000 volts. The storage battery charges continually while the engine is running in exactly the same manner as the starting battery of an automobile.

The antenna for the mail plane radio equipment consisted of a 200-foot trailing wire. This is carried on a special reel in the cockpit and let out when the plane takes to the air. A counterpoise, consisting of the engine, gas tank and all the struts and wires of the plane, connected together by bending straps, is used for the ground connection.

During the time the installation work for the prelimi-

nary tests was in progress it rained constantly for two days and nights. As the equipment was only covered by canvas, it became thoroughly saturated with moisture, so much so that the aluminum brackets and other parts were covered with spots where the drops of water had evaporated.

Yet the tests went off with great success. The apparatus was tested out on the ground without being dried, and operated perfectly, no tube or other failures occurring. During one of the trial flights both rain and snow were encountered at times, neither of which interfered with the operation of the set.

The tests comprised a number of trial flights from Schenectady. The ground station was the special government call of WWS, assigned by the Department of Commerce. The longest flight made from Schenectady was when the pilot returned to Hazelhurst Field, Long Island, an air line distance of about 175 miles, during which continuous conversation with him was carried on.

The final message received was: "I am in sight of the landing field and am going to reel in my antenna." This came in at Schenectady strong, indicating that the equipment could cover an even greater distance and that its normal rating of 100 watts output and 100 miles range is undoubtedly conservative.

The Radio University

Conducted by the Technical Staff of RADIO WORLD for the information and instruction of its subscribers.

Why is it that when a WD12 tube is used in a receiver that has operated successfully for months using WE-VT1 and UV200 that both the range and the volume fall off more than one-half? Do these particular tubes need special grid leaks and condensers? Must I use 30 ohm rheostats for them? What plate voltage is best for their operation, in a Flewelling (improved single condenser with plate variometer)? Jack Riggs, National Bank Building, Baltimore, Md.

These tubes, while good detectors, will not give the volume that the larger tubes do. Their volume is about 75 per cent of that of the tubes you mention, and even less than that for some of the poorer ones. This is due to the smaller plate surface, and the fact that the filament being smaller does not give off the amount of electrons that the other tubes do. They do not need special grid condensers, but a variable grid leak helps in their operation. They operate on six ohm rheostats. Suggest that you do not

towns. We have tried to locate the hum by the use of a five-tube loop receiver in an automobile, but it is just as strong one place as another, the difference being that it is terrific anywhere there are many street lights in operation. We have complained to the lighting company but they refuse to as much as investigate the matter. What can we do to stop this, or at least to get the officials of the company to have it stopped?—K. R. Kuenne, Random Lake, Wis.

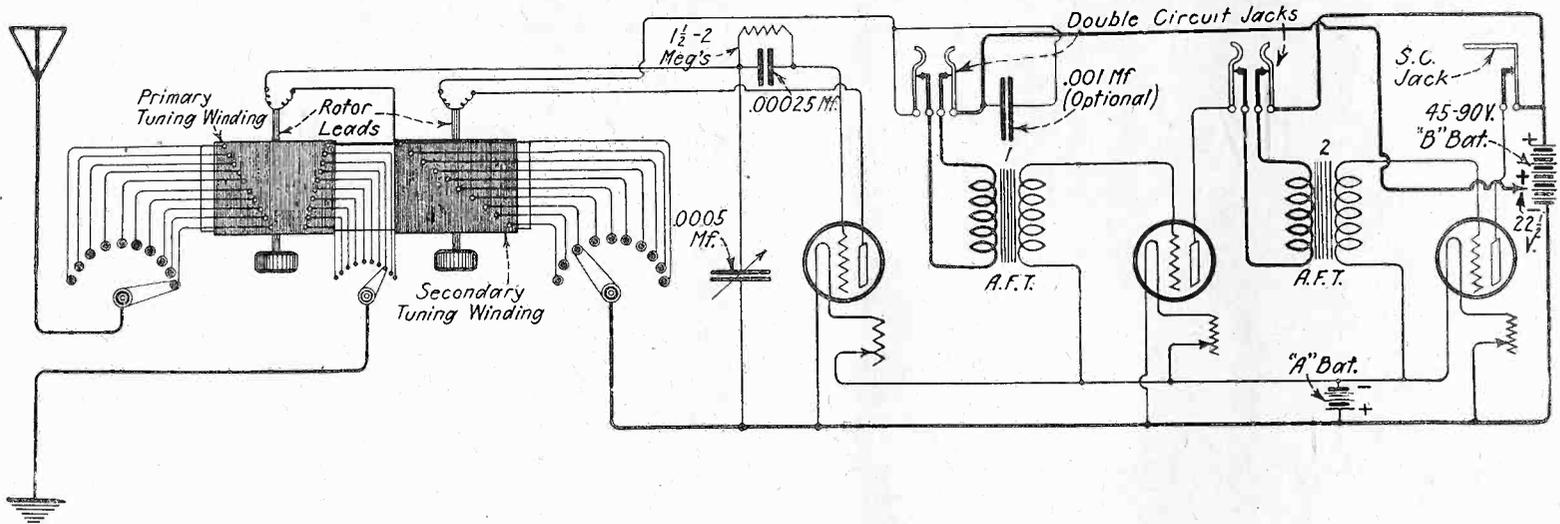
Suggest that you make a complaint to the State Public Service Commission, in the form of a signed petition. The hum is probably due to a faulty transformer or high tension alternator which should, in the interest of economy and safety, be corrected by the company operating the lighting plant.

You recently published a diagram of a "Duplex Tuner Circuit" by LeRoy Western. Is it possible to add two stages of audio-frequency amplification to this circuit? What

to be varied? I have been told that you cannot use fixed capacities because each tube is different. In what respects do these tubes differ, and why is that so?—Malvern Hallenback, Chicago, Ill.

The small capacity condensers, or neutrons, are to neutralize or balance out the internal capacity of the tubes, which is the cause of the circuits oscillating. You cannot use a fixed condenser. They are not made in small enough values, and furthermore each circuit has to be separately balanced out for the particular tube used. The tubes are different as to capacity in the leads, due to the fact that the space between the leads in the base varies slightly, making each tube have its own special capacity in that respect. The neutrons or condensers should be set for each particular tube to get best results.

Is it possible for a 469 meter wave to "blend" with a 526 meter wave? I have heard the announcement "this is station KFI, California," during the program at WOAW, and several times during KGW's programs the same thing has occurred. WOAW is on 526 meters, and the other two stations are on 469 and 492 respectively. At both times, the two programs were heard during a lull in WOAW's program and were not audible when the station was working. How can this be avoided? My set is described above, with the type antenna I am using. Could



Circuit asked for by Frank Maxwell. It is the Western "duplex tuner circuit" with two stages of audio-frequency amplification. The constants for this circuit are marked, leaving the selection of the audi-frequency transformer to the builder.

use them in the Flewelling, as high plate voltages are necessary (90 to 100 volts is best). You should not have any trouble in getting distant stations with these tubes, only the distant stations will not come in with the volume that larger tubes bring them in with.

I have a Monroe D7 radio receiver as shown by the circuit herewith. It operates O.K., except that I cannot get the lower wave stations. Can I do this by placing a condenser in my ground lead?—George W. Anderson, Fairmont, W. Va.

Your circuit shows a variable condenser in the ground lead. If it is a manufactured receiver, it has in all probability the condenser already. Between the taps on the primary and the series condenser you should have no trouble in reaching the lower stations provided your antenna is not too long. 75' to 80' is long enough.

Myself and all the other fans in town have had considerable trouble lately due to a terrible alternating current hum in our receivers. It is only lately that this has happened, as some of the receivers have been in successful operation for over three years. We have finally traced the hum to a lighting circuit which supplies three different towns. The hum is evident in all places in all

apparatus will be necessary for this? Will you kindly give a diagram for it. Several of my friends are interested in building this receiver with the amplification.—Frank Maxwell, 300 North Page Street, Stoughton, Pa.

The diagram you request is published herewith. The same constants apply in this circuit as in the first. The material you will need will be: 2 audio-frequency transformers; 2 additional tubes; 2 additional rheostats; 2 sockets; 2 double circuit jacks; 1 single circuit jack; additional A and B batteries.

Does the circuit published under the heading, "A Broadcast Receiver of Simple Design" use a 23 plate variable condenser? Under good conditions what should be the range of this receiver if the parts used are the best purchasable?—J. Hervieux, 7 Melbourne Avenue, Hudson Falls, N. Y.

The circuit calls for a 23 plate condenser and it should be used. The range of any receiver is problematical and depends upon too many exterior factors to even guess at it. The only test of the range of a receiver is to put it into operation.

What is the purpose of the small capacities used in the neutrodyne receivers? Are there any fixed condensers that I may use instead of the ones that come with the set, and have

the manner in which I run my antenna with regard to the high tension lines of the power plant have anything to do with it? I cannot tune below 280 meters at present.—M. E. Curtis, P. O. Box 814, Stockton, Calif.

The cause of the phenomena you note is more or less common in well populated districts where there are a number of receiving sets and transmitters. The commonest cause is due to a harmonic of the other station. This crosses the wave of the first station and is audible in the receiver of any one listening to the station. Another cause is the re-radiation of a harmonic from a wrongly tuned receiver, listening to the one station. This is not common, but has been noticed in some places where receivers are bunched more or less closely. The high tension lines have nothing to do with your trouble, as they are too far from the station mentioned to cause any trouble by a carrier. For lower waves insert a variable condenser in your ground or antenna lead. It might be of interest to state that FL, the high power French transatlantic code station, has been copied several times in New York city on a harmonic of 550 meters. Their wave length is 8,500 meters for their transatlantic work. Several of the more powerful broadcasting stations in the middle west have harmonics which are noticeable.

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IMPORTANT NOTICE

While every possible care is taken to state
correctly matters of fact and opinion in technical
and general writings covering the radio field, and
every line printed is gone over with a scrupulous
regard for the facts, the publisher disclaims any
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time and controversy in matters over which the
publisher cannot possibly have control.

DECEMBER 8, 1923

The Newspaper and Radio

By SARAH STRIER,

Radio Editor, Brooklyn Daily Times.

SINCE the last half of the nine-
teenth century and especially
during the past decade the mass
of scientific discoveries and inventions
of various natures has given the news-
paper opportunities for new fields of
writing. Almost daily, front page
stories of aeronautic achievements,
electrical experimentations, details of
the discovery of important fossilized
bones, will be found as evidence that
the American newspaper realizes the
important role science is playing in the
twentieth century.

Along with the colossal findings in
engineering science and the like, has
sprung up with phenomenal growth the
science of radio, opening up to the
American newspaper a new field of
stories, a new means of educating and
informing the people of civilization's
progress.

Contrary to what pessimists may say
that radio is taking away some readers

from the newspapers we believe that
radio is working hand in hand with the
newspaper, and as discoveries are as-
certained in this radio world, more and
more will the newspapers have oppor-
tunities of describing them in their col-
umns. Naturally that paper with the
fullest, most elucidating and scientific-
ally correct information about the new
radio output, will be the one that will
gain the popular appeal.

Although thousands of radio fans
will listen in to important speeches
made at a Marine Convention, a Cham-
ber of Commerce luncheon or a famous
testimonial dinner, most of these en-
thusiasts will also read their daily news-
paper the next day and see how it de-
scribed this particular event. Take
the sporting announcements that are
now regularly made by the important
radio stations. The next day after the
big game has been played or the fa-
mous horses have run, sporting fans
will read their favorite paper to know
how its editor has described the setting
and details of the sporting event.

The newspaper and radio are not
only working together, but will act as
advisory and cooperative supplements
to each other for the benefit of the pub-
lic.

Radio has already exemplified so
many of its usages that the world is
continually astir listening to its daily
progress, wondering at the marvel of
it at present, and prophesying its fu-
ture greatness. Mariners think of
radio in its means of aiding ships
through fogs and other difficulties that
may beset them on extended voyages.
Explorers will now be able to seek
expeditionary victories on far-distant
shores, spurred on by the assistance of
radio service. Aeronauts will sail
higher in view of the aid that perfected
flying equipment and radio will be to
them. Land and water will be con-
quered by scientific discoveries and the
beneficial services of radio.

More Radio Prophecies

THE prophet in the radio field
has this advantage over all
other forecasters—past achieve-
ments have been so wonderful and
have been so thoroughly realized that
almost any prediction based on human
need meets credence. People are al-
ways inclined to believe what they want
to believe. And when a recognized
radio engineer or inventor cautiously,
or otherwise, expresses a belief as to
the next development in this astounding
science he is sure of a sympathetic
audience.

A few weeks ago Marconi prophe-
sied three forthcoming developments
of radio, all of which would be of the
utmost value and importance. These
were the perfection of commercial
transatlantic radio telephony, the suc-
cessful development of radio communi-

cation between the surface of the earth
and deep mine workings and the per-
fection of radio signalling between sub-
marines and their mother ships or other
vessels. It needs no scientific knowl-
edge to realize the importance and ad-
vantage of such desirable accomplish-
ments. Added interest and hope is
given to these prophecies because of
the source from which they emanate.

And now steps forth no less eminent
a scientist than Edouard Belin, the
Frenchman, who ventures to predict
that within twelve months "television"
will be practicable between London and
Paris while greater distances will be
covered in the very near future. What
more will there be left to do after we
can talk with some one a thousand
miles away and look into the listener's
face at the same time?

Popularizing Music by Radio

OUR esteemed contemporary,
"Radio News," is to be con-
gratulated on the experiment it
is making to popularize music solely
through the instrumentality of radio.
The effort was undertaken to combat
attempts by the American Society of
Music Publishers, etc., etc., to collect
royalties on copyrighted music trans-
mitted by the broadcasting stations.
The society claimed that this use of
music hurt the sale of printed copies.
The broadcasters who had the nerve
to stand out against the society's de-
mands said that quite the contrary was
the case—that radio transmission added
to the popularity of good music and
therefore increased its sale.

To demonstrate this latter contention
our monthly contemporary organized
a prize contest for composers and
offered suitable rewards for the best
piece of jazz music and the best march
submitted to a competent board of
judges. The contest developed great
interest and the compositions submit-
ted were of excellent calibre. Six were
selected for transmission to the radio
audience through Station WJZ on the
evening of November 24. Three were
jazz pieces and three were marches.
Both varieties of music were sung by
artists and then played by the Six-
teenth Infantry Band, of the regular
army. All the pieces were given num-
bers and the radio audience was asked
to express its choice through a mail
ballot. The jury of award already
had picked the two prize winners and
the mail ballot will serve to justify or
deny their choice. Our ballot goes for
the march numbered 43 and the jazz
piece designated 100.

The prize winning compositions will
be published at once and will be popu-
larized and "boosted" solely by radio.
We hope and believe that the experi-
ment will be entirely successful and
that the society, etc., will be obfuscated.

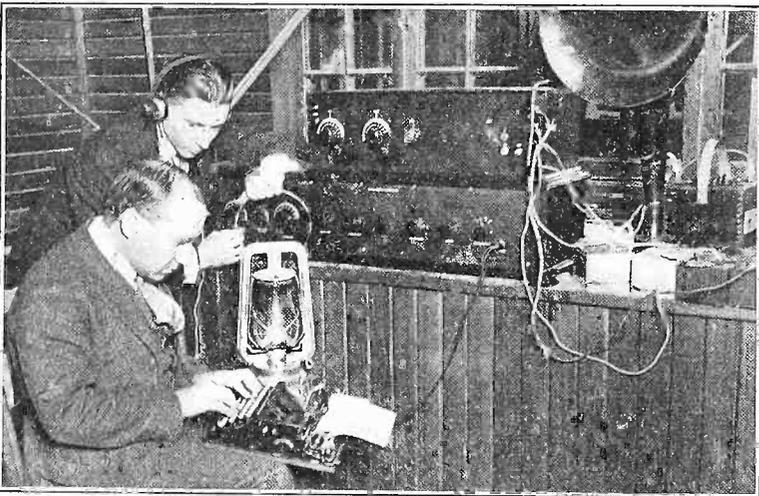
Variety Pictured in the Radio News



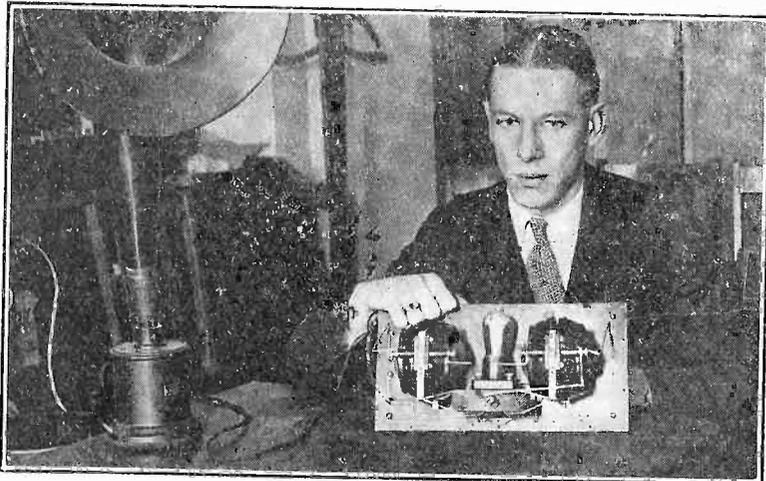
(C. International Newsreel)
 Berlin fan and investigator of peculiar radio phenomena, contrasting the loop antenna reception on a four tube receiver, with an antenna composed of an umbrella and his body. He holds the umbrella up, clasping its metal stem tightly, then alternately connects the loop and his own idea of an efficient antenna. The reason for his sitting atop the chimney is not stated.



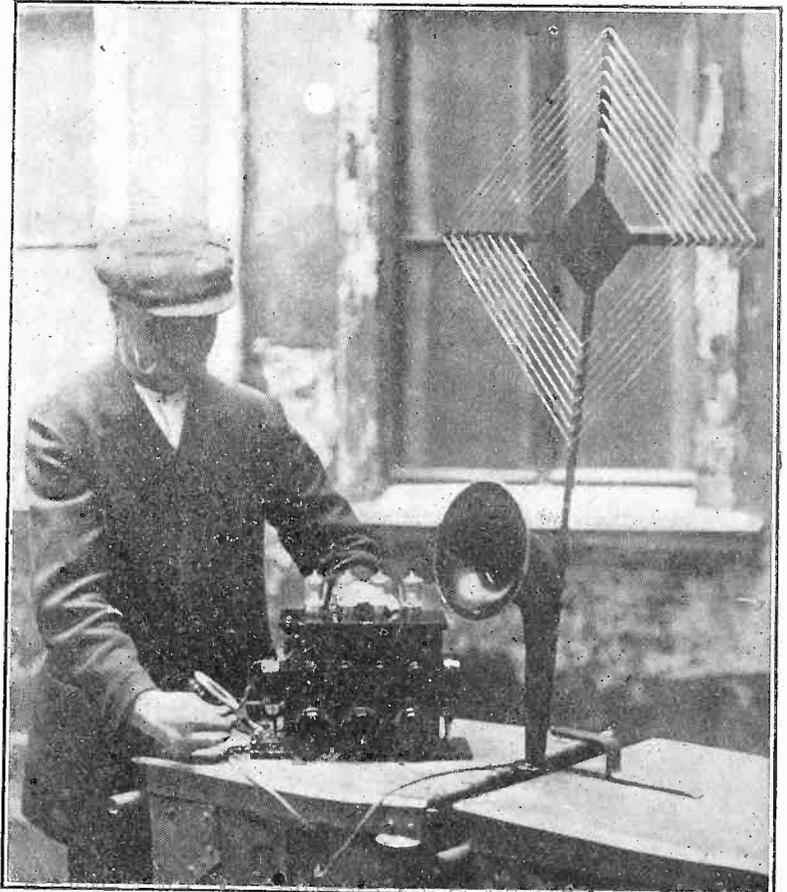
(C. International Newsreel)
 One of the features of this year's Chicago Radio Show was this silver mounted receiver. A solid silver map of the United States in relief forms the top or cover. The states and broadcasting stations are marked and it is an easy matter to locate them on the map while receiving. All the handles, markers and switch arms and points are of sterling silver, and the relief design on the top corner and side are of filigree silverwork, hand-wrought. The set is listed at \$2,000.00.



(C. Kadel and Herbert)
 Arthur Lynch and Alfred M. Caddell (with the typewriter) logging the foreign amateurs on a ten-tube superheterodyne. This year the test was for the American amateurs to be the listeners and to catch as many stray foreign calls as possible. The super used is one of the new type, calling for two tuning controls, and two heterodyne controls. The shack where this official listening post is located is in Garden City, and not having any electric light, they really "burn the midnight oil."



(C. Foto Topics)
 M. L. Muhleman, the designer of the new one-tube "autoplex" circuit and the completed receiver that he is using as a standard model in designing improvements. The circuit uses neither grid condensers nor grid leaks, making use of only a rheostat, tube, two variometers and one high inductance honeycomb coil. The picture shows the rear of set and the location of the apparatus on panel. Simple, isn't it?



(C. International Newsreel)
 In Berlin, instead of the conventional organ grinders, they now have the radio man, going around with a portable loop receiver, with loud speaker, and collecting the pfennigs and marks. The set is entirely self-contained and convenient straps allow him to put it on his back and trot around the streets with it. When he strikes a likely location he simply unstraps it, tunes in and waits for the money to clink.

Here Are Good Broadcast Programs

Station WOC, Davenport, Iowa

484 Meters (620 Kilocycles). Central Standard Time. December 6.—10:00 A. M.—Opening market quotations. 10:55 A. M.—Time signals. 11:00 A. M.—Weather and river forecast. 11:05 A. M.—Market quotations and agriograms. 12:00 Noon—Chimes concert. 2:00 P. M.—Closing stocks and markets. 3:30 P. M.—Educational program: (Musical numbers to be announced.) Lecture by Karl G. Stephan. Subject: "Pathology of Bright's Disease." 5:45 P. M.—Chimes concert. 6:30 P. M.—Sandman's visit. 6:50 P. M.—Sport news and weather forecast. 8:00 P. M.—Musical program (1 hour), P. S. C. Orchestra, Gerald M. Barrow, director.

December 7.—10:00 A. M.—Opening market quotations. 10:55 A. M.—Time signals. 11:00 A. M.—Weather and river forecast. 11:05 A. M.—Market quotations. 12:00 Noon—Chimes concert. 2:00 P. M.—Closing stocks and markets. 3:30 P. M.—Educational program: (Musical numbers to be announced.) Lecture by C. A. Russell. Subject: "Nitrogen, the Creator and Destroyer of Life." 5:45 P. M.—Chimes concert. 6:30 P. M.—Sandman's visit. 6:50 P. M.—Sport news and weather forecast. 7:00 P. M.—Educational lecture: "Is the Retail Dealer a Necessity or a Nuisance?" by J. W. Gamble, of the Standard Chemical Mfg. Co., Omaha, Neb. 8:00 P. M.—Musical program (1 hour), Erwin Swindell, musical director.

December 8.—10:00 A. M.—Opening market quotations. 10:55 A. M.—Time signals. 11:00 A. M.—Weather and river forecast. 11:05 A. M.—Market quotations. 12:00 Noon—Chimes concert. 12:30 P. M.—Closing stocks and markets. 3:30 P. M.—Educational program: (Musical numbers to be announced.) Lecture by C. C. Hall. Subject: "The Uses of Sulphur." 5:45 P. M.—Chimes concert. 6:30 P. M.—Sandman's visit. 6:50 P. M.—Sport news and weather forecast. 9:00 P. M.—Orchestra program (1 hour), P. S. C. Orchestra, Gerald M. Barrow, director. (Popular selections released through the National Association of Broadcasters, of which WOC is a member.)

Station WGI, Medford, Mass.

360 Meters (830 Kilocycles). Eastern Standard Time. December 7.—12:00 Noon—Selections on the Edison phonograph and the Ampico. 12:40 P. M.—New England weather forecast. 12:45 P. M.—Closing report on farmers produce market report. 3:00 P. M.—Amrad Women's Club program: Talks by Mrs. Evelene Spencer, U. S. Bureau of Fishery, Department of Commerce, "New System." Especially arranged program, arranged by Vocalion Hall, Boston. 5:30 P. M.—Closing stock market reports; live stock markets reports; Government reports. 6:15 P. M.—Code practice, lesson No. 182. 6:40 P. M.—Boston police reports. 6:45 P. M.—Late news flashes; sports news. 7:30 P. M.—Evening program: 1. Selected verses by Mr. Charles L. H. Wagner, radio poet. 2. Vocal selections by Miss Marion E. Watson. 3. Red Cross health talk by Henry Copley Green, of the Metropolitan Chapter of the American Red Cross. 4. Continuation of Musical program to be announced.

December 8.—6:45 P. M.—Code practice, lesson No. 183. 7:05 P. M.—Boston police reports. New England weather forecast. New England crop notes. 7:30 P. M.—Evening program: Thirty-sixth of a series of talks on New England Business Problems, by Arthur R. Curnick, of the New England Business Magazine. Evening's musicale to be announced.

December 9.—4:00 P. M.—Twilight program: 1. "Adventure Hour," conducted by the Youth's Companion. 2. Program to be announced. 8:30 P. M.—Evening program: 1. Talk on "World Unity" under the auspices of the Greater Boston Federation of Churches. 2. Evening's musicale to be announced.

Station KFAE, Pullman, Wash.

330 Meters (910 Kilocycles). Pacific Time. Programs begin 7:30 P. M. December 7.—Educational talk on soils. Talk on the new books, Miss Alice L. Webb, editor General Publications. Musical numbers. Farm prices, by R. N. Miller, farm management demonstrator.

December 10.—Essentials of a cropping system, Prof. E. G. Schafer, Farm Crops Department. Musical numbers. Source of the Palouse Dust Storms, by Prof. Olaf P. Jenkins, Geology Department. How to read more and better, by Dr. C. W. Stone. Alfalfa in Washington, by Leonard Hegnauer, soil and crop specialist.

December 12.—The need of preparation for a vocation, by Dr. Hamilton. Buy eggs by weight and quality tests, by W. D. Buchanan, poultry specialist. Musical numbers. Business opportunities through a knowledge of Spanish, by Prof. F. C. Chalfant, head of Modern Language Department. Farm women in national affairs, by Miss Maud Wilson, assistant director of Extension Service.

Station KSD, St. Louis, Mo.

546 Meters (550 Kilocycles). Central Standard Time. December 6.—8:00 P. M.—Broadcasting the concert of the St. Louis Symphony Orchestra, Rudolph Ganz, conductor; Max Steindel, 'cellist, soloist, given at the Odeon.

December 7.—Silent.
December 8.—7:30 P. M.—Orchestra concert, organ recital and vocal and instrumental specialties broadcast direct from the Missouri Theatre.

Station WOR, Newark, N. J.

405 Meters (740 Kilocycles). Eastern Standard Time. December 7.—2:30 P. M.—Reading of original poems by Carlyle T. Straub, former member of the Royal Air Force and friend of Joyce Kilmer. 2:45 P. M.—Gertrude Bronenkant, lyric soprano. 3:00 P. M.—Alice Delysia, star of "Topics of 1923," in a short talk. 3:15 P. M.—Dr. Harriet Van Buren Peckham, of Brooklyn, in her weekly talk on "Health Hints." 3:30 P. M.—Reading of original poems by Carlyle T. Straub. 3:45 P. M.—Continuation of soprano solos by Gertrude Bronenkant. 6:15 P. M.—"Icicle," Santa Claus' assistant in his toy factory, will speak to the children. 6:20 P. M.—"Music While You Dine," Kenneth Kitchen's Club Orchestra. 6:30 P. M.—"Man in the Moon Stories for the Children," copyright of the Newark Sunday Call. 7:00 P. M.—"Music While You Dine, Kenneth Kitchen's Club Orchestra.

December 8.—2:30-3:30 P. M.—Florence Lee, pianist and assisting artists in a program of violin, piano and soprano solos, duets and trios. 3:30-4:00 P. M.—Miss "Jack" Wilbur, diagnostician of personalities, will give her second talk on "What It Takes to Make a Distinguished Person." 6:15 P. M.—"Icicle," Santa Claus' assistant in his toy factory, will speak to the children. 6:25 P. M.—Concert by the Park City Quartet of Bridgeport, Conn. 6:35 P. M.—Soprano solos by Lucille Rogers. 6:45 P. M.—Continuation of concert by the Park City Quartet. 7:00 P. M.—Soprano solos by Lucille Rogers. 7:15 P. M.—Fred J. Bendel of the Newark Morning Ledger will give his weekly talk on "Sporting News Up-to-the-Minute." 8:00-9:00 P. M.—Gene Ingraham and his orchestra in the latest popular numbers. 9:00 P. M.—Concert for two pianos by Frances and Elizabeth Adelman. 9:15 P. M.—"Laughology," a monologue by John M. Lynch. 9:30 P. M.—Continuation of concert for two pianos by Frances and Elizabeth Adelman. 9:45 P. M.—Hon. E. Meade Whipp of Pennsylvania in a talk entitled "A Non-Partisan Forecast of the Presidential Possibilities of 1924." 10:00 P. M.—Continuation of concert for two pianos by Frances and Elizabeth Adelman. 10:15-11:00 P. M.—Four composers of popular and semi-classic songs at two pianos.

Station WRC, Washington, D. C.

469 Meters (640 Kilocycles). Eastern Standard Time. December 7.—5:15 P. M.—Instruction in code practice. 6:00 P. M.—Children's hour by Peggy Albion. 8:00 P. M.—Song recital by Alfred Johnson, baritone. 8:15 P. M.—Violin recital by Sol Minster. 8:30 P. M.—Song recital by Elizabeth Dayton, soprano. 8:45 P. M.—Piano recital by Gertrude Smallwood. 9:00 P. M.—A talk on the Coast Guard by Oliver M. Maxon, chief of the Division Operation of the United States Coast Guard. 9:15 P. M.—Violin recital by A. E. Ambrogio of the United States Navy Band. 9:30 P. M.—Song recital by Elizabeth Dayton, soprano. 9:45 P. M.—Piano recital by Gertrude Smallwood. 10:00 P. M.—Song recital by Alice Meynard, soprano.

December 8.—3:00 P. M.—Fashion developments of the moment. 3:10 P. M.—Song recital by Mary Blagden, soprano. 3:25 P. M.—The Magazine of Wall Street. 3:35 P. M.—Farm and home reports. 3:40 P. M.—Piano recital by Alice Bartlett. 3:55 P. M.—Current Events by the Review of Reviews. 4:10 P. M.—Travel talk prepared by the National Geographic Society. 5:15 P. M.—Instruction in Code Practice. 6:00 P. M.—Children's hour by Peggy Albion.

Station WGY, Schenectady, N. Y.

380 Meters (790 Kilocycles). Eastern Standard Time. December 7.—11:55 A. M.—Time signals. 12:30 P. M.—Stock market report. 12:40 P. M.—Produce market report. 12:45 P. M.—Weather forecast. 2:00 P. M.—Music and needle talk, "Cross-stitching Last-minute Christmas Gifts" (Courtesy of "Modern Priscilla"). 6:00 P. M.—Produce and stock market quotations; news bulletins. 6:30 P. M.—Children's program. 7:35 P. M.—Health talk—N. Y. State Department of Health. 7:45 P. M.—Program by Wotan Zoellner, violinist, and WGY Orchestra. 10:30 P. M.—Hawaiian program.

December 8.—11:55 A. M.—U. S. Naval Observatory time signals. 12:30 P. M.—Stock market report. 12:40 P. M.—Produce market report. 9:30 P. M.—Phil Romano's Rain-bo Orchestra at the Kenmore Hotel (Albany, N. Y.)

Station WLW, Cincinnati, O.

309 Meters (970 Kilocycles). Central Standard Time. December 7.—10:00 A. M.—Weather forecast and business reports. 1:30 P. M.—Stock Exchange. 3:00 P. M.—Business reports. 4:00 P. M.—A half-hour lecture—Recital by Mildred Templeton Williams of the Cincinnati Conservatory of Music. Subject: "MacDowell."

December 8.—10:30 A. M.—Weather forecast and business reports. 1:30 P. M.—Business reports.

Station WFAV-9YY, Lincoln, Neb.

275 Meters (1090 Kilocycles). Central Standard Time. Transmitter 500 Watts. Radiophone 500 Watts C. W. Schedule: Music and weather forecasts daily at 10 A. M. and 12:40 P. M. Concerts Wednesday nights at 8:30.

Station WFAA, Dallas, Texas

476 Meters (630 Kilocycles). Central Standard Time. December 7.—12:30-1:00 P. M.—Address, Dr. Robert Stewart Hyer, Southern Methodist University, on the Sunday school lesson, "Out-reach of the Early Church." 8:30-9:30 P. M.—Band recital by the Western Union Telegraph Company's Boys' Band, in popular music.

December 8.—12:30-1:00 P. M.—J. P. Comer, Southern Methodist University, in "Literary Lines." 8:30-9:30 P. M.—Orchestra from the North Texas State Teachers' College, Denton, Texas. 11:00-12:00 P. M.—Mrs. May Zigenbein, pianist.

December 9.—6:00-7:00 P. M.—Radio Bible Class, Dr. William M. Anderson, Jr., pastor of the First Presbyterian Church, teacher; half-hour Bible study and half-hour Gospel song. 9:30-10:00 P. M.—Sacred song recital and brief address. 10:00-11:00 P. M.—Jimmy Allen's Orchestra, Southern Methodist University boys, in popular dance music recital.

Station KHJ, Los Angeles, Calif.

395 Meters (760 Kilocycles). Pacific Time. December 7.—12:30-1:15 P. M.—News items; music. 2:30-3:30 P. M.—Matinee program presenting Richard Headrick, screen juvenile. 7:00-7:30 P. M.—Organ recital from First Methodist Church. 8:00-10:00 P. M.—Program presented by Polytechnic High Girls Glee Club. 10:00-12:00 P. M.—Broadcasting Art Hickman's Orchestra, by line telephony, from the Los Angeles Biltmore Hotel.

December 8.—12:30-1:15 P. M.—Program presented by piano pupils of Alice. 2:30-3:30 P. M.—McComas Gray. 6:45-7:30 P. M.—Children's program. 8:00-10:00 P. M.—Program presenting Hollywood Women's Club Chorus. 10:00-12:00 P. M.—Broadcasting Art Hickman's Orchestra, by line telephony, from the Los Angeles Biltmore Hotel.

WOR Will Radio Address on Personality

MISS "JACK" WILBUR, who styles herself "Diagnostician of Personalities," will talk from Station WOR, Newark, N. J., this afternoon, December 8, at 3:30, on "What It Takes to Make a Distinguished Person." This is the second lecture by "Jack" Wilbur to be broadcast by WOR. The first, two weeks ago, met with such approval that a return booking was made. On that occasion the struggles and achievements of Dr. Steinmetz, the electrical scientist who died recently, were recounted in a most interesting manner. Miss Wilbur was a friend and admirer of Steinmetz and gave many intimate anecdotes which had not previously been made public.

Both WGY and WHAZ Heard in England

RUTHERFORD HAYNER, of Station WHAZ, Troy, N. Y., under date of November 28, sends to RADIO WORLD the following self-explanatory telegram:

"From dispatches received from overseas explanation is made of how it came about that broadcasting station WHAZ, Rensselaer Polytechnic Institute, Troy, N. Y., was given credit in the British Isles for the test program sent out by General Electric Company Station WGY at Schenectady Monday night.

"By request the Troy station stood by for fifteen minutes after 10 o'clock for Schenectady to make a Trans-Atlantic test. By the time Owen D. Young, head of the Radio Corporation, had finished his address it was 10:17 and assuming the test complete WHAZ came in with its announcement and program which completely drowned out the playing of 'God Save The King' and closing announcement from WGY so that the overseas listeners coupled the WHAZ call letters with the Schenectady test program.

"Several reports came from England and Scotland and one from Station LCM, at Stavanger, Norway, crediting the WGY test to WHAZ Station which is heard in England nearly every week."

RADIOGRAMS

WORLD NEWS HAPPENINGS BRIEFLY
PHRASED FOR OUR BUSY READERS

Miss Maud Moran, Vincennes, Ind., composer of radio music and songs, experienced such a pronounced reaction from reading a paragraph in RADIO WORLD about her that she was seized with an inspiration for a new song. She wrote the words and music in five hours of concentrated effort. The song will be published in the near future. Miss Moran calls it "Radio Lullaby"—and that causes a slight feeling of uneasiness on the part of the writer of the other paragraph.

* * *

Prof. Michael Idvorsky Pupin, of Columbia University, wrote for the New York Sun an appreciation of his friend, the late Dr. Charles Proteus Steinmetz, in which he said: "The greatest merit of Steinmetz was the fact that he performed every job assigned to him with wonderful loyalty and wonderful efficiency. He never thought of himself, but always of his job. Whenever I think of the great plant of the General Electric Company and of the great part it plays in the industrial life of this country, I cannot help seeing in it a splendid monument to the loyal servants who raised it. One of the foremost among them was Charles Proteus Steinmetz. He worshipped his job and it will forever be his monument."

* * *

When the infant moon is nigh, there still is music in the air. But not music alone, observes F. P. A. in his column in the New York World. And then he goes on: Tomorrow night, over Station WOR, Mr. Arthur Murray, director of the National Institute of Social Dancing, will—he writes—begin a course of dancing lessons by radio. "This," he adds, "is the first time dancing lessons have ever been taught through the air." Crash! go our other Wednesday night appointments. And clip! go the years of suffering—suffering that only other wall-flowers know. All we need is an hour of some dear gazelle's time and the courtesy of somebody's radio set. And, revising Milton:

Come and trip it as you go,
Tuning in by radio.

* * *

A queer thing happened one day last week during the reception of the nightly bedtime story. The little folks were listening in on one of the stations which broadcast a popular version of the "bear or bearish type." The announcer had proceeded well into the story, and the little bunny was just hippity hopping down the lane "and as the little rabbit heard the noise he turned around and—the Ford was completely wrecked, its license number was—12 chestnuts and a great big—piece of glass penetrated the—green grass along side of the—lamppost which was wrecked." This sort of thing continued for the remainder of the program. The set was inspected, and finally the antenna. It was found that the antenna was hanging down, swinging periodically against a metal clothes line and changing the wave to that of another station which was at the time broadcasting an accident.

Captain Sparks is the very appropriate cognomen of the commander of the cable repair ship "Restorer" whose job is to keep certain of the Pacific cables in working order.

* * *

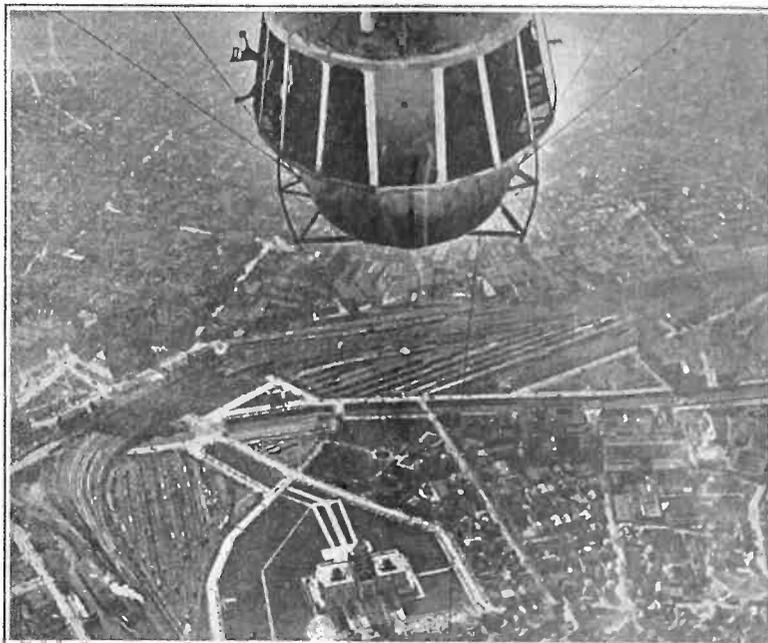
Nauen, Germany, now sends a time signal on 3,100 meters and simultaneously on a wave length of 13,000 meters. Petrograd, Russia, sends a signal on 1,500 meters, spark. Moscow, Russia, transmits a signal on 5,000 meters, spark.

* * *

Radio saved the life of a sailor suffering from acute gastritis aboard the steamer "Venetian," 1,200 miles out at sea, when officers of the vessel were able to treat the man according to directions wirelessed from Los Angeles, Calif., by Maj. H. L. Heidreck of the United States public health service.

* * *

The Navy Department received a bid of \$2,000 from the Federal Telegraph Company for its old radio station at Beach, San Francisco, Calif. Bids for this station, including several buildings, two 300-foot masts and complete radio equipment, were opened at the Navy Yard, Washington, recently, but no award was announced.



(C. Kugel & Herbert)
A view of the control car of the U. S. Navy's great airship "Shenandoah" taken while over Providence, R. I. The radio antenna is seen hanging from the car.

Capt. MacMillan Communicates Easily with the States

HARTFORD, CONN.—Regular amateur radio relay traffic between the North Pole and the principal cities of the United States, enabling Captain Donald B. MacMillan, Arctic explorer, to keep in constant touch with his secretary in Boston and associates in New York, Chicago and other cities, has been proposed by the American Radio Relay League. This unique service will be attempted every Monday and Thursday of each week over definite traffic routes.

Until the present time, and especially when MacMillan's schooner the "Bowdoin" was making its way north up the coast of Greenland, communication with the explorer has been undertaken on a rather "hit and miss" basis. Not until the ship had reached winter quarters at Refuge Harbor, 750 miles from the pole, and Donald Mix, radio operator, had begun to maintain constant communication

with Jack Barnsley of Prince Rupert, British Columbia, did regular traffic appear certain.

There is no reason now, in the opinion of A. R. R. L. officers, why Captain MacMillan, from his perch on the top of the world cannot keep as close in touch with his friends by radio as he could by the ordinary telephone were he sitting in his office in Boston. That is the object of the proposed experiment.

No one doubts any longer that amateur radio has become the greatest boon and comfort to the explorer, breaking forever the bonds of isolation and relieving anxiety over the welfare of family and friends that have been left behind. In his little cabin under the Arctic sky, the explorer can transact business as easily as he could in Boston, or call across the broad Arctic waste friends in New York and, in fact, any city or town in the country.

Latest Radio Patents

Electrical Wave Transmission System

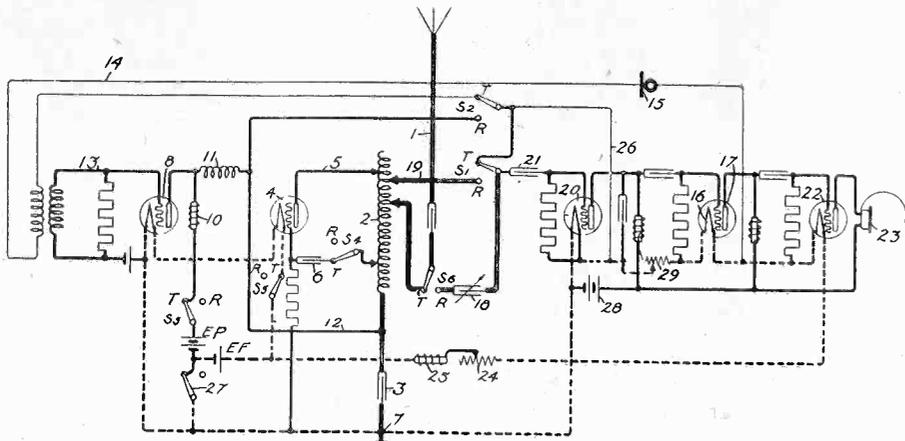
No. 1,470,955: Patented October 16, 1923. Patentee: W. E. Booth, New York City.

The invention relates to electrical transmission systems, and has for an object to provide particularly simple and convenient forms of signaling systems, more especially radio signaling systems.

A further object is to provide a sending and a receiving system for radio communication in connection with a single antenna system, and provided with means

mitting and receiving systems so designed that upon placing the receiving system in receiving condition, the transmitting system is left in condition not to interfere therewith and vice versa.

A further object is to provide a signaling system with means for supplying direct current to the microphone of a transmitter apparatus from the same electrical source which is used for one or more other purposes in the system, there-



System to be used on a receiving-transmitting set designed for minimum bulk and simple control of apparatus.

which enables a single element in the antenna to serve to receive energy from the transmitter for transmission and to apply received energy to the receiver circuit.

A further object is to provide switching systems for radio or other trans-

by eliminating one source which heretofore has usually been provided.

A general object is to provide a commercially desirable form of wireless system for two-way signaling having minimum weight, bulk and complexity of apparatus.

Receiver for Wireless Telegraphy

No. 1,472,092: Patented October 30, 1923. Patentee: H. J. Round, London, England.

It is well known that an atmospheric, being highly damped, causes the receiving circuits to oscillate at their own natural frequency and cannot therefore be eliminated by tuning these circuits. It is also well known that if an oscillatory potential of a certain frequency be induced in an oscillatory circuit of a different natural frequency two sets of oscillations are produced in that circuit, namely a transient free oscillation of the natural frequency

last for a very short time, and in order that they shall not affect the circuit tuned to the beat frequency, it is necessary for this frequency to be comparatively high so that several beats may occur before the oscillations due to the atmospheric die out. Where this necessitates the beat frequency being above the limit of audibility it is necessary to employ one of the well known devices for causing these beats to produce audible indications as for example a rectifier, or in the case of continuous waves a ticker or the generation of another frequency which will interfere with the inaudible frequency and produce beats of an audible frequency.

Rolled Condenser

No. 1,470,781: Patented October 16, 1923. Patentee: Phillips Thomas, Edgewood Park, Pa.

My invention relates to improvements in condensers and it has special relation to the lead connections of rolled condensers.

It is customary, in the manufacture of rolled condensers, in which there are several leads for each polarity, to solder the leads of the same polarity together. When this is done, after impregnation of the condenser with wax, the process of soldering several leads together requires so much time and heat, that the condenser-impregnating wax is melted and air is allowed to enter the condenser at the leads. If, however, the leads are soldered together before the condenser is impregnated, the condenser is held rigidly in shape by the leads and is thus prevented from being properly impregnated. When the condenser is pressed, the leads are, moreover, pushed out of shape, if not broken.

My invention has for an object to provide a method of so connecting such leads as to secure proper electrical and mechanical connection between the leads connected to each pole of the condenser, without injury, either to the impregnating wax or to the leads themselves.

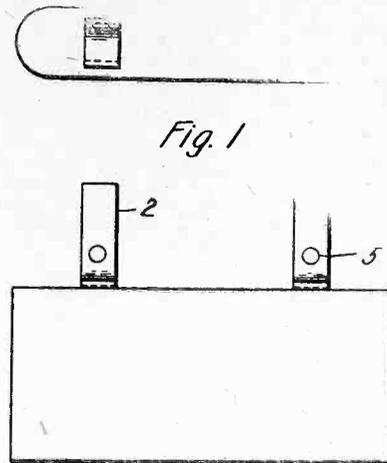


Fig. 1

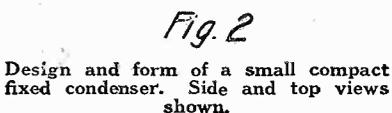


Fig. 2

Design and form of a small compact fixed condenser. Side and top views shown.

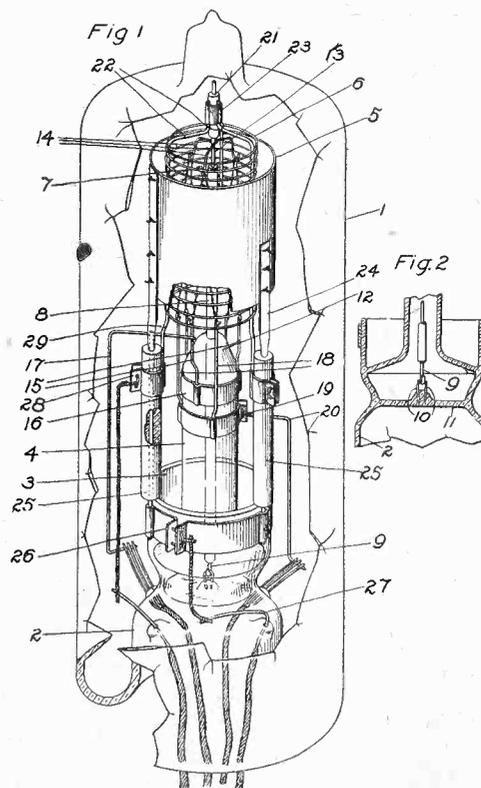
In the drawing Fig. 1 is a plan view of a condenser constructed according to my invention; and Fig. 2 is a side elevation of the structure of Fig. 1.

Electron Discharge Device

No. 1,472,477: Patented October 30, 1923. Patentee: R. W. King, New York City.

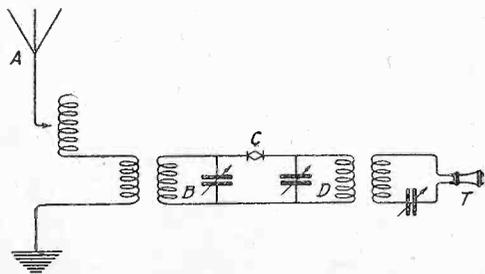
The invention relates to electron discharge devices, for instance, of the audion type, and particularly to devices of this type that are adapted for use with high voltages and large operating currents.

An object of the invention is to provide a more rugged mounting for the electrodes than is possible in case the usual glass rod or arbor is employed. This object is accomplished by using a support-



Constructional details of a high power three element tube, with special attention to the rigidity and strength of the supporting electrodes.

ing standard located centrally of the tube, the standard being preferably of insulating material, such as lavite which is stronger than glass, the electrodes being supported from this standard.



Receiver designed for the exclusion of atmospheric disturbances.

of the circuit and a forced oscillation of the frequency of the induced potential.

According to the present invention I make the natural frequency of the receiving aerial different from that of the received waves so that both the forced and the free oscillations occur producing the well known phenomenon of beats and I rectify the resultant current and carry it to a circuit tuned to the beat frequency and I may directly or indirectly connect a telephone to this tuned circuit. The oscillations produced by an atmospheric

The DXers Are Now Reporting

DX Nite Owls, Attention!

THE DX season is now upon us.

All faithful DXers are requested to get ready for the fray and prepare themselves for the night vigil.

Send your records to the DX Editor of RADIO WORLD.

Write only on one side of the paper and write clearly.

Give full particulars of your location, your set, your aeriels and other items of interest.

Make Yourself at Home

From J. E. Bradley, Justin, Texas.

Picked up quite a few stations last nite while it was raining most of the time with a single circuit set with 2 stages of A. F. A. (WO-11 tubes).

WOC, 5:50 p. m., chimes, Davenport, Iowa; WEAH, 5:52 p. m., orchestra, Wichita, Kansas; KDKA, 6:10 p. m., Cameo Theatre organ, Pittsburgh, Pa.; WWJ, 6:15 p. m., Cameo Theatre organ, Detroit, Mich.; WDAP, 6:20 p. m., markets, Chicago, Ill.; WOAI, 6:21 p. m., news, San Antonio, Texas; KYW, 6:22 p. m., financial review, Chicago, Ill.; WCK, 7:00 p. m., musical program, St. Louis, Mo.; KFKB, 7:07 p. m., announce, Milford, Kansas; WHB, 7:25 p. m., announcement, Kansas City, Mo.; WGY, 7:30 p. m., music, and the play, "Daddy Long Legs," Schenectady, N. Y.; WHAS, 7:35 p. m., theatre orchestra, Louisville, Ky.; WOQ, 7:45 p. m., announcement, Kansas City, Mo.; WHA, 8:06 p. m., lecture, Madison, Wis.; WJAD, 8:07 p. m., music, Waco, Texas; WSY, 8:10 p. m., lecture on the coal and iron industry of Bessemer, Ala., Birmingham, Ala.; KSD, 8:18 p. m., play "Dulcy" from theatre, St. Louis, Mo.; WOS, 8:30 p. m., announcement, Jefferson City, Mo.; WPAD, 9:08 p. m., soprano solo, Chicago, Ill.; WCBBD, 9:12 p. m., Zion Orchestra, Zion, Ill.; WLAG, 9:15 p. m., musical program, Twin City, Minn.; KHJ, 9:25 p. m., organ First M. E. Church, Los Angeles, Calif.; WMC, 9:36 p. m., lecture, Memphis, Tenn.; WRK, 10:10 p. m., lady sings, Hamilton, Ohio; KFFQ, 10:16 p. m., orchestra, Colorado Springs, Colo.; WGR, 10:40 p. m., Hotel Statler Orchestra, Buffalo, N. Y.; WOAW, 11:00 p. m., orchestra, Ohama, Neb.; WJAZ, 11:05 p. m., Oriole Orchestra, Chicago, Ill.; CKY, 11:05 p. m., orchestra, Winnipeg, Canada. Station somewhere in Mexico did not announce in English; quit at 11:30 p. m. Central time; was on about 450 or 455 meter wave length. It was neither PWX or 6KW. WSB, 11:35 p. m., Radionel program, Atlanta, Ga.

We Won't Bother Counting Them, Old Dear!

From J. S. Medd, Stony Brook, Long Island.

I AM enclosing my complete DX record for the months of April, May, June, July, August and September, 1923. There are 201 stations, most of which I have heard several times; 58 of them are west of Chicago.

The set used was a standard 3-coil honey-comb coil set with two stages of amplification and was used at Stony Brook, Long Island, 55 miles from New York. As a detector I have used with great success a rebuilt UV199 purchased last April from a firm dealing in rebuilt tubes. The tube draws .25 amp and is about the best detector I have ever used.

I have purchased several more since that time with the same good results.

Following are just a very few of the 201 stations I received: KDEN, Dearborn, Mich.; KDKA, Pittsburgh, Pa.; KDYL, Salt Lake City, Utah; KDYV, Salt Lake City, Utah; KDYW, Phoenix, Ariz.; KDZQ, Denver, Col.; KFAD, Phoenix, Ariz.; KFAJ, Boulder, Col.; KFAU, Boise, Idaho; KFBV, Colorado Springs, Col.; KFPC, Ogden, Utah; WFI, Los Angeles, Calif.; KOB, State College, New Mexico; KSD, St. Louis, Mo.; KYW, Chicago, Ill.; PWX, Havana, Cuba; WAI, Dayton, Ohio; WAAB, New Orleans, La.; WAAD, Cincinnati, Ohio; WAAE, St. Louis, Mo.; WAAF, Chicago, Ill.; WAAG, Shreveport, La.; WAAH, St. Paul, Minn.; WAAJ, Boston, Mass.; WAAK, Milwaukee, Wis.; WAAN, Columbus, Mo.; WAAP, Wichita, Kan.; WAAX, Crafton, Pa.; WAAZ, Emporia, Kan.; WABN, Grover, N. C.; WAPK, Fargo, N. D.; WBAQ, Decatur, Ill.; WBAP, Fort Worth, Texas; WCAK, Houston, Texas; WCBBD, Voliva, Zion City, Ill.; WDAF, Kansas City, Mo.; WDAP, Chicago, Ill.; WFAA, Dallas, Texas. Canadian stations: CFCA, Toronto; CFCF, Montreal; CFCX, Longon, Ont.; CKCR, St. John, N. B.; CHOC, Vancouver, B. C.; CHCA, Vancouver, B. C.; CFTC, Toronto, Ont.

This is not such a bad record in my mind, considering the fact that quite a few of the very distant stations were not high power stations, but stations operating on as low as 50 or 100 watts. Of course, the high power stations operating on 500 or 1,000 watts came in more frequently, but by careful tuning, and manipulation of the main controls I find that a receiver can be made to do actual wonders on even two tubes. Hope that I can break my old record this season, and if I do, will keep you busy counting new ones.

Rabid Is Right!

From Mrs. E. L. Rhodes, 1004 West St., Utica, N. Y.

Your invitation to send in records and other items is going to be accepted and I hope I won't bore you too much. However, I will first tell you that I have had my set since October, but since that time I have become a rabid DXer and I refuse to leave my set until all hopes of another signal is gone. And I have been rewarded for my efforts as per my record:

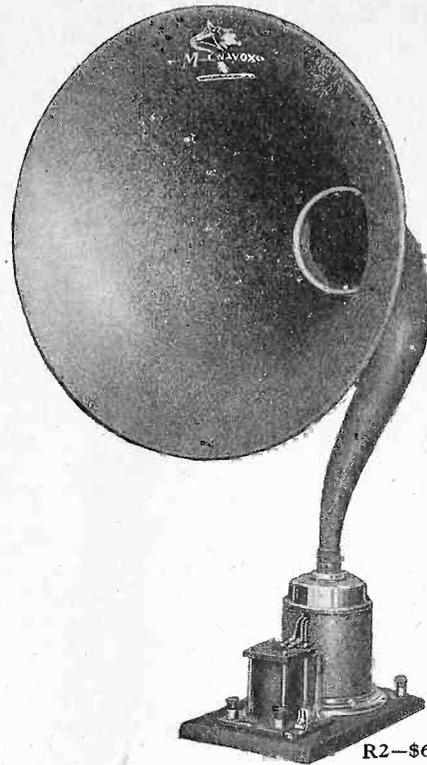
KHJ, Los Angeles, Calif.; KLZ, Denver, Colo.; WABL, Storrs, Conn.; WCAP-WRC, Washington, D. C.; WSB, Atlanta, Ga.; KYW-WDAP-WPAD-WJAZ, Chicago, Ill.; WTAS, Elgin, Ill.; WCBBD, Zion, Ill.; WOC, Davenport, Ia.; WIAH, Newton, Ia.; KFKB, Milford, Kan.; WHAS, Louisville, Ky.; WNAC, Boston, Mass.; WGI, Medford Hillside, Mass.; WBX, Springfield, Mass.; KOP-WCX-WWJ, Detroit, Mich.; WLAG-WBAH, Minneapolis, Minn.; WOS, Jefferson City, Mo.; WDAF-WHB, Kansas City, Mo.; KSD, St. Louis, Mo.; WAAW-WOAW, Omaha, Neb.; WOR-WAAM, Newark, N. J.; WGR, Buffalo, N. Y.; WMAK, Lockport, N. Y.; WJZ-WEAF-WDT-WHN, New York, N. Y.; WHAM, Rochester, N. Y.; WHAZ, Troy, N. Y.; WLW-WSAI, Cincinnati, O.; WJAX-WTAM, Cleveland, O.; WBAV, Columbus, O.; WOAV, Erie, Pa.; WCAU-WDAR-WIP-WFI, Philadelphia, Pa.; KDKA-WCAE, Pittsburgh, Pa.; WIAR, Providence, R. I.; WMC, Memphis, Tenn.; WBAP, Ft. Worth, Tex.; WFAA, Dallas, Tex.; WAOI, San Antonio, Tex.; WHA, Madison, Wis.; WPAH, Waupaca, Wis.; CFCN, Calgary, Alta, Can.; CKAC, Montreal, Que., Can.; PWX, Havana, Cuba.

I have letters from Los Angeles, Calif., and Denver, Colo., confirming my statement that I have received their program. I have only given stations that are over 100 miles from Utica. I have a Paragon RA10 receiver with amplifier and tuning condenser with storage batteries for both A and B circuits. The aerial is a long, straight wire 320 feet long, running north and south, making a right angle turn on roof, running east 30 feet and down side of house. I trust I have made this plain, but as I'm still an amateur and my son fixes up things, I may not have explained clearly. One night California came in loud enough for the loud speaker. We keep our batteries fully charged and I believe that spells "better reception."

I guess I have told you all I know and it is time for me to tune in, so no more for I might miss something.

Is my record good—better than the average? I believe I have outdone any one in my vicinity.

MAGNAVOX Radio Products



R2—\$60

Electro-Dynamic Reproducer

IT is due to their construction on the electro-dynamic principle that Magnavox Reproducers (type R) have become a universal accessory for use with any good receiving set.

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 Company, Ltd.,
Toronto, Montreal, Winnipeg

Radio Merchandising

Advertising Rates: Display, \$5.00 an inch, \$150.00 a page. Classified Quick-Action Advertising, 5 cents a word. Phones: Lackawanna 6976 and 2963

New Radio and Electrical Firms

Amco Radio Stores, New York City, \$20,000; A. Morofsky, M. Inger. (Attorney, M. Levy, 115 Broadway.)

L. & S. Radio Co., Brooklyn, New York, \$4,000; M. and D. C. Spies, M. M. Kotz. (Attorney, F. J. Knorr, Albany.)

Pinkus Electric Co., New York City, \$10,000; A. Herman, E. Olson. (Attorney, L. Misnell, 2 Rector St.)

Signal Radio & Electric Corporation, 64 University Place, New York City, has made an assignment. Liabilities, \$21,042; assets, \$14,852, main items being accounts, \$8,898; cash, \$3,953. Principal creditors are Estate of Joseph Lederer, \$1,532; Peck, Spring Co., \$1,002; Anna Lederer, \$1,748.

Premier Radio Corporation of America, 78 Fifth Ave., New York City, has filed a petition in bankruptcy. Liabilities, \$24,701; assets, \$8,337, main item being stock, \$6,500; accounts, \$1,737. Principal creditors are Wald Electric Co., \$3,574; Cutler Hammer of Milwaukee, \$11,062; Federal Tel. Co., Milwaukee, \$1,950; S. A. Potter, \$1,500. Henry Caplan was appointed receiver, under \$1,000 bond, by Judge A. N. Hand.

Waltham Electric Corp., New York City, \$10,000; W. H. and A. Nusbaum, M. Rosenthal. (Attorney, J. L. Rosenthal, Woolworth Bldg.)

Noyes Electrical Supply Corp., New York City, \$50,000; C. W. Noyes, D. Erb, J. A. Obermaier. (Attorney, L. Freidman, 1540 Broadway.)

Langers Radio Stores, Bronx, New York City, \$10,000; S. and R. Langer, Z. Lipcy. (Attorney, M. Cohen, 51 Chambers St.)

Kuslansky Electric Supply Co., Brooklyn, N. Y., \$10,000; R. and M. Kuslansky, A. Schmittman. (Attorney, W. Welzer, 44 Courts St., Brooklyn.)

J. B. Ferguson, New York City, electric machinery, \$10,000; J. B. and J. B. Ferguson Jr., R. Setbmann. (Attorney, F. W. Park, 27 William St.)

M. D. Reddock & Co., Brooklyn, N. Y., electric and radio supplies, \$10,000; M. D. Reddock, L. P. O'Brien, I. Snyder. (Attorney, M. H. Katz, 305 Broadway.)

Superior Electric Co., Philadelphia, Pa., \$10,000 (Corporation Guarantee & Trust Co.)

Williamsburg Electric Supply Corp., Brooklyn, N. Y., \$100,000; J. A. Korn, M. A. and P. Cutler. (Attorney, S. J. Cutler, 50 Court St., Brooklyn.)

Veolayne, New York City, radio apparatus, \$25,000; J. and M. Hurley, J. Ferri. (Attorney, J. C. McDermott, 27 William St.)

Kelly Radio Laboratories, New York City, \$5,000; H. S. Barnes, G. J. Kelley, J. Graham. (Attorney, F. J. McEwen, 170 Broadway.)

Another Hazeltine License Granted

THE Ware Radio Corporation, 160 Duane Street, New York City, has been granted a license under the Hazeltine patents for the manufacture of neutrodyne sets, by the Independent Radio Manufacturers, Inc.

Radio Moving Ahead Slowly in Great Britain

LONDON.—The radio game as it is played by the private citizen interested in receiving is moving slow in Great Britain.

In the first place, the Post Office Department has full charge of radio communication, says a special correspondent of the American Radio Relay League, and the British Broadcasting Company has a firm grip on receiving sets of every description. The regenerative sets are banned at present for fear of the evils resulting from radiation. This handicaps the British receiving public, and forces them to employ more tubes of radio and audio amplification.

Broadcasting is also done on a much broader band of wave lengths than in the United States, with the result that most of the commercial receiving sets manufactured are made to tune wave lengths from two hundred to several thousand meters. "The effect of this, in my opinion, is to reduce their sensitivity to a certain extent, as it necessitates bank winding, large condensers, adjustable radio-frequency transformers, etc." The public is very much interested in radio, and despite the red tape, and the really severe penalties imposed on illegal operators, there are many unlicensed sets.

"I was much amused at the owner of a store in Edinburgh, Scotland, who specialized in radio receiving equipment. He told me that the biggest percentage of his visitors were radio enthusiasts who spent hours of his valuable time discussing circuits. He did not know the word for this type of radio man, but he is undoubtedly running up against the good old radio 'ham.'

"There is nothing like the variety of receiving equipment and apparatus here that there is in the United States, except in the way of tubes. There is certainly a glorious display of the latter, which embody every principle known and unknown in radio. One striking feature of the trade is the fact that there is practically no competition from the outside, as the duty is very high and only recently a law was passed prohibiting the use, for a period of two years, of all imported radio receiving apparatus."

Western Dealers Ask to Join R. T. A.

THE Minneapolis Radio Dealers Association, West Hotel, Minneapolis, Minn., has applied for membership in the Radio Trade Association, of New York City. The western organization has 14 members.

A Man Once Lost a Base Drum, Too

FAVESDROPPED at a party: "I don't believe I could sing for the radio."

"Do you sing from your diaphragm?"

"I don't know where my diaphragm is."

"Well, you had it last."—N. Y. World.

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:

Alva Carson, Blackford, Ky.
V. A. Merklein, 7513 Third Ave., Brooklyn, N. Y. (Retailer.)

Thomas M. Hanlon, 613 Bayview Ave., Inwood, Long Island, N. Y. (Retailer.)

Miller F. Kline, Box 83, Weldon, Iowa. (Retailer.)
A. Benesovitz, 415 McKinley St., Hibbing, Minn.

Alex Mego, Box 376, Braddock, Pa.
L. C. Brown, 212 W. Lincoln Ave., McDonald, Pa.

H. V. Glass, Cumberland, O. (Dealer.)
Carl Fresell, 28 Jackson Ave., Rutland, Vt.

Marshall Berry, Box 125, Kingston, New Hampshire.

Dawson & Hurley, Oxford, Md. (Dealers.)

World Radio Laboratories, 67 Hauxhurst Ave., Weehawken, N. J.

Dr. J. R. Boyd, Oakvale, W. Va. (Retailer.)

B. L. Hitchcock, 241½ West 11th St., Erie, Pa.

M. F. Stilwell, Worcester, N. Y.

Wm. Chrispell, Nichols, N. Y.

J. A. McCracken, P. O. Box 283, Huntingdon, Quebec, Canada. (Dealer.)

Lloyd Allen, Deering, North Dakota.

H. S. Christman, 1303 Albert St., New Castle, Pa.

J. Henry Warner, 6334 Haverford Avenue, Philadelphia, Pa.

Theodore Slawinski, 3674 East 104th Street, Cleveland, Ohio.

Radio and Electrical Business Opportunities

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

NEW INVENTION

by German chemist; storage battery electrolyte charges batteries in 10 to 20 minutes, without any outside help; exclusive territories now being allotted; non-competitive accessory; unusual opportunity; \$500 investment protected with merchandise; many territories open to men who financially and otherwise are able to handle the proposition. For particulars, write or call Ever-Charge Battery Electrolyte Co., cor. 206th St. and 9th Ave.

ENGINEER, electrical, mechanical, 37, desires connection with privilege investment if mutually satisfactory. Box XX, Radio World.

RADIO DEPARTMENT

to rent in well-advertised electrical store; unusual opportunity. Write Box M, Markwell Advertising Service, 152 West 42d St.

INVENTIONS developed, model making. Henry Herman, 11 East 42d St., N. Y.

HAVING other interests, will dispose of importing electrical specialty business; have sole American rights; business operating; no expense; large stock on hand; splendid opportunity for hustling salesman; \$3,500 required. Box X, Radio World.

OPPORTUNITY

to purchase a well established radio shop doing a splendid business; great possibilities for an electrical contractor, can combine with that line; low rent; honest proposition, courts rigid investigation; reasonable. Box Z, Radio World.

SALES DISTRIBUTION—We have dies and manufacturing equipment for radio specialty, of superior design, highly endorsed by expert; very advantageous proposition to party who can successfully market and finance distribution. Metal Crat Co., 432 East 71st St. Rhinelander 3362.

EXPERT MECHANIC builds mechanical and electrical models, conducts tests, investigations, experiments, makes working drawings. Ems, 519 East 32d St., Paterson, N. J.

METAL SPECIALTIES

Connecticut manufacturer of small metal specialties is open for suitable contracts on either model work or manufacturing. Address Manufacturer, P. O. Box 159, Thomaston, Conn.

LET US BE YOUR FACTORY

Do not use your funds to buy machinery and equip a plant; we have one of the most complete manufacturing plants in New York and broadest experience in designing and building dies, tools and automatic machinery for economical production; we will make you parts or build your entire device, and attend to packing and shipping if desired; you can use our facilities and experience profitably. Interstate Mechanical Laboratories, 521 West 57th St. Phone Columbus 5321.

Major Mott Gets WNP

MAJOR LAWRENCE MOTT, Avalon, California, among his other unique achievements, goes on record as the first Pacific Coast American amateur to get into communication with station WNP, Capt. MacMillan's arctic vessel "Bowdoin." He caught Operator Mix, of WNP, on his Grebe "13" receiving set and is very enthusiastic over the way it performs.

A telegram dated October 25 from Major Mott to A. H. Grebe & Co., Richmond Hill, N. Y., manufacturers of the "13" set, reads as follows:

"Copied MacMillan ship two hours last night on 'thirteen.' Took many messages and press reports. They are eleven degrees from Pole. All well. Heavy snow. Temperature below zero. Saw sun for last time yesterday. Easily work him on your splendid receiver. Am first American Pacific Coast station to hear him."

Again on November 19 Major Mott telegraphed the Grebe firm:

"Worked wireless North Pole directly for one hour this Sunday morning. Could read him on Western Electric speaker via your magnificent model thirteen."

The latest communication from Major Mott bears date of November 27 and piles up another record for him. It reads:



The Grebe "13" Receiving Set on which Major Mott got WNP

"Using Grebe 13 broke all speed records early today. Received message for Mix from Boyd Phelps station IHX, Hartford, Connecticut, direct. Transmitted direct to Mix and returned answer to Hartford in five minutes and six seconds. I insist upon hollering about it."

From California to Etah is 3,650 miles and from Hartford to California to Greenland 6,150 miles. The total distance out and back is 12,300 miles. Major Mott scarcely is to be blamed for his enthusiasm.

Radio World in London

RADIO WORLD has been meeting with a large sale among radio enthusiasts in England. Some of our London readers have asked where RADIO WORLD can be procured in London. Among the newsdealers where RADIO WORLD is kept regularly are the following:

R. C. Willis, 1 Green St., Leicester Square, W. C., London.

W. H. Smith & Son, George St., Richmond, Surrey, England.

W. H. Smith & Son, High St., Kensington, London, S. W.

Fox's Bookshop, 26 Aldgate, London E. C.

Fox's Bookshop, 18 New Kent Road, S. E.

W. H. Smith & Son, High St., Putney, S. W.

Willing & Co., Capthall Ave., London Wall, London, E. C.

Librarie Hackette, 34 Maiden Lane, London, W. C.

C. H. Greaves, 133 Clerkenwell Rd., London, E. C.

\$100,000,000 Saved by Christmas Clubs for Gifts—How Much for Radio?

THE Christmas Club, a corporation which extends a savings service to banks throughout the country, announces that the total Christmas savings of the people of the United States will this year amount to \$211,606,800, of which approximately \$100,000,000 will be spent in stores for Christmas presents. The remainder will be used for various other purposes, according to the past records of the Christmas Club.

This huge sum will be distributed by December 15 and in the hands of the people who will spend it.

How much of the \$100,000,000 can be attracted to the radio industry for the purchase of receiving sets, apparatus and parts? All efforts should be made to divert as large a proportion as possible to the radio field.

Allows Sharp Tuning

THE Amateur Radio Equipment Supply have placed on the market a coupler which is entirely different from other

As a helpful suggestion to this end RADIO WORLD sent the following telegram to E. F. McDonald, Jr., president of the National Association of Broadcasters:

"National banks report Christmas Clubs saved over one hundred million dollars for gifts. Will you communicate members your association suggesting broadcasting message that substantial part this sum can be spent advantageously on radio gifts? Great chance for direct appeal to potential radio buyers."

If it is found possible to carry out this idea, and it would seem perfectly feasible, a great impetus in radio buying undoubtedly will be energized.

More potential radio buyers and their friends can be reached quickly by broadcast radio messages than in any other way.

and a variable condenser coupling it back to the plate. The coupler also proved efficacious in the ordinary single, double and triple circuit receivers, by means of its screw-adjustment device.

Who Else Heard This Greeting to RADIO WORLD?

J. K. HOLLINGSHEAD, 91 Halstead J. Street, East Orange, N. J., was listening in on the night of November 27 during the trans-Atlantic tests and thought he heard the message, "Hello, Hello, New York! Greetings to RADIO WORLD!" Mr. Hollingshead would like to hear from anybody else who heard the same message. He thinks it was broadcast from Newcastle, England, but isn't sure. The message came to him about 10.15 p. m.

More Time to Submit Radio Dramas

THE radio drama prize competition, inaugurated by WGY, the General Electric Company station at Schenectady, N. Y., has been extended one month and will close December 31.

Many manuscripts have been received but so many requests have come in appealing for an extension of time to permit the completion of radio plays now in the writing that it was decided to give another month.

The object of the competition is to develop a type of play that is especially adapted to radio presentation, a type of play that tells its whole story through an appeal to the ear and the imagination, just as the screen play is directed exclusively to the eye.

A prize of \$500 is offered for the best original drama submitted under the terms of the competition. Additional prizes in varying sums up to \$100, depending on merit, will be awarded at the option of the General Electric Company for other plays deemed suitable for radio production. The director of WGY will be very glad to supply additional information on the contest.

What Do You Like Best in Radio World?

THERE must be some reason why you, with tens of thousands of other radioists throughout the country, are buying RADIO WORLD every seven days. The Editor is anxious to know what it is in our columns that pleases you most. Will you drop a line to him and let him know?—The Editor.

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. Qualify 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. 910, 4513 Ravenswood, CHICAGO



OUT OF THE ETHER

Chats About Broadcasting Stations

By Hirsch M. Kaplan

Morton Witkin, through WIP delivered a very interesting talk on "Things you ought to know about criminal law." His address not only interested those who have business connections with criminals, but also those interested in criminal life.

The West End Ladies Trio once more entertained us with their splendid musical program—this time through Station WJAR.

WBS and their regular Radiowl Concerts certainly do make a hit with me, for not only is the talent good, but there is variety to their programs.

Harry Wolfe, ivory tickler at Station WEAN, amused us with some popular Irish melodies.

The other evening we tuned in some one that reminded us of our club meetings. He started with, "In the name of the Nighthawks I now call this meeting to order. This is Station WDAF, the Nighthawks, Kansas City, Missouri. Everybody present? Glad to see that our orchestra is ready." Then he proceeded to announce the first number on the program for the evening. Gosh, but isn't this a grand and glorious way of making you feel at home with the rest of the world!

J. E. Hardenberg, managing editor of the City News Association, fascinated us with an inside story of news gathering.

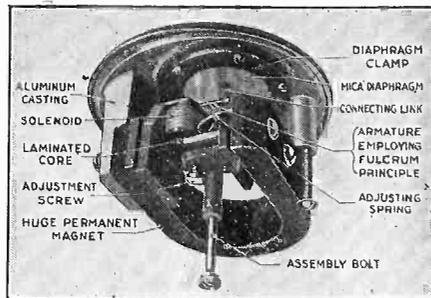
Little Miss Dorothy's song recital went over great. Due to her baby talk, she slurred many of the words, but her ability to carry a note was astonishing. She rendered her program from Station WOR.

We were entertained with a program of excellent band music as played by the General Staff Band of the Cuban Army under the direction of Capt. Torre. This excellent music was broadcasted by Station PWX. (Concluded on next page)

THE TRINITY LOUD SPEAKER

TYPE "A1"
21" FIBER
HORN
\$25.00

TYPE "B"
(For Phonographs)
\$12.50



INTERIOR CONSTRUCTION

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

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

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Atlas Loud Speaker re-PRODUCTIONS are absolutely true to the original. The patented "double diaphragm" responds to every vibration intensity. Adjustable to your set and particular receiving conditions. Ask your dealer for a demonstration.

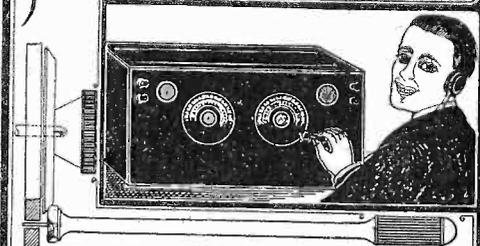
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ORANGE ST. RADIO DIVISION NEWARK, N. J.

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PATENT APPLIED FOR

OVERCOMES BODY CAPACITY

Gives micrometric adjustment outside the field of inductivity.

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

Due to increase in business activities, it has been found necessary to install two telephone trunk lines in the office of RADIO WORLD. These two trunk line numbers are Lackawanna 2063 and Lackawanna 6976. If one is busy, try the other.

Out of the Ether

(Concluded from preceding page)

Those interested in the art of selling may profit by tuning in B. J. Munchweller at Station WDAR, on Wednesday evenings at 7:45 P. M. and listen to his talks on "Salesmanship."

Radio fans can enjoy a real treat by tuning in Paul Specht and his Hotel Alamac Orchestra who will play from Station WJZ on Wednesday evenings for the next two weeks and on Saturday nights thereafter. What could be sweeter?

Much to our delight we tuned in Station WNAC, Boston, which was presenting to its radio audience the musical comedy, "Mary, Jane and McKane." I would suggest that they make the intermissions between the acts a little more interesting else we will be tempted to tune some one else in.

WEAF furnished the best bet for the week by broadcasting radio minstrels by members of the Central Lodge No. 361 Free and Accepted Masons. Yes sir, they sure did offer some variety. There were baritone, tenor and bass singing, zither artists, an orchestra, male quartet, colored songs, and oh, those endmen! They had my sides splitting from laughter.

KDKA broke through with the Million Dollar Orchestra playing from the Million Dollar Hotel, Pittsburgh. This orchestra sure did sound like a million dollars.

I couldn't recommend the Clover Garden Orchestra for the first division, but they could easily lead the second of my "Parade of the Best Orchestras." Suggest that the next time they leave the cornet at home. It has a bad effect on the "mike."



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ELECTRAD VARIOHM
 Each movement a definite new resistance. Positively does the work where others fail. Gradual resistance over entire range of ¼ to 10 megohms. Eliminates circuit noises, moisture proof, non-microphonic. At your dealers', or order direct.
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Accommodates Head Set and Loud Speaker or Two Head Sets — permitting instant choice of Five Circuits without removing plug or changing tips.

Price \$1.50

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MADE OF GENUINE BAKELITE
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G. E. WALKER CO., Inc.
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SLEEPER-MONOTROL
GRIMES INVERSE DUPLEX CIRCUIT
 One control—no aerial, no ground.
 Four tube set, \$140 Three tube set, \$115
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Write for our Monthly Bulletin of Radio Parts, etc., at greatly reduced prices.

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WD-11	\$3.50	UV-199	\$3.50
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UV-201	3.00	C-301A	3.50
C-300	2.75	UV-202	4.00
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Mail orders solicited and promptly attended to.
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 Clinton-Hill Station Newark, N. J.

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Tune in on station
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HEARST'S INTERNATIONAL

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Write for Free Copy of the Latest Radio Reprint E. It contains a complete story from Hearst's International Magazine. Address Radio Editor, Hearst's International Magazine, 119 West 40th Street, New York City.

Q

All You Want to Know about RADIO

Here is a Radio information mine. It can't grow old nor out-of-date. It grows with new Radio discoveries. It is in loose leaf form and every purchaser is a registered owner. Every month, by mail, you get in printed, finely illustrated, punched pages every new fact concerning Radio without extra charge. You buy the book **once**.

LEFAX PERPETUAL RADIO HANDBOOK

was written by and is added to each month by the authors, Dr. J. H. Dellinger and L. E. Whittemore, Chiefs of the Radio Laboratory, U. S. Bureau of Standards, Washington, D. C. You simply insert the pages instantly and easily in the handy pocket size, flexibly bound Lefax Handbook.

It is finely, accurately illustrated. It has linen index tabs. It is clearly, cleanly printed. It gives a full list of broadcasting stations with full information about them—and new ones as they are established. Lefax is a reference and instruction book that takes all the mystery out of Radio.

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Lefax, Incorporated, Publishers
 151 South Ninth St., Philadelphia

Radio Instruction for New York Police Reserves

An interesting development in the use of radio in the public service was contained in the announcement last week by Police Inspector General Charles H. McKinney, in charge of the Police Reserves, that 120 members of the reserves had formed a class to study radio.

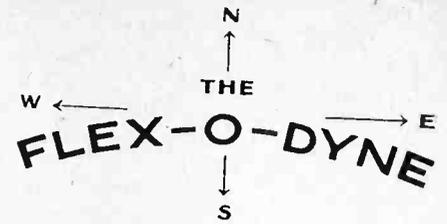
The purpose is to provide the Police Department with a system of wireless telegraph and telephone that may be used for co-ordinated communication to all parts of the city. Edward B. Craft, of the Western Electric Company, a Major in the Police Reserve, will act as instructor.

As soon as the pupils qualify they will be assigned to stations throughout the city and others will be instructed until a perfect system of wireless communication has been established in the territory covered by the New York City Police Department.

Here is a most interesting and valuable application of radio which undoubtedly could be used in many municipalities.

Blood Secured by Radio

A broadcast appeal for a subject for blood transfusion has resulted in a woman volunteer giving half a pint of her blood to another woman in a London hospital. The operation was successful.



THE RECEIVER YOU WILL EVENTUALLY BUY— WHY NOT NOW?



Conceded To Be The Set Without A Peer

NO ANTENNA NO LOOP

THE GUARANTEED TRANSCONTINENTAL RECEIVER

Receiving Los Angeles on a Loud Speaker in the Heart of New York

Without Any Outside Aerial or Loop

SOLD EXCLUSIVELY BY

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NEW ELECTRAD DIODE
Replaces crystal in all circuits. Overcomes difficulties with reflex work. Gives greater volume, greater selectivity and steadies the circuit. No adjustments for change of wave lengths. Real results. Absolutely guaranteed. At your dealers, or order direct. Socket 50c. ELECTRAD, Inc. 428-K Broadway New York

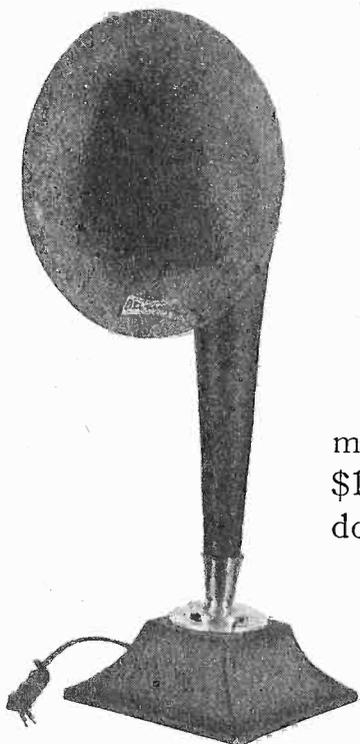
\$25 FOR \$10

By eliminating the profits of the distributor, the jobber and the dealer, we are enabled to give you this famous Speaker at a tremendous saving.

Direct from Factory to You

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Prepaid within 300 miles



THE ACOUSTICAL AMPLIFIER
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TRADE MARK

GUARANTEE

We guarantee to the publication carrying this advertisement that each and every speaker sold will be exactly as advertised.

Call at the factory, send us your money order or pay the postman \$10.00 C. O. D. delivered to your door. Try this speaker for ten days and if you are not entirely satisfied return the instrument to us and we will refund your money without question.

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BENSEL-BONIS CO., Inc., Dept. E

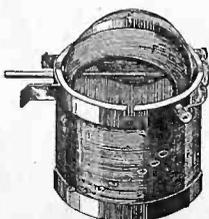
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THE IDEAL VARIO-COUPLER BRINGS IN DX AS CLEAR AS A BELL. MADE OF DARK RED MOULDED RADION. THE SUPREME INSULATION. DOUBLE SILK COVERED WIRE USED THROUGHOUT. ALL METAL PARTS NICKEL PLATED. WORKMANSHIP, MATERIAL AND PERFORMANCE GUARANTEED.

If you cannot secure one at your dealers send purchase price to us with your dealer's name and address.

BEL-TONE RADIO CO.

List Price \$6.00

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BROOKLYN, N. Y.

.00005 **FRESHMAN** NOISELESS TESTED MICA CONDENSER .008
MFG. BY CHAS. FRESHMAN CO. Inc. NEW YORK CITY
And all other capacities at good dealers.

Radio World mailed every Tuesday. \$6.00 year (52 numbers).

Seek Cause for Fading of Radio Signals

WHEN radio first was used for long distance communication it was noticed that signals were not transmitted as far during the day as during the night. It has also been observed that at night radio signals on the higher radio frequencies or shorter wave lengths vary greatly in intensity from minute to minute. Persons who receive broadcast concerts from distant stations have occasion to notice this variation in intensity of received signals since loud signals may be received from a given distant station at one moment only to disappear entirely for a few minutes and then recover their original intensity.

This and related phenomena have been recorded and various hypotheses have been brought forward in an attempt to explain them. The phenomena are dependent upon a large number of variable quantities such as the weather conditions, the nature of the country over which transmission occurs, the surroundings of the transmitting and receiving stations, and the method of handling the receiving apparatus. Only by a statistical study in which the results obtained simultaneously at a large number of receiving stations are collected and tabulated may reliable averages be obtained.

In an attempt to secure some worthwhile statistics of this kind, a co-operative study of radio signal fading was made by the Bureau of Standards and the American Radio Relay League during 1920 and 1921. In these tests from five to ten radio stations transmitted signals in succession on certain nights, according to prearranged schedules. The signals were received simultaneously by about one hundred receiving stations whose operators were provided with forms for recording the variations in the intensity of the signals as received.

Paper Scientific No. 476, of the Bureau of Standards, gives summary tables pointing out possible relationships between weather conditions and the fading and intensity of radio signals and the prevalence of strays or atmospheric disturbances. On account of the limited number of observations and the large number of factors which influence transmission, the statistical results can be considered as only tentative.

The general result of these tests, however, substantiates the theory that the sources or causes of fading are intimately associated with the conditions at the Heaviside surface, which is a conducting surface some sixty miles above the earth. Daytime transmission is largely carried

on by means of waves moving along the ground, while night transmission, especially for great distances and short waves, is by means of waves transmitted along the Heaviside surface. Waves at night are thus free from the absorption encountered in the daytime but are subject to great variations caused by irregularities of the ionized air at or near the Heaviside surface. These variations probably account for fading.

Copies of Scientific Paper No. 476 of the Bureau of Standards can be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., for ten cents, cash.

More Relay Records Broken

A NEW record of 12,300 miles in five minutes, six seconds flat for the round trip of a message and answer bids fair to establish a relay record for a long time. Boyd Phelps, 20-year-old amateur Radio Relay Leaguer, of Hartford, Connecticut, communicated with Major Lawrence Mott at Catalina Island direct, by means of CW, at 5:19. The message was shot to Donald Mix, of the MacMillan expedition, 760 miles from the North Pole and ten miles from Etah, Greenland. It was acknowledged and the Hartford operator had his . . . back at 5:24. From California to Etah is 3,650 miles and from Hartford to California to Greenland is 6,150 miles. The total out and back is, of course, double that, so the message traveled a distance of 12,300 miles in a three-man relay in five minutes and six seconds.

Minneapolis Amateurs Work Mix of WNP

TWO amateurs of Hennepin County, Minn., worked the MacMillian station WNP for long periods in direct two-way communication after listening to WNP and some of the Pacific Coast stations talking for some time. Cutting in at the end, Don C. Wallace (2ZT) and L. J. McKesson, another Minneapolis amateur, talked to WNP for another hour. Clear two-way transmission was kept up with but few repeats.

It is of interest to note that most of the amateurs owning CW sets are constantly striving to communicate with WNP, and the fact that more and more are getting there in messages to and from the isolated

expedition show what marvelous distances can be covered by low-power, high-frequency transmitters such as the amateurs use.

Radio Reaction

Little Jack Horner sat in a corner
Taking dad's wireless to bits,
But now he is grieving, for after "receiving,"
He's cautious whenever he sits!
T. H. H. in Columbiad.

Sterling

RECEIVING PHONE DE LUXE

A CHRISTMAS GIFT

— SURE TO PLEASE —

There is a Reason why STERLING PHONES Are Daily Being Considered the BEST Phones That Are Made.

The REASON: The Phone with the Stay Locked Adjustment.

\$6.00
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Entire Satisfaction or Money Refunded.

Try Your Dealer. If for any reason he cannot supply you, write direct.

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Loudest and Most Powerful Radio Crystal

DX-ALENA, the Sensational, Synthetic, Guaranteed Radio Crystal. Each Crystal tested on Broadcasting 50 miles distant. Fifty cents postpaid. Dealers should get our attractive proposition.

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

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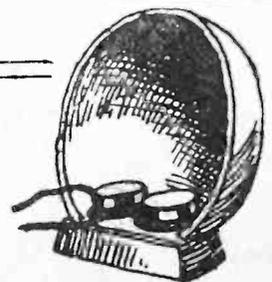
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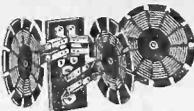
Newark, N. J.

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For best reception you need



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The finest short wave tuner on the market. Great for present broadcasts, local and DX. Used in all parts of the world. Certificate of merit from testing laboratories. Pamphlet on request.

L. W. GOODMAN, Mfr., Drexel Hill, Pa.

Cockaday Coil Set \$2.50

Including full size blue prints of panel layout, complete picture hookup, and fully illustrated instructions for construction and operation.

Coils are fully assembled, made exactly as specified by Mr. Cockaday, D coil bank wound. Far more efficient than any home-made coils.

Standard parts for this sensational circuit—panel, coils, condensers, verniers, variable resistance, vernier rheostat, socket, double jack, dials, switch, contact points, posts, busbar, wire, spaghetti, etc. (no tubes or phones).

Complete for \$11.65

Postage additional on all shipments. Send no Money. PAY THE POSTMAN

All Goods Shipped Parcel Post C. O. D.

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Defiance Mica Condensers



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TESTED PHONE COND.
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Whose Quality is Guaranteed.

Made in the full capacity. Mail orders filled.

.001	25c.	.0005	20c.
.002	30c.	.00025	20c.
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SHAMROCK CRYSTALS
Three in one. Galena, silicon and iron pyrites sold under a replacement guarantee. All tested. Price 50c. each

SINGLE CRYSTALS
Best Tested and Guaranteed

Defiance GALENA	25c.
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Defiance IRON PYRITES	30c.

All individually mounted and boxed. Special quotations on 1000 quantities.

All goods shipped C. O. D. or cash with order. Dealers write for discounts.

DEFIANCE LABORATORY
65-67 West Broadway New York City

Transatlantic Radio Tests Successful

THE recent tests of broadcasting in England and receiving in America, held during National Radio Week, showed that it is possible for the English stations to be heard in America. It is an established fact that the American stations are heard in England consistently, but few reports show that the English stations have been heard in America.

During the test, however, it was demonstrated that the broadcasting stations across the water could be heard if the American stations kept "off the air" for a sufficiently long period. The manner in which the tests were held was planned beforehand, and but for a few slips on the part of some of the more powerful stations in the middle and western states who did not keep to schedule and sign off during the period, it would have been entirely successful.

For the main listening the "Radio Broadcast" station at Garden City, Long Island, N. Y., was used, with various other listening posts up and down the coast. Special apparatus was used, consisting of powerful eight and ten tube super-heterodynes or multi-tube radio-frequency receivers. Arrangements were made to telegraph or telephone results from the outlying points to the Garden City listening post.

The first night of the test, eight official British Broadcasting Corporation stations and one unofficial station operating in Liverpool were logged between the hours of 10:00 and 10:30 p. m., Eastern Standard time. This period was chosen because darkness covers the ocean at that time and the best distance is possible.

Reports came in from several amateur stations that they had heard the words "Hello, Hello, America!" and parts of programs. These all checked up with the reports that came in from the official stations. Had not two or three of the American stations gone on the air before their specified waiting time was up, it is probable that reception could have been continued on all the stations during the entire program.

The listening was done on alternate evenings, England being given a test on Tuesday, Thursday and Saturday, and America reaching across on Monday, Wednesday and Friday.

The listening post at LCM, Stavanger, Norway, picked up the speech of Owen D. Young, given at WGY, Schenectady, N. Y., and the operator immediately got in touch with America advising the exact time the name of the speaker and other facts.

As Owen D. Young said in his speech, "radio is yet in its infancy," and before long Americans should be able to sit up and listen to their contemporaries in London, Manchester, Glasgow or Birmingham. This first test proves that it can be done.

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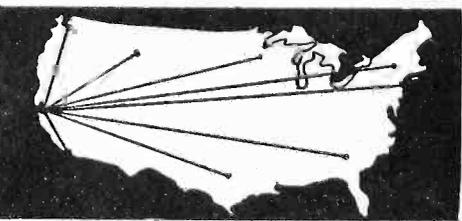
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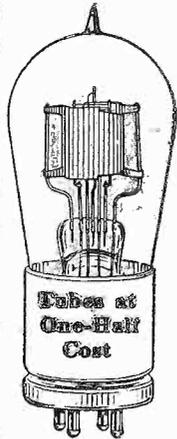
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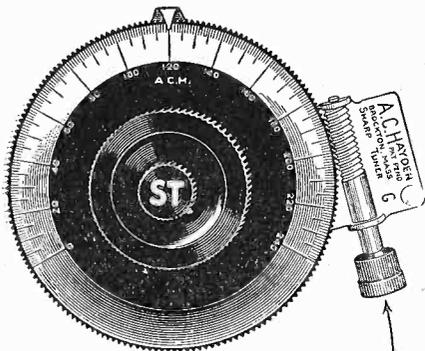


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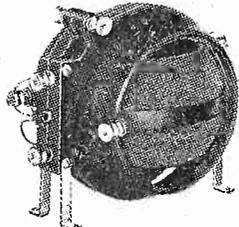
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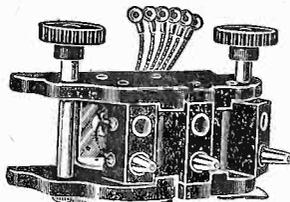
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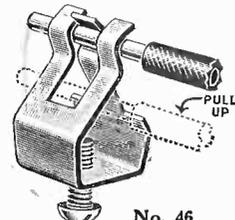
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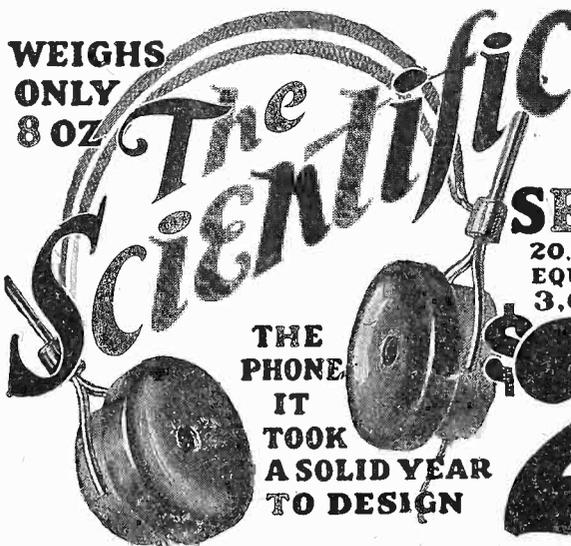


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Radio Saves Reporter

A SOMEWHAT tardy reporter, although it must be admitted, one with initiative, saved himself from being scooped on a local Capital story, through using his head and radio. He may have saved his head also.

It was Sunday. He had tickets to an entertaining matinee. He went intending to leave in time to make the trip to a big cathedral on the outskirts of Washington, get the speech of a celebrated divine, and return to the office to write his story for the morning. But he stayed so long at the theatre, he could not get to the cathedral in time, even with a taxi or an airplane.

Suddenly he recalled that WCAP was broadcasting the ceremonies and that there was a receiving set at the Press Club. He was saved. Rushing to the club, he tuned in and leisurely made notes during the discourse of the speaker. Later at the office he pounded out a neat half-column and went home, saved by radio, if the city editor doesn't find it out.

French Transmit on Three Foot Antenna

GEN. GUSTAVE FERRIE, director of the Eiffel Tower radio station, confirms the report that experiments held to prove that successful telephonic transmission could be carried out on a wave length of approximately six feet were successful. A three-foot antenna was used, and a distance of about two miles was covered with an antenna current of 80 milliamperes. Special tuning apparatus and tubes were used in this work. The scientists of this station have been working along these lines for some time and this successful experiment is the ultimate result of their first research work on extremely short wave lengths.

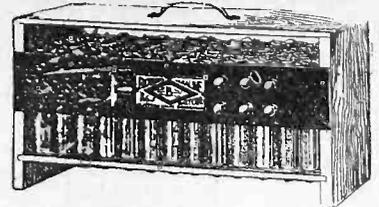
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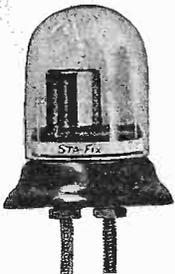
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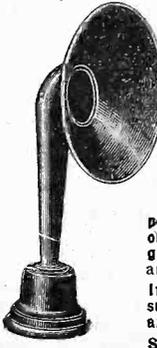
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Standing 21" high, with 11" bell and made of heavy metal, eliminating vibration, together with its special loud speaking unit, this speaker reproduces voice and music far beyond expectations. Finished in plain black or brown, also special alligator grain in black and green or black and crystalline.

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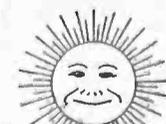
Lloyd George Aids Campaign With Radio
 ELECTION time drawing near in England, sees the Hon. David Lloyd George sweeping around England and Wales in a good old-fashioned American style election tour. In order to address as many people as possible in as short a time as possible so that he may travel from place to place fast, he has had arranged loud talking public address systems at various places along his route. He expects to show the politicians how to "sweep the country," American fashion.

WNP in Ideal Radio Location
 R EPORTS coming to the world from the MacMillan expedition to Jack Barnsley, Prince Rupert, B. C., show that the party is getting practically everything there is to be "got" in the way of radio. At the latest reports, the WNP station which is locked in the ice 760 miles from the North Pole, has copied the station at Hawaii, all of the big stations of the United States and Europe. Donald Mix, the operator of WNP, established communication with 6CEU, of Hawaii, on short wave CW. This is a distance of over 5,000 miles and is a record for such work. Instead of the loneliness of the long arctic nights, the MacMillan party are now "sitting on top of the world" and getting news from every part of it just as quickly as the people in the cities and towns. The terror of the far north has been conquered by radio.

WDAP Gets Real Credit for This One
 L ISTENERS who stay up late have no doubt heard WDAP'S latest method of signing off their musical programs. For the benefit of those who do not let a little thing like a good program keep them away from their beds, we will tell of a little trick that the Drake Hotel, Chicago, Radio Station WDAP is pulling these days.
 After the regular musical program is over, and just before giving the fans the weather forecast, they broadcast their own particular song, "This is W-D-A-P Chicago, Up on the Drake Hotel." It is one snappy song! The words are sensible, the music good, and it is a great way of signing off. More stations should follow this lead, and maybe some of those once-wonderful chimes would get a much needed rest. Besides that, the song idea sort of carries a "punch" that "puts the show over" in grand style, a sort of exit very gracefully idea.

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Better Tuning B-T
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GET THIS BOOK FREE

Tells you why and shows you how to tune your radio set. Explains wave length control, Reaction, Feed back, Filament control and many other features. Send us your dealer's name and stamped, self-addressed envelope and the book is yours.

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UV. 200, C. 300	2.90
UV. 201, C. 301	3.20
UV. 201A, C. 301A	3.85
UV. 199, C. 299	3.85
UV. 202, C. 302	4.25
DV6, \$3.25; DV6A	3.05

Complete line of the NEW AMERICAN Radio Tubes will be ready for delivery shortly. Particulars on request.

Burnt out or broken tubes repaired. Send tubes Parcel Post, prepaid. Returned prepaid when cash accompanies order, otherwise C. O. D. Our absolute guarantee of satisfaction with every tube.

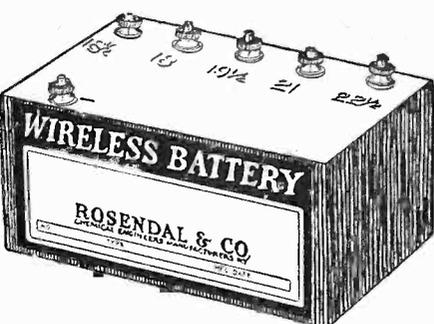
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Fresh "Lively" "B" Batteries

It is all important when buying a "B" Battery that you get it fresh—not one that's a month or two old. A Battery deteriorates whether it's being used or not and it stands to reason that a fresh Battery will last longer in your set.

A "Rosendal" is chock full of that electrical energy that makes a good battery, and it comes to you fresh—not a week old when you get it.

Guaranteed money back if you're not satisfied.



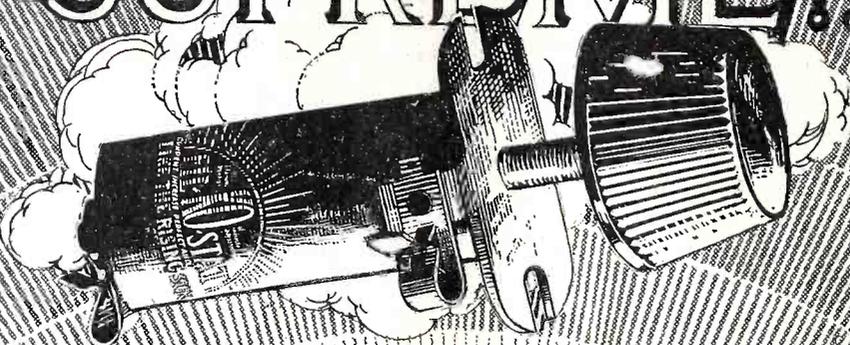
ROSENDAL & CO.
 Chemical and Radio Engineers
 2 and 4 Stone Street New York

Shipment prepaid at the following direct to consumer prices:

	Large	Medium	Small
22½ Volt Plain	\$1.66	\$1.33	\$0.93
22½ Volt Variable	1.84	1.50	1.00
45 Volt Plain	3.33	2.33
45 Volt Variable	3.66	2.66

Ask for Circular on other radio parts

SUPREME!!



FIL-KO-STAT

SUPREME because it was designed to be supreme! That's the secret of FIL-KO-STAT superiority. Built to permit *infinite* adjustment of electronic flow in the vacuum tube—whereas other devices were drafted into radio service because, before the FIL-KO-STAT, there was no real *filament* control.

Put a FIL-KO-STAT in your set to-day. The maker's guarantee *assures* your satisfaction—and FIL-KO-STAT satisfaction means noise shut out—distance brought in—stations you never heard before.

FIL-KO-STAT has no screws to tamper with—no adjustments to puzzle—no discs to break or chip—no wires. It is *not* a powdered carbon rheostat—FIL-KO-STAT resistance element is 70% metallic substance. Its full resistance is 30 Ohms—only *two* terminals and you use them for *all* tubes, including 5-watt transmitting tubes. Triple tested and adjusted in the laboratory to the ideal "off" position for any of them.

RADIO STORES CORPORATION

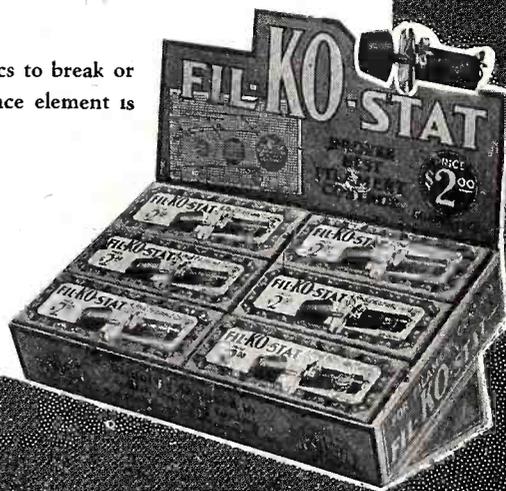
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