

Look at the New T up Circuit (See Inside)

15c. a Copy

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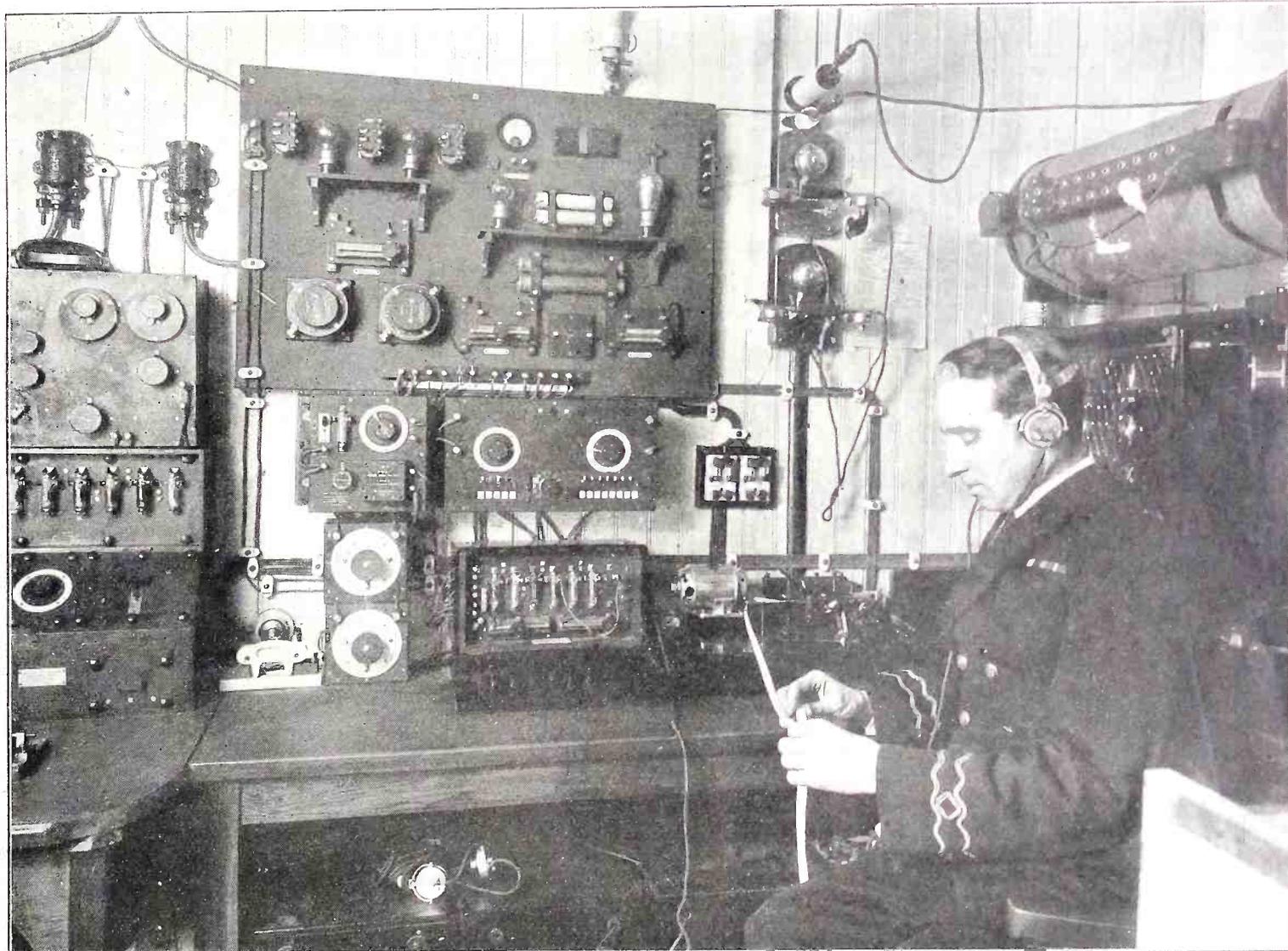
RADIO WORLD

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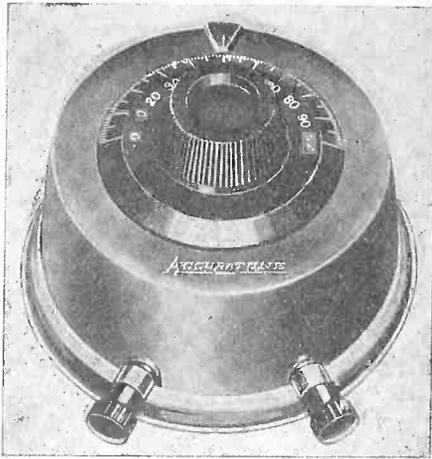


(C. Photonews, N. Y.)

One of the wireless officers of the S.S. "Majestic" receiving high speed radio signals at 80 words a minute from Paris, 800 miles distant. Press dispatches also were received aboard the ship from the station at Chatham, Mass. The new receiver affords secrecy of communication owing to the rapidity of the reception of dots and dashes.

Gen. Squier's New Telegraph Alphabet (See Inside)

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The Broadcasters-Composers-Producers Muddle

THE royalty drive directed from several vantage points at the broadcasting stations of the country goes on, aided by a lot of publicity for all hands. Everybody concerned, outside the radio field, seems to have developed an insatiable appetite for royalties.

George Schubel, executive secretary of the Radio Broadcasting Society of America, charged that the American Society of Composers, Authors and Publishers had cast a "funeral pall upon all broadcasting activities."

James J. Foley, president of the Society of Radio Artists and Audiences, an organization supplying talent for radio programs, declared the music writers had taken an "unpatriotic, unsportsmanlike and purely commercial attitude."

J. C. Rosenthal, secretary of the composers' organization, said: "It is going to be the absolute ruin of the music publishing industry if the radio men do not recognize our copyrights."

These developments followed the refusal of WJZ, Westinghouse station, to take out a license.

Officials of the Radio Broadcasting Society of America are quoted as saying that there was not a chance of their compromising.

Several radio clubs, who have remained anonymous up to date, have started a boycott and passed resolutions to the effect that "under no condition whatsoever shall any member for any reason buy any sheet music, phonograph records or piano rolls controlled by the American Society of Composers until they withdraw the fee laid upon the broadcasting stations of the country for broadcasting any of their compositions."

Arthur Hammerstein announced last week that the Producing Managers, New York City, have taken up the subject of radio broadcasting and have appointed a committee of which he is chairman to look into the subject of royalties for the use of compositions now current on the stage as radio material. "The sale of sheet music and records," he said, "is likely to be harmful to patronage since they are permanent fixtures in the home and are available for reproduction at any time. On the other hand, the broadcasting of the music through the air is a transitory operation that is calculated only to whet the appetites of those who hear it for more of the same."

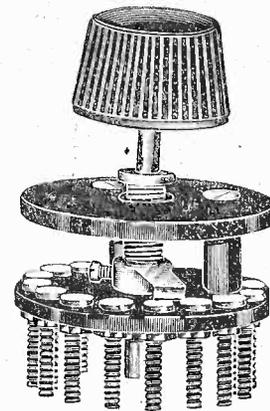
Representatives of 60 broadcasting stations from twelve states met at Chicago last week, organized the National Association of Broadcasters, and prepared to press an effort to prove their right to broadcast copyright music. Radio concerts, they assert, have been "dry" for the past few weeks because all the popular songs were barred. The broadcasters maintain they make no money but give the music much free advertising. They say they will carry the case to the Federal Supreme Court on this basis if necessary. Thorne Donnelly of Chicago was elected President of the organization.

To many anxious inquirers: **RADIO WORLD** has no free list. One copy is sent as a voucher to each advertiser or advertising agent represented in current issues. All other copies are paid for on subscription or through the news trade.

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RADIO BROADCASTING MAP

FOR the benefit of those interested in Radio and those who are becoming interested, Band McNally & Company have prepared a publication containing a wealth of information of greatest value. It shows in the most comprehensive way, the location of the broadcasting stations, gives their classification, the call letters, wave lengths, ownership, etc., of each.

The Band McNally Radio Map of United States is 28x50 inches in size. The locations of broadcasting stations are shown by distinctive symbols. The call letters of each station are given, also the wave lengths of each. The Radio Districts with numbers are shown in red and the Radio Relay Divisions are in blue. Time zones are included. Alphabetical lists of stations and alphabetical lists of call letters are in the margins. Convenient pocket form with cover.

Price 35c Each

THE COLUMBIA PRINT

1493 BROADWAY NEW YORK CITY

RADIO WORLD

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

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May 5, 1923

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The Convenient Multi-Jack—How to Make it

By Arthur S. Gordon

SOME amateurs exercise all degrees of ingenuity when it comes to fastening the cord tips of two or more head phones together. Most of them, however, are content with a makeshift arrangement which must be disturbed every time an extra pair of phones is inserted in the hookup, while others are always at odds for a short piece of wire with which to make a temporary splice. If they are lucky, the splice will hold good for the evening, but experience demonstrates that this rarely happens. The usual result is that one of the listeners suddenly finds himself

They may be made to accommodate three or four headsets, or even five, if it has been found by experience that your set will operate that number.

Two designs are shown, one for the convenience of amateurs who do not employ jacks and plugs, and the other for those who do. The first design (Fig. 1) shows a piece of bakelite or panel material of any kind $1\frac{1}{2}$ inches by $4\frac{1}{2}$ inches, upon which are mounted four single circuit jacks. The jacks are connected in series, and come in the circuit from left to right. That is to say, unless a pair of phones is plugged in on jack

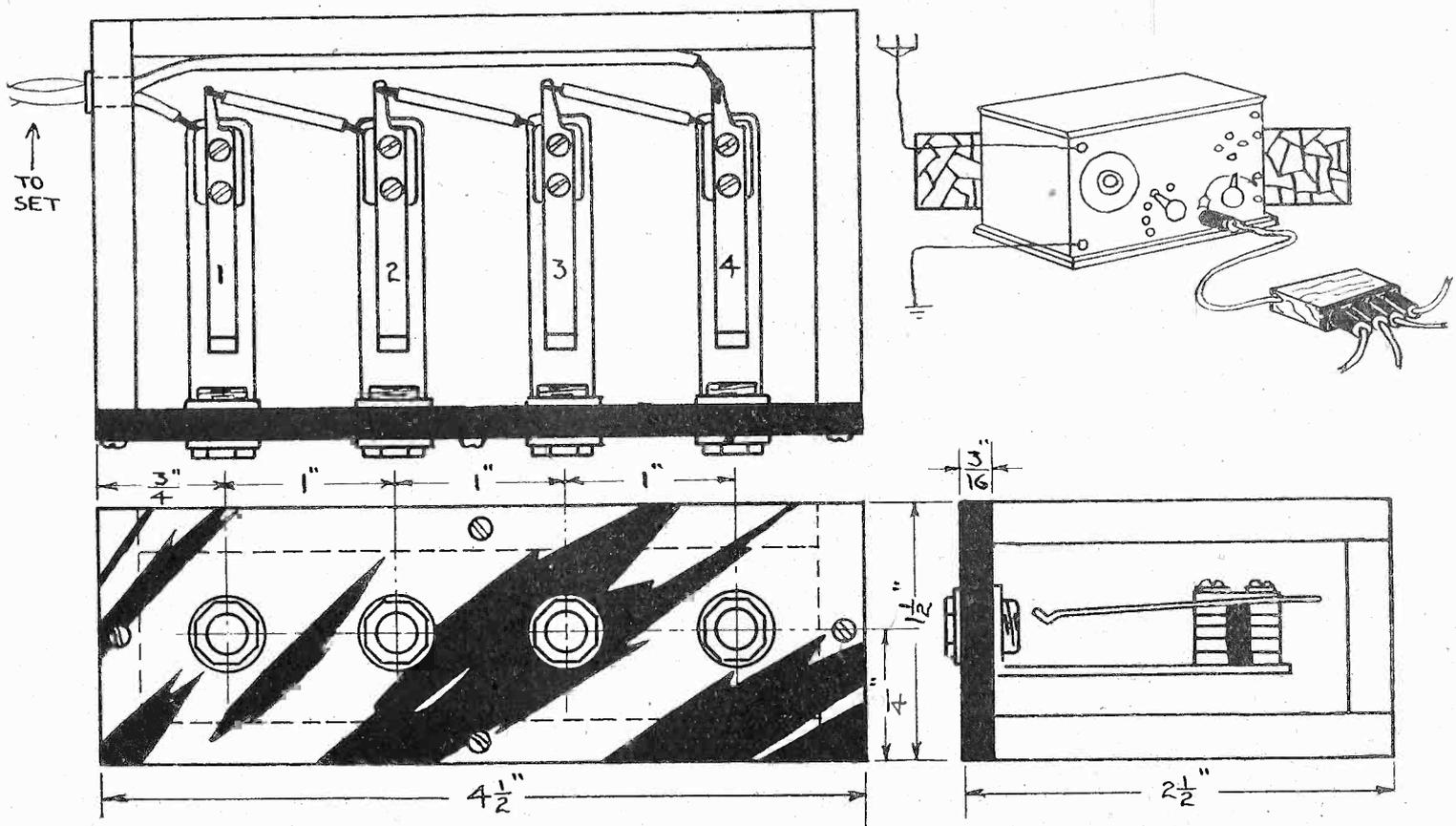


Fig. 1. Layout for making a multi-jack to accommodate four headsets.

cut off from the concert, or all the listeners are annoyed with heavy and constant clicking of which there seems to be no explanation. The need for perfect connections where all the phones are joined together is just as imperative as the same need elsewhere in the circuit. To insure these connections, and to lessen the trouble oftentimes experienced, the multi-jack arrangements described in this article are presented for construction.

The devices can be very easily put together from standard parts, with very little workbench experience.

No. 1, jack No. 2 is inoperative. Both these jacks must be occupied before No. 3 becomes operative, and so on.

All the connections are soldered and the whole instrument is enclosed in a neat polished wood box. The leads are brought out through a hole in one end of the box, and are fastened at the other end to a plug, which is used in the set proper as though attached to a single pair of head phones instead of to a multi-jack. Lamp cord is excellent wire for this connection, and it need not be very long.

(Continued on next page)

New Wave Lengths For Class A Stations

By Carl H. Butman

WASHINGTON, D. C.—Six Class A stations, the first of the newly classified broadcasters, were licensed during the past week by the Radio Section of the Department of Commerce. Texas, Oklahoma, Illinois, Pennsylvania, Louisiana and Indiana each received one station with a wave length exclusive for its respective district.

From the schedule of wave lengths for Class A stations, printed below, it will be seen that at least twenty distinct wave lengths in each of the nine radio districts are available for distribution by the local inspectors. Three or four wave lengths in each district will be reserved for the best of the local stations of this class, these waves not being assigned to stations in the immediately adjoining districts. This gives the better of the A broadcasters a partially exclusive transmitting wave. For example, the wave length 222 meters may be assigned to stations only in the 4th, 5th and 8th districts; similarly, the wave of 233 meters will be authorized for use only in the 2d, 5th and 7th districts, while waves 224, 226, 229, etc., in column two, will be allocated in every district. This plan, it is believed, will tend to prevent considerable local interference, and create virtually an "A-1" class of stations within the general A class.

District radio supervisors, as they are called, are assigning Class A waves now, but the transfer of B stations from 400 meters will not be made until noon on May 15.

In the distribution of 582 broadcasters by districts on April 1, the 9th, the largest, including the states of Indiana, Kentucky, Wisconsin, Illinois, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas, Colorado and the upper part of Michigan, is seen to be in the lead with 190 stations, followed by the 8th, which includes lower part of Michigan, Ohio, West Virginia, and largest parts of New York and Pennsylvania.

The distribution of broadcasting stations in the Nine Radio Districts as of April 1, 1923, is as follows:

Dist.	1	2	3	4	5	6	7	8	9
Class A...	27	19	37	31	65	63	56	71	183—Total 552

Class B...	1	5	4	2	3	4	1	3	7—Total 30
Total	28	24	41	33	68	67	57	74	190—Total 582

Most of the stations designated here as A are now operating on the wave length of 360 meters, but will be placed in Class C on May 15 if they desire to continue on 360 meters.

Class A Broadcasting Wave Lengths

All Dists.				All Dists.			
Frequency.	Wave Lgths.	Dists.	Frequency.	Wave Lgths.	Dists.	Frequency.	Wave Lgths.
1350 kc/s	222	(4-5-8)	1190 kc/s	252			
1340	224		1180	254			
1330	226		1170	256	(1-3-6)		
1320		227 (1-6-9)	1160	258			
1310	229		1150	261			
1300	230		1140	263	(2-5-7)		
1290		233 (2-5-7)	1130	266			
1280	234		1120	268			
1270	236		1110	270	(4-7-8)		
1260		238 (1-3-6)	1100	273			
1250	240		1090	275			
1240	242		1080	278	(1-6-9)		
1230		244 (2-4-9)	1070	280			
1220	246		1060	283			
1210	248		1050	286	(3-8-9)		

Six New Class A Broadcasters Licensed

Call Station	Frequency kc/s	Wave Lengths Meters	Power Watts
KFFZ Al. G. Barnes Amusement Co., Dallas, Texas.....	1330	226	20
KFGD Chicakasha Radio & Electrical Co., Chickasha, Okla.	1210	248	20
WABA Lake Forest College, Lake Forest, Ill.....	1130	266	100
WABB Lawrence, Dr. John B., Harrisburg, Pa.	1130	266	10
KFFY Pincus & Murphy, Inc., Alexandria, La.	1100	275	100
WRAF Radio Club, Inc., Laporte, Ind.	1340	224	10

The above stations were licensed during the week ending April 20, 1923, by the Department of Commerce and will start transmitting on their respective lengths at once.

(Concluded from preceding page)

The second design (Fig. 2) is for use with cord tips only. Amateurs who prefer plugs, of course, cannot use this device. It consists of a bakelite strip one inch wide by 5 3/8 inches long, with two end pieces (made either of wood or bakelite) screwed or bolted

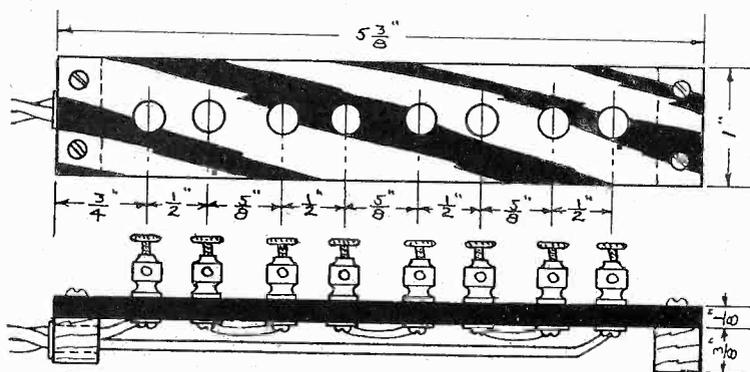


Fig. 2. Design for a multi-jack to use with cord tips only.

on. Standing upright upon this strip are eight binding posts, set apart in four units of two binding posts each.

The connections are made as indicated in the drawing, and terminate either in cord tips or in a plug. Perhaps this second design, with its leads fitted to a plug, is the more economical if not the neater of the two multi-jacks submitted. Amateurs who build either of these devices will find their time and money repaid in a very short time by greater convenience and less annoyance.

The multi-jack may be fastened either to the table or not, according to the wishes of the builder. It is better, perhaps, as a loose instrument, for often on a crowded operating table it can hang down below the table top where it will take up no room and yet is easy to get at.

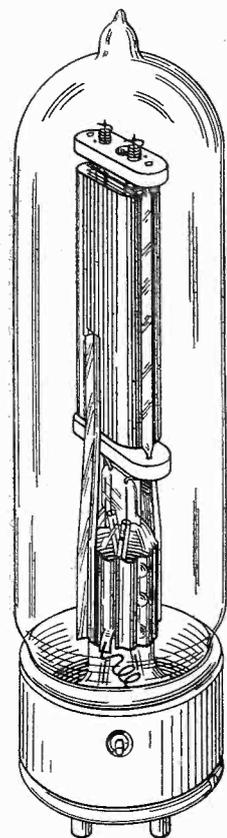
The paramount advantage of the multi-jack is the ease with which a pair of phones may be inserted into a radio circuit or withdrawn from that circuit. Incidentally the cord tips of the phones do not become frayed from constant binding, and there is a noticeable increase in all around efficiency and convenience. For the amateur who constantly keeps two or three and sometimes four headsets in the circuit, this device is indispensable.

WHAZ, Rensselaer Polytechnic Station, Broadcasts Both Entertainment and Instruction

ONE of the radio broadcasting plants which has established many enviable records is WHAZ, the radio station at Rensselaer Polytechnic Institute, Troy, New York.

The equipment was installed primarily as a part of the lecture and laboratory equipment in the course in communication engineering which is given at the institute, and was not primarily meant for the regular broadcasting work as it is utilized today. The apparatus had been installed in units, in such a manner that each could be adjusted and corrected as a separate unit, without relying upon any of the other apparatus. When this apparatus was originally installed it was found that with small additional cost, it would be possible to combine both the regular routine work and public broadcasting. This course was determined upon.

When the first actual program for this station was pro-



(C. Western Electric)

Figs. 1 and 2. On the left is shown a 50-watt tube such as is used on the transmitter at WHAZ. The condenser-microphone, shown on the right, is one of the latest developments in the field of microphones, embodying the carbon-disc or grain principle.



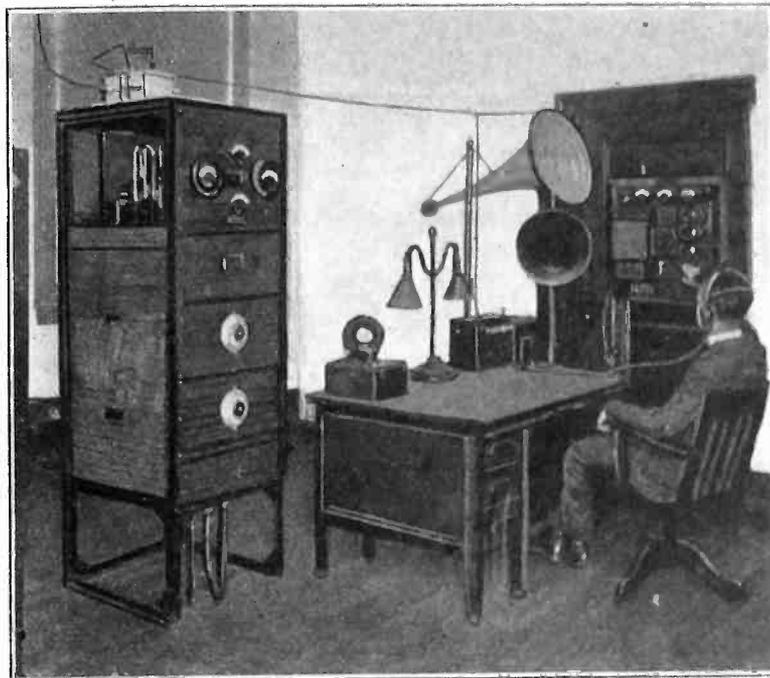
posed, it was the intention of the operators to use mechanical music, such as player pianos and victrolas, but the demand was found to be so great for really interesting programs, that a regular broadcasting schedule was laid out and programs similar to the other stations were promulgated. The original purpose of the station was to test fading and directional effects and this was carried on by means of outside reports with the aid of many thousands of listeners as well as the occasional research expeditions of the students and professors.

The broadcasting apparatus consists of a Western Electric 500-watt transmitter and receiver for monitoring purposes, a regulation spark transmitter, a continuous wave Colpitts oscillator circuit transmitter, which is used as a small power telephone transmitter for short work and also as an instructional set for experiments in the laboratory.

This station has been heard in Lakeport, California, a distance of 2,500 miles air line, which is somewhat of a

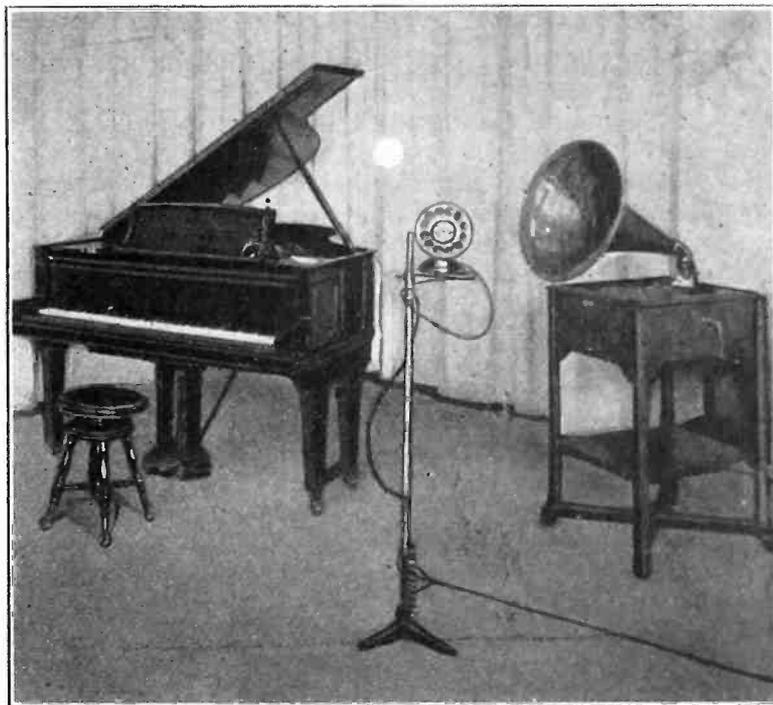
record for a station that started out as an educational feature of this most up-to-date institution. For this last reason it is somewhat different from the usual broadcasting station, as it is used not only for the purpose of entertainment for the outside world but also as a means of practical instruction in this latest of arts, the theory of which is studied as a part of the college routine.

When the station was first opened it was decided to



(C. Western Electric)

Fig. 3. Control room of Station WHAZ. The transmitter is shown on the extreme left and the speech modulating and amplifying apparatus on the right. The operator listens in continually to check up on the transmitted signals.



(C. Western Electric)

Fig. 4. The studio at Station WHAZ. Heavy draperies and carpets are used to deaden the room because of the propensity of the sensitive microphone to pick up outside noises.

run test programs on the second Monday of each month; but after serious thought, and in cooperation with the popular desire, it was found necessary to put on a regular program, utilizing student talent in the form of orchestras, glee clubs, lectures and general information, such as might

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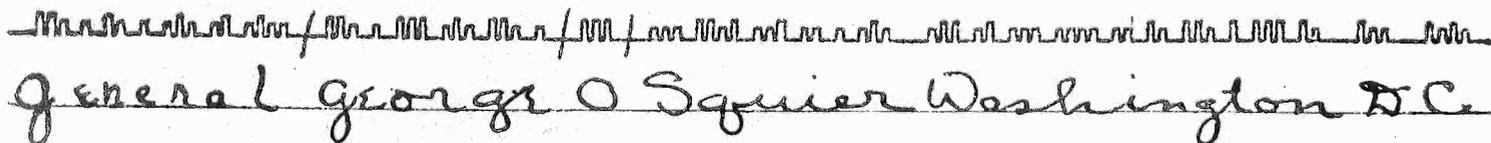
Gen. Squier Invents New Alphabet for Radio Telegraph and Cable

Will Increase Transmitting Speed Nearly Three Times

WASHINGTON, D. C., April 25, 1923.—A new telegraph alphabet for use in radio telegraph and cable in all languages has just been given to the world by Maj. Gen. George O. Squier, Chief Signal Officer of the Army and one of America's most prolific electrical communication inventors. With his new code system a speed 2.65 times the present transmitting rate can be achieved, and it is easier to "tune to."

The first presentation of this new "universal" code was made yesterday afternoon by the General in a speech before the National Academy of Sciences in Washington.

The present telegraph alphabet was invented by Professor Morse in 1844 before the telephone, alternating arc or radio transmission, and yet, with advances in nearly every other phase of communication we have continued to use the same alphabet which, it was pointed out by General Squier does not fit. It was for this reason that General Squier "redesigned" the 80-year-old alphabet for 1923 use. In the old alphabet the dots, dashes and spaces required different time for transmission, whereas the new plan provides for sending each in the same space of time. In his system in alternating current, no consecutive signals



Sample record of telegraph message as recorded by General Squier's new alphabet.

It now appears that the code used for almost 80 years will be superseded throughout the world with a gain of over 150 per cent in speed.

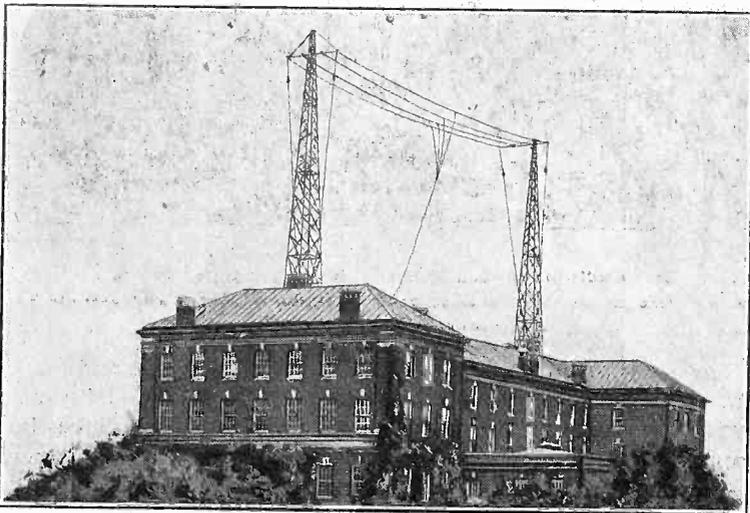
Briefly, General Squier proposes to vary the amplification or intensity of each half cycle of alternating current to send a dot, space or dash each of which require the same time of transmission. The signals are distinguished in receiving by the three different amplitudes, one each for the dot, dash and space. Six permutations are possible with the three intensities; one arrangement being to represent the dot with a certain intensity, the dash with a larger one and the space with a smaller amplification. The method tried successfully by General Squier in the Signal Corps laboratories was with the dash the largest, the dot intermediate and the space the smallest. Other methods will be tried, however, and a better arrangement may be found.

The system has been studied by radio experts of the Army and Navy who, it is reported, find no "bugs" in it; on the contrary they see added efficiency, and decreased interference. It is the plan of the inventor to submit the system to the next International Technical Conference of Telegraphy, with a suggestion for unification of all codes, radio, wire and cable, using the same system of modulation for the signals.

are of the same sign, but different amplitudes. In Morse such letters as S and H required three or four signals of the same sign and were not as legible as the signs for the letters A and N where no two signs were alike, they being composed of dots and dashes. The several letters of the old alphabet did not have the same legibility and the whole alphabet was slowed down by the "slow" letters to their speed. This defect has cost the world hundreds of thousands of dollars in transmitting costs, it is estimated.

In forming the new alphabet, the letters used most frequently, like the vowels, were assigned short signals. In the old alphabet O the second important letter in English, next to E in use, was one of the worst and longest to send, being composed of three dashes, requiring 11 units of time, counting dashes and spaces. General Squier sends this important letter in four units, nearly three times as fast. We should have designed our alphabet before we designed the transmitting apparatus it is now thought, whereas we worked backwards.

The new alphabet is easier to learn, it is said, and will be of international value, being applicable to all languages. The increased use of the printing telegraph makes it even more valuable. It will tend to reduce interference as well as atmospheric through the ability of receiving stations to tune in both high and low frequencies, experts believe.



(C. Western Electric)

Antenna equipment of Radio Broadcasting Station WHAZ.

(Concluded from preceding page)

be found interesting to outside listeners. These first programs awakened such a decided interest throughout the entire country that it was definitely decided to continue the programs and even enlarge them to meet the popular idea and demand. This has been done and several of the original features of the station have been changed to accommodate the public.

Probably one of the most novel features of this college station is the fifteen-minute talk every Monday evening on an educational subject, such as might prove helpful and interesting to the radiophone listeners.

At the time of the reception of this station in California, a fan was giving a radio party to the brotherhood of his church. There were 150 present, the great majority of whom had never "listened in." The reception from this particular station was amplified by a Western Electric loud speaker in connection with a power amplifier, and the entire program was audible from start to finish, in the 50x90 hall, in which the California party had gathered.

"PWX Is Easy Using This Circuit and One Tube"

The Stockelberg "Pup" Circuit

By Robert L. Dougherty

IN these trying times when every "ham" who owns a receiver nearly breaks his neck—or his set—to get distance so many circuits pop up that it is impossible to even keep track of them, much less give them more than a cursory trial, before something else jumps up and demands to be tried out.

A circuit recently perfected by Mr. Stockelberg, a prominent Boston amateur, is so simple to construct and easy to work (it has only one control) that it is a crime for even the most hardened fan to pass it by without giving it a trial. And if he just gives it a trial he will be convinced that it is "a real circuit."

The arrangement is described as a reversed Hartley circuit, which is an adapted Armstrong single circuit

The tuning is accomplished by the 21 plate condenser which is located in the antenna circuit. This is the one and only tuning control and, for best results, should have a vernier button on the panel of the type that sets outside the periphery of the dial. The

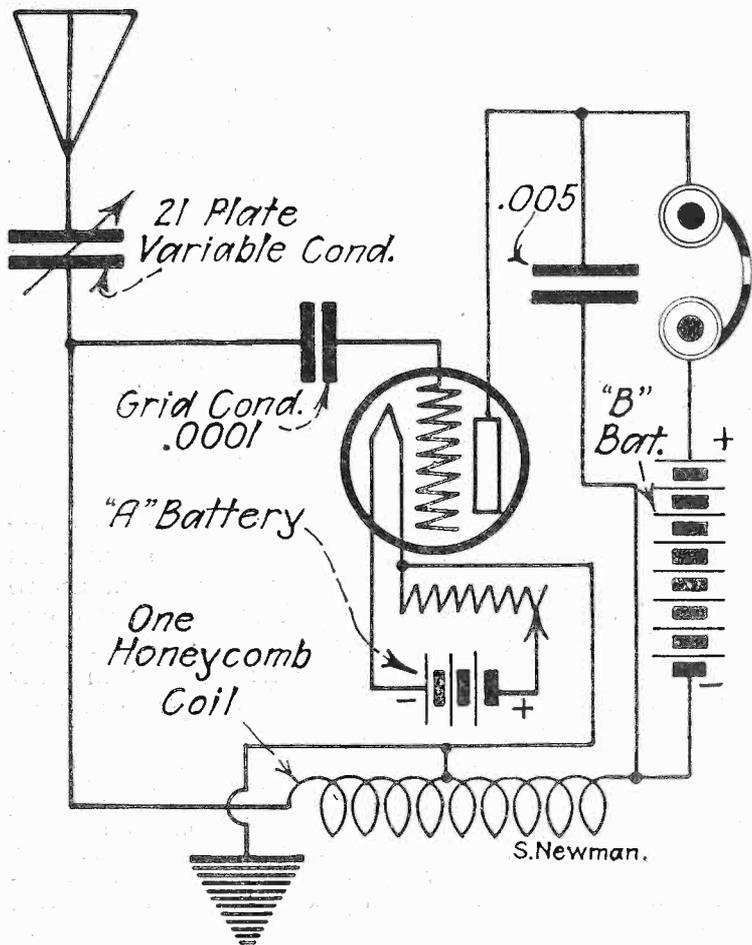


Fig. 1. The "Pup" circuit. Note that the honeycomb coil is tapped. The correct point for this tapping is explained in the text.

with several improvements which make it surprisingly selective and wonderfully sensitive. As can be seen from the diagram, a D-L 75 honeycomb coil is used. In the drawing it appears to be tapped in the center, but such is not the case. It should be tapped at about the twelfth turn, in a 75-turn coil and about the eighth or ninth turn in a 50-turn coil. It is not necessary to use the same size coil, as coils up to 150 can be used, tapping them about two-thirds of the way, as this seems to be the governing factor in the circuit. A little experimentation in that way will determine the best point, as when it is once discovered it does not have to be changed, and the lead can then be soldered on.

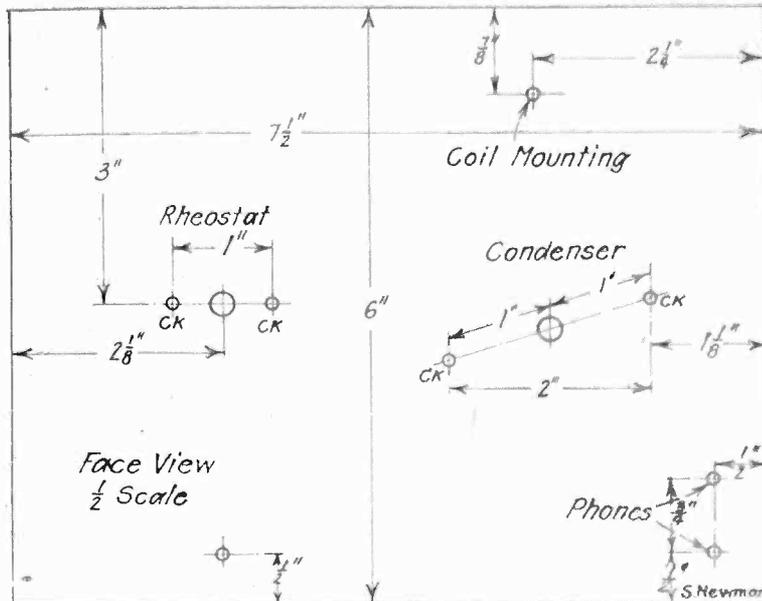


Fig. 2. Panel layout with all measurements. The panel is small, because the apparatus is arranged to take up little space, and there is only one control.

panel for reasons well known to anyone who has used a single regenerative circuit should be well shielded with either tin or copper foil, taking care that it does not short any of the leads. In order to eliminate any

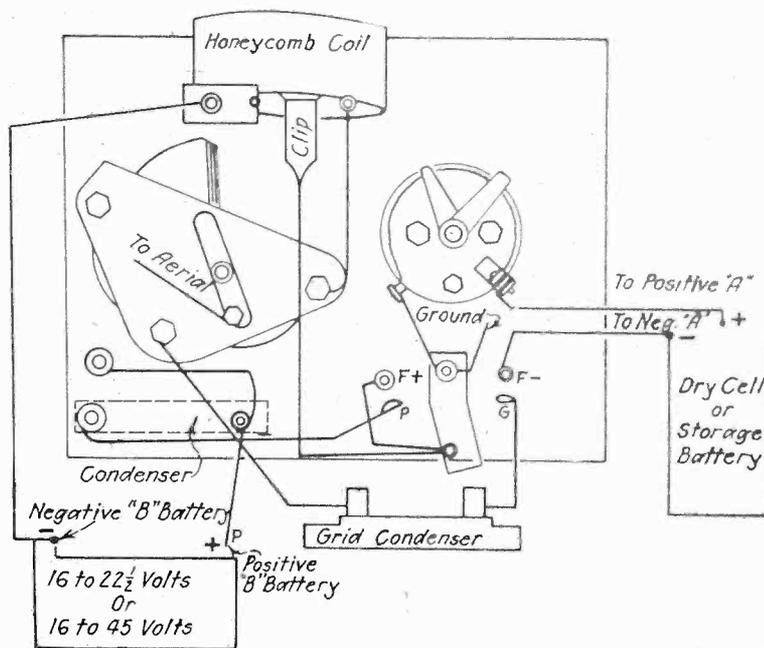


Fig. 3. How the apparatus should be mounted on the back of the panel with wiring diagram repeated for the benefit of those wanting to know how to arrange wiring.

other trouble, connect the rotor side of the variable to the antenna side of the circuit when hooking up. The elements needed for this new and popular circuit (Continued on page 10)

Radio and the Woman

By Crystal D. Tector

A VERY good friend of ours who recently acquired a reflex loop set wanted to take it across town to her mother, who is very ill, and unable to get out of bed. Not having a car, she put it in the perambulator and then, to assure herself that it was not broken, she turned on the tubes and of course was gratified to hear it working. The loop she stuck on top of the hood, after first turning the hood down. She had gone about a block when the set jugged and the battery made connection and started talking. As luck would have it she was at that time just outside a school and all the kiddies, who were going home, stopped, looked, listened, and started in to follow her, begging her to turn it on again. Some grown-ups seeing the crowd of boys following, sheep-like, followed too, just bursting with curiosity and begging her to turn it on. She became so embarrassed she said she felt that her face must have been burning up and she almost started to cry, when one woman approached her and said: "My, my, isn't that a novel way of advertising radio? My dear, will you bring one like that around to my house tonight? Maybe John will buy one, when you demonstrate it." She said she was never so embarrassed in all her life, but when she visited the woman and explained, the woman asked her if she didn't think it would be a good idea to equip some perambulators like that and try and sell radio sets by that sort of demonstration. Well, all I think is that some people just fall into luck.

* * *

Friend Husband brought a very distinguished Japanese student home the other evening and told me that he was studying law in his office, preparatory to taking a course in international law at one of the big universities. Of course we showed him our radio and to our surprise, he started in to tell us how far advanced his own country is in that particular line, saying that his father had endowed a college in Tokio for the express purpose of radio research work. He talked very interestingly for some time. I had thought that Americans were the only people who knew anything of importance connected with radio, until I met him. He actually talked like a college professor, warming up to a lecture on advanced science before a class of post-graduates. He was worth hearing.

Radiograms

WOAW, the new \$55,000 radio station of the Woodmen of the World, is broadcasting regularly from the roof of the nineteen-story W. O. W. building in Omaha, Neb.

* * *

The telegraphers' unions are discussing the possibility of establishing a "Morse Day" throughout the United States on which to honor the inventor of the telegraph and have suggested that the day be April 27.

* * *

George Hill Lewis, assistant to Powel Crosley, Jr., president of the Crosley Manufacturing Company, Cincinnati, home of radio broadcasting station WLW, is the owner of the first government license issued to a wireless operator. It was granted to Mr. Lewis in 1911.

* * *

The appointment of George K. Burgess as Director of the Bureau of Standards has been announced by Secretary Hoover, after a conference with President Harding. Mr. Burgess has been Chief Physicist of the Bureau and will succeed Dr. S. W. Stratton, who resigned several months ago to become President of the Massachusetts Institute of Technology.

Wouldn't it be grand if you could actually call up your favorite broadcasting station and ask to have your request number played? And also, wouldn't it be grander yet if the bootleg tubes would work as well as the regulars—or last half as long?

* * *

I notice in all the pictures I see of broadcasting studios that the singers and actors appear in costume. This puzzled me at first. What does it matter what they wear as long as their audiences can't see them? I have decided, however, that actors and singers are so accustomed by long training to "dress the part" that they might not do as well if they failed to wear costume. In this case, at least, "atmospherics" are a good thing.

* * *

The other day I read where a woman was suing her husband for a separation, charging cruelty. Her contention was that he came home, ate his supper, rushed up to the garret where he had a radio set and sat three until all hours of the morning. She said that she had forgotten that she had a husband at all, except when she had to wake him up in the morning. Well, I cut the piece out of the paper and laid it alongside of F. H.'s place so that he would see it when he came home for supper. He walked in and was all beaming, as he told me that I ought to have heard the story that one of the fellows told him in the train, coming home. It was the same story that I had cut out of the evening paper. "It's too bad that that poor Gump didn't think quick enough when he was putting in his set, to put it in the parlor, so that his 'disgusted darling' would have gotten the bug and been as interested as he was." Well, all I can say is that some men have brains and others just part their hair.

* * *

Don't you think that she is foolish? I do. I think that if I had been in her place, I would have done one of two things. I would have invited him to bring his set downstairs, or else I would have climbed up to the garret with him, and when the steam went down I would have shivered so much that he would have taken compassion on me—if radio leaves that in your system—and gone downstairs.

Experiments made by Nebraska Wesleyan University based on thunderstorm reports furnished by the Weather Bureau are reported to lead to the conclusion that there is no relation between barometric pressure and audibility. A nearby thunderstorm area tends to reduce the audibility at the receiving station.

* * *

WSY, the broadcasting station of the Alabama Power Company, at Birmingham, Ala., sends out return postal cards with a request for comments by those who have picked up features on its programs. Over 1,000 letters were received from every State in the Union praising the singing of the male quartette of Tuskegee Institute, broadcast by WSY.

* * *

Dr. Schuyler Skaats Wheeler, inventor, engineer and physicist and President of the Crocker-Wheeler Company of New York and Ampere, N. J., died suddenly at his home in New York City on April 20. Dr. Wheeler was famous for his inventions of electric appliances, drives and motors. He was the designer of the "C. & C." motor, the first manufactured small motor for practical power work in the world. Dr. Wheeler was the organizer and founder of the United Engineering Society. He bought in Europe and brought to this country the Latimer Clark library, the largest collection of rare electrical books in existence, and presented it to the American Institute of Electrical Engineers, of which he was a past president.

Elementary Instruction for the New Army of Radio Beginners

Constantly Used Terms Explained
in Simple Language for
the New Radio
Enthusiast

By Lynn Brooks

TUBE-DETECTOR: A rectifier which depends upon the theory that a heated filament in an enclosed exhausted space, will emit negative electrons. These detectors, or tubes, contain three elements—a plate, grid and filament. In short the theory is as follows: A positive charge is put upon the plate by means of a high voltage battery connected to it. The negative electrons emitted from the filament will, by nature, follow a path across the grid to the plate. This grid is alternately negatively and positively charged, by means of the condenser in the grid circuit. When it is negatively charged, it forms a screen to the electrons emitted from the filament because negative poles reject or repel each other. When this condition exists in the tube, no signals will be heard in the phones. The condenser when positively charged, changes the polarity of the grid to positive which allows the electrons to pass and carry one-half of the cycle over to the plate, causing signals to be heard on the phones.

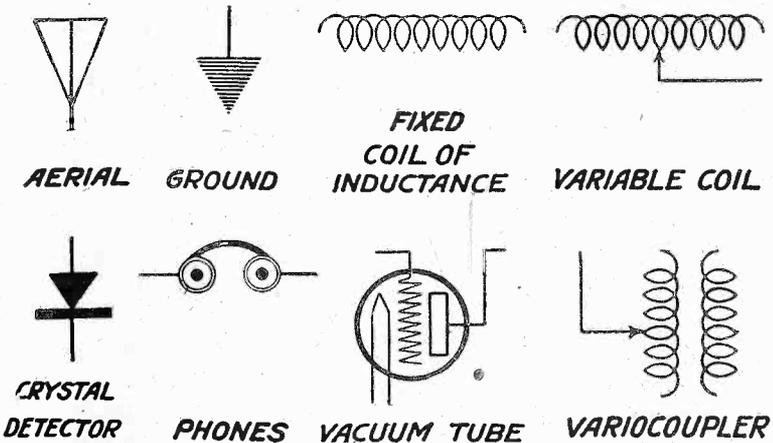
PLATE: One of the elements in the tube detector. Generally it entirely encloses the other two elements of the tube. It is made of nickel composition. In small power tubes and detector tubes there is no oxide on this plate, but in the larger tubes handling currents up to 1,000 watts the plates are coated with an oxide.

GRID: A spiral wire enclosing the filament and situated between the filament and the plate, acting as a gate to allow the electrons to flow, or stopping the flow, depending upon the condition of its polarity.

FILAMENT: A fine tantalum, tungsten, or platinum wire which is heated by means of a battery. In the old style tubes these filaments are not coated; but in the latest models both the 6-volt and the 1½-volt tubes have an oxide coated filament which does not need to be heated to extreme incandescence in order to operate the tube at its maximum. Some of them operate at such a low tempera-

ture that the filament is not brought beyond a very faint cherry red glow. This is because in coating the filament with an oxide a greater electronic emission is provided for a given amount of current than could be had by using a bare wire. This wire is extremely thin and fine, often being no greater in diameter than a human hair. They are about one inch in length in the 1½-volt tubes, or about three inches long in the other tubes, doubling back and forming an inverted V in appearance in the larger tubes.

PHONES: A means of making the received signals audible to the ear is necessary in a receiver. To accomplish this certain apparatus is necessary, and this we know as the phones. Phones, or telephones, are composed of a case, either metallic or of some composition, within which are two high resistance magnets, the poles of which are permanently magnetized. The magnets themselves are wound with thousands of turns of very fine wire, No. 40 being generally used. Of course the many thousands of turns that are necessary, make the resistance of the magnets very high. It is a mistake to consider a phone in terms of resistance. It would be better were they considered in terms of ampere turns. Across the front of these magnets, and separated by a very small space, is a thin piece of iron or steel which is magnetized and drawn



Symbols used in drawings and illustrations to designate the different parts used in radio circuits and sets.

toward the magnets whenever a current of electricity flows through the magnets. As the rectified signal is only one-half of the phase of the received signal, the current flowing through the magnet is consequently intermittent, allowing the magnet to attract the diaphragm and release it some thousands of times a second.

DIAPHRAGM: The diaphragm of a phone is a thin circular piece of steel which fits over the rim of the phones and is separated by a minute distance from the pole piece of the magnets. Its vibration, caused by the current flowing through the magnets, allows the received signals to be heard.

Washington, D. C., to Get Another Broadcaster

THE Chesapeake and Potomac Telephone Company announces that by May 15 Washington, D. C., will have another broadcasting station. It will probably be a Class B station with an individual wave length which will reach to all corners of the nation. This company, which is a part of the American Telephone and Telegraph Company, has started the erection of the second of the Bell System broadcasting stations, and plans to duplicate in power and quality the New York station WEAJ.

A unique feature is that the new plant will be a public service station; that is, it will be operated without profit and may be leased or chartered by other interests for periodic broadcasting at a rate equivalent to the proportional cost of operation.

It is understood that a local broadcasters' association

may be organized and the operating time of the station scheduled to care for its members. This, it is believed, will save small operators considerable money in comparison to the costs of installation and upkeep of private broadcasting stations. Certain hours of any schedule would be reserved by the telephone company for the transmission of matter of public interest such as presidential addresses, congressional debates and governmental information. Important concerts broadcast from WEAJ in New York may be sent by land line to Washington and broadcast simultaneously from the new station, officials say.

The electrical equipment is the product of the Western Electric Company, and will be installed under the direction of C. & P. and A. T. & T. Co., engineers. The station will be located on the telephone building, 725 13th Street.

Naval Radio and Aircraft More Necessary Than Gun Elevations

TECHNICAL experts are arguing whether or not, under the Arms agreement, the gun elevations of the American first line battleships may or may not be increased, when what we really need is radio and airplanes. In order to increase the range from around 21,000 yards to 24,000 yards several degrees of elevation would be necessary, but with this increase neither the gun pointers nor the lookouts on the masthead could see where the shells fell. Airplanes with radio transmitters are the only means whereby battleships can fire with any degree of accuracy over 22,000 yards or about eleven nautical miles. Radio-equipped airplanes are also of great service under that range, especially in the case of a smoke screen which would make a target invisible from the ship itself.

Due to the curvature of the earth, a rangefinder in a fighting top about a hundred feet above the surface of the sea, can observe the water line or horizon approximately eleven miles distant, which is the resulting limit of accurate fire if he does his own spotting. That is, if the observers endeavor to tell the gun captains below how much short

or over the target their shots fall or how far to the right or left, eleven miles is the maximum range.

For fighting top observations over this range much taller masts would be needed or airplanes which can spot by radio. To see the water line at 30,000 yards a fighting top would have to be 170 feet aloft—too high for practical purposes by many feet. Of course, a masthead lookout a hundred feet above the sea could see the mast and perhaps the superstructure of a ship over the horizon, but he could not see the fall of the shells in the water or their splash, and would only be able to tell if the mast or superstructure were hit, which would not aid the gun pointers in picking up the target.

It is for this reason that airplane spotters which can ascend several thousand feet, are used in the Navy and it is only by radio that they can report to the gunners the exact spots where the shells fall, thus enabling them to correct their aim.

What we need as much as gun elevating, some experts think, is more naval air spotters radio-equipped.

(Concluded from page 7)

cuit are so limited in extent that any fan ought to find most of them right in his shop. Then, with an hour-and-a-half's time, he should have a "pup set" set up and bringing in the DX. The bill of materials follows:

Bakelite panel, 6x7½x¼.....	\$1.50
1 3-inch dial.....	.50
1 Vernier button-panel mount.....	.20
1 Vernier rheostat.....	1.25
2 Brackets—1 large—1 small.....	.23
4 lengths bus bar wire.....	.20
1 Grid Condenser, .0001—No leak.....	.75
5 Binding posts.....	.25
1 Condenser, .001 fixed.....	.25
1 21 plate condenser.....	1.50
1 DL-75 Honeycomb coil.....	1.62
1 Single mount for Honeycomb coil.....	.60
1 Socket for tube.....	.75

Total \$9.60

Additional apparatus, if no tubes or batteries are on hand:

1 Dry cell tube.....	\$6.50
1 A battery.....	.40
1 B battery.....	1.50
1 pair of phones.....	5.00

Total of entire set.....\$23.00

This set, when made up for the newcomer in the radio field, or the old "hard-tack," does not cost a mint of money, and at the same time is sensitive enough to satisfy the most hardened DX Nite Owl, in his hunt for freedom and the open spaces.

The panel layout for the set is given herewith, and all dimensions are all worked out completely, so that the prospective builder should not worry about details. Drill your holes carefully, being sure to make the holes for the condenser from a template. If you do not get a template with the condenser, do the following: Take a fairly stiff piece of paper, or a card, and make a hole in the upper center of it, of sufficient size to accommodate the shaft of the condenser. Then with a pencil, find and pierce a hole for each of the standards of the condenser, taking care that the card or

paper is held perfectly still, and does not move. Then use this as a template, by pasting it on the wrong side of the panel, and drilling through the center of the marks you have made.

A back view of the panel is also given to show the location of the various pieces of apparatus, as laid out for efficiency and short leads. Extreme care should be taken in the wiring, making sure that you run the wires correctly. Too much care cannot be taken in wiring a set, and ten minutes spent tracing the wire after you have finished may save a disgusted builder and probably a burnt out tube. Note the fact that there is no grid leak used in this circuit.

Consider that you have built the set, wired it up, and are ready to listen in. Turn on your tube about three-quarters and turn the condenser toward zero. If the set is functioning properly, the click or squeal of regeneration will be heard and, if a station is operating, the carrier wave of the station will be heard. Using your vernier button on your condenser, tune between the two squeals, and if the voice comes in muffled, turn down the filament battery a bit. This may cause the signals to die out entirely, and if such is the case, turn up the rheostat, one notch at a time, until the squeal is again heard. Then turn down just one notch, and bring the vernier of the rheostat into play until the voice or music is plain and unmuffled. Then leave it entirely alone, and do all your tuning with the condenser for the rest of the evening, unless the battery runs down. Then you will have to tune with your vernier rheostat again.

If when you are tuning in you do not get the set to function properly, try another tap on the honeycomb either nearer the center or further away, always one turn at a time. When the right spot is found, as before stated, solder it, and leave it alone, because it will remain the same unless a different antenna is used.

This set has been tried and found true. It works on an antenna 40 feet long and only 25 feet high with remarkable selectivity, even though ten stations could be brought in within 10 degrees. Because of the fact that it is so simple to construct and operate it should prove extremely popular. The only trouble that can be experienced is that of tapping the honeycomb coil, and that cannot really be called trouble if care is taken in doing it.

Navy Electrician Designs Efficient Four Tube Transmitter

A VERY neat, compact and efficient transmitter has recently been made by M. Bebaut, chief electrician at the Radio Center, Navy Headquarters, New York City. The circuit employed is the original Colpitts oscillator, using grid modulation. With this set distances of 1,800 miles have been covered constantly on CW, and 900 to 1,200 on phone and buzzer modulated CW.

Referring to the diagram of the circuit published herewith, it will be noted that the four tubes (CW-931 5-watt tubes) are hooked in parallel, as to plate and

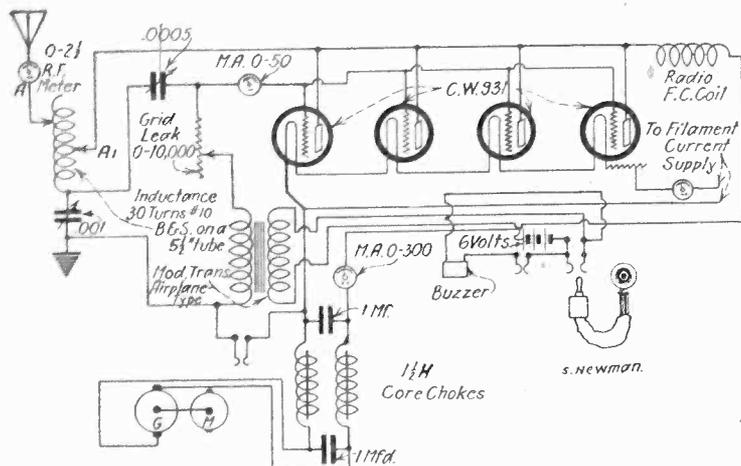


Fig. 1. Hook-up of circuit used by Chief Electrician Bebaut.

grid, and the filaments are all in series. The current for the filament is taken directly from the 110-volt line, using four 60-watt bulbs in series-parallel, in series with a 6-ohm rheostat, in the positive lead on the tube side, for finer regulation of the filaments.

The current from the plates is derived from a standard Westinghouse Electric motor-generator unit which delivers up to 550 volts to the plates, through two 1½-henry iron core chokes, with two 1 mfd. condensers at either end to remove the ripple. The motor of this unit is driven from the 110-volt line, through four 100-watt bulbs in series-parallel.

The modulation of the set is accomplished through a modulation transformer in the grid circuit, the secondary of which is in series with the 0-10,000 ohm leak of the non-inductive type. This transformer is the airplane type commonly used now on all of the U. S. Navy destroyers, on their intermediate wave sets. For CW the key is inserted directly between one leg of the generator, which goes to the filament side, and the grid side of the circuit, as illustrated. This has been found to give the best results as concerns the space current when using straight CW, because there is less fluctuation at the break and make of the key.

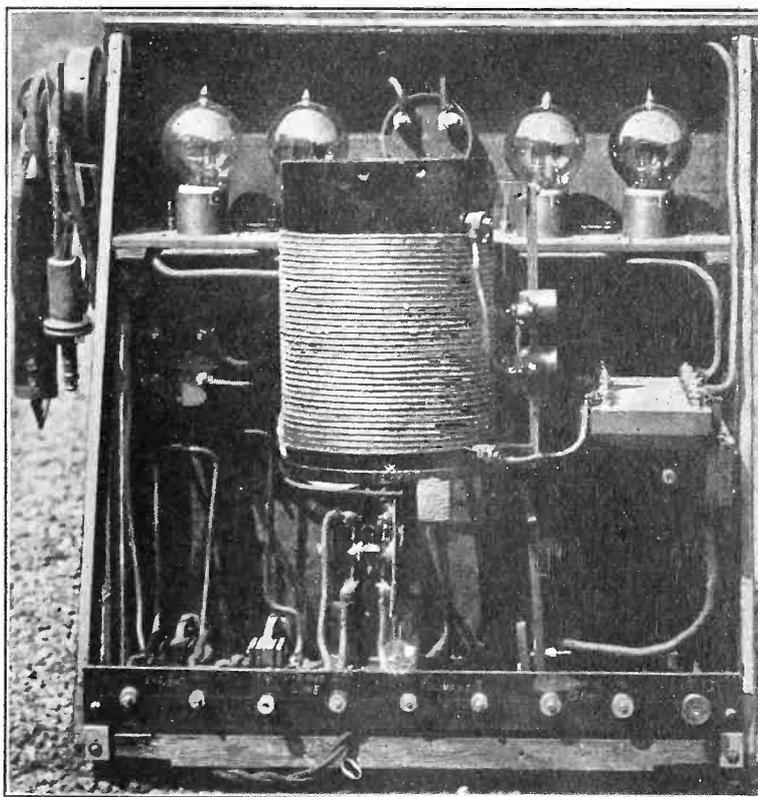
An important part of the set is the tuner, which as shown consists of 30 turns of Brown & Sharpe No. 10 insulated wire on a 5½-inch core. The important part of this tuner is the fact that the two sliders for antenna and plate tuning are attached to one another, approximately 5 to 7 turns apart, and they are both

tuned together. On the antenna tuning switch is a piece of metal, which shorts the rest of the coil that is not being used, doing away with the dead-end effect, and at the same time giving much sharper tuning.

When it is desired to use the set in phone work the plug is inserted in the extreme right hand jack. The jack immediately next to it is for buzzer modulation, and the key is inserted in it for ICW.

An air core choke coil is inserted in the plate lead of the last coil. This choke is necessary to keep the plate circuit from backing up and down when fluctuations in the plate circuit occur.

The other illustration shows a comprehensive interior view of the set as well as all the apparatus and the controls. When the set was planned it was thought necessary to have a wave change switch to allow transmission on 150 meters; but when this was attempted, it was found that the change meant that the



(C. Photonews.)

Fig. 2. Interior view of Chief Electrician Bebaut's four-tube set.

whole tuning would have to be readjusted, so it was dropped and transmission on 200 meters was set.

The antenna used for this set is a six-wire cage antenna T type, 50 feet in length and 32 feet in height, situated at the extreme lower end of New York City in the U. S. Naval Communication Bureau's Office. With this set which is rated at 20 watts, using four 5-watt CW 931 tubes, stations in St. Louis have been consistently worked. Stations in South Carolina have picked up this station on both CW and ICW and once reported receiving phone for a short period.

Coming! New List of Broadcasters!

While the Department of Commerce has assigned wave lengths for each of the broadcasting zones established by the recent Second National Radio Conference, individual assignments of station wave lengths have

not been announced. They are being arranged as rapidly as possible and as soon as finished **A COMPLETE, UP-TO-DATE LIST OF BROADCASTERS** will be published by **RADIO WORLD**.

The allocation of wave lengths for Class A stations appears elsewhere in this issue of **RADIO WORLD**.

Developments of Vacuum Tube Research

By *F. S. McCullough*

Research Engineer, Westinghouse Electric & Mfg. Company

A PERSON using a vacuum tube seldom realizes that this tube is not a development of recent years. It has a long history back of it. The forerunner of a vacuum tube was the experiment of Edison in 1883, when he observed an electric current between the plate and a hot filament in a vacuum. Simultaneously some German scientists were working on it. The work of Edison was followed by Preece, Fleming and Thompson, English scientists. It was not until 1899 that Sir J. J. Thompson suggested an explanation of this phenomenon. About this time Marconi introduced radio telegraphy. Sir J. A. Fleming applied the vacuum tube for detecting radio signals in 1904. In 1905 DeForest, the American, changed this vacuum tube. The new tube was able to amplify the signals. Then in 1913 E. H. Armstrong invented an electric circuit, which with this tube was capable of producing oscillating currents suitable for sending radio waves or regenerating received signals. By regenerating we mean multiplying these signals hundreds of times. This briefly is the history of the tube you are using.

Larger tubes of this type are used at the broadcasting stations. For transcontinental telephone transmission, telephone companies are using a similar tube. In appearance, it looks somewhat like an electric light bulb. It has a glass bulb for maintaining a vacuum. This is sealed in a metal base. Mounted inside the tube you can see a heated filament surrounded by a complicated metallic structure. A radio engineer would tell you this was the grid and plate, and if you examine carefully, you will see that the outside of the structure is a thin metal plate formed into a cylinder or an oval. Between this plate and the filament, you will see a wire coil or a mesh. This is the grid. Now imagine a stream of electrical particles shooting out from the filament and across the space through the grid to the plate. This grid acts like a door. By opening and closing this door you can vary the amount of current that goes through; only you open and close this door electrically, and not mechanically. Just like a small child can open a door for a grown up person, so can the small electric currents open a door for large electric currents. That is exactly how a vacuum tube works.

To produce this tube, the scientists and engineers had to solve quite a number of technical and scientific problems. Years of research and millions of dollars were

spent on developing the materials, the methods and the machinery for the manufacture of these tubes. To give you an idea of what these problems are let us compare the vacuum tube to an electric light globe. In the latter we have a vacuum which has about one-millionth of ordinary air. In a vacuum tube there is ten million times less air than in an electric light globe. Imagine the trouble of getting this vacuum. When you get nearly this far, the glass walls and the metal parts inside of the tubes begin to give off gas. Before vacuum tubes were invented, the scientists did not even know that the glass and the metals could contain gas. Now they had to find a way to remove the gas, and make sure no more gas would come out after the tube is in service. It may be interesting to observe that with all this vacuum an average receiving tube will still contain about ten to twenty billions of atoms of gas.

You have seen tubes with a bright filament and a dim filament. Some need a storage battery while others will burn with a dry cell. It is seldom realized that dry cell tubes take only one twentieth as much power as a storage battery tube, yet give the same service. However, a large amount of experimental work had to be done before this small amount of power could be made to do the work. The engineers had to develop a filament of extremely fine dimensions. This filament is one fourth of one-thousandth of an inch thick and ten-thousandths of an inch wide. This means that it would take four thousand of these filaments to make up an inch if laid side by side. This filament must be then coated in a delicate manner with a layer of active material. When you consider that it must be mounted in the center of the coil one-sixteenth of an inch wide, you will get some idea of what the difficulties are. The other extremes in vacuum tubes are the power tubes at the broadcasting stations. These tubes are made at the present time in sizes which range up to 1000 kilowatts. This means that they are capable of delivering about 1300 horsepower of radio energy to an antenna. Of course, no broadcasting station is now allowed to use such an amount of energy. When this will be allowed one broadcasting station will be able to reach the extreme ends of the earth. This day is not far distant. A few years from now you may be able, on your set, to listen to one station in London and another in Peking.

Warning Against Fake Radio Inspectors

A "FAKE" radio inspector has been issuing "licenses" to amateur and broadcasting stations in Minnesota, the Department of Commerce has been advised. Using the return stub of an amateur application blank secured from the department, an individual giving his name as Cecil Osborne is said to have supervised the installation of a radio station in Minnesota and issued what he called a license.

This impostor claimed that he was a former radio operator of the Navy Department and a member of the Naval Reserve. The only record of a man of that name in the files of the Navy Department, is that of a deserter who served for a time as an apprentice and seaman. He deserted in San Francisco in July, 1922, the official records state.

All radio inspectors of the department, the officials in

Washington point out, are supplied with means of identification, including official badges and identification cards bearing their photographs. Amateurs and broadcasters are advised to ask for identification cards and to pay no fees for licenses. Although the White Radio Bill contemplated the payment of fees for licenses, it failed to pass. The present law provides for the licensing without charge.

OUT-OF-PRINT ISSUES OF RADIO WORLD

TO RADIO WORLD readers who want copies of our issues of April 22, May 20, June 24, Oct. 21, and Dec. 2:

These issues are out of print. If you have any copies of these dates and will send them to us, we will send you current issues for them. If you have ordered any of these issues from us, please let us know if you wish to have us return the money to you, or send you current issues.

Radio World, 1493 Broadway, New York.

How to Make a Built-up, Sectional Aerial Mast

By Arthur G. Shirt

AMATEURS who live in isolated buildings are often confronted with the problem of how to hold up the far end of their antenna. There are no trees or other buildings conveniently near, and a pole or mast of some kind seems to be the only way out of the difficulty. The expense involved in buying and erecting a mast of suitable height cannot always be met; moreover, there is always the problem of transporting a ready-made structure of lengthy proportions. These considerations are often the only reasons why some radio fans do not own their sets, and it is to help them that these plans for making a really ingenious mast from a few lengths of 2x4 studding are here presented.

The mast in question stands 36 feet high. It may be

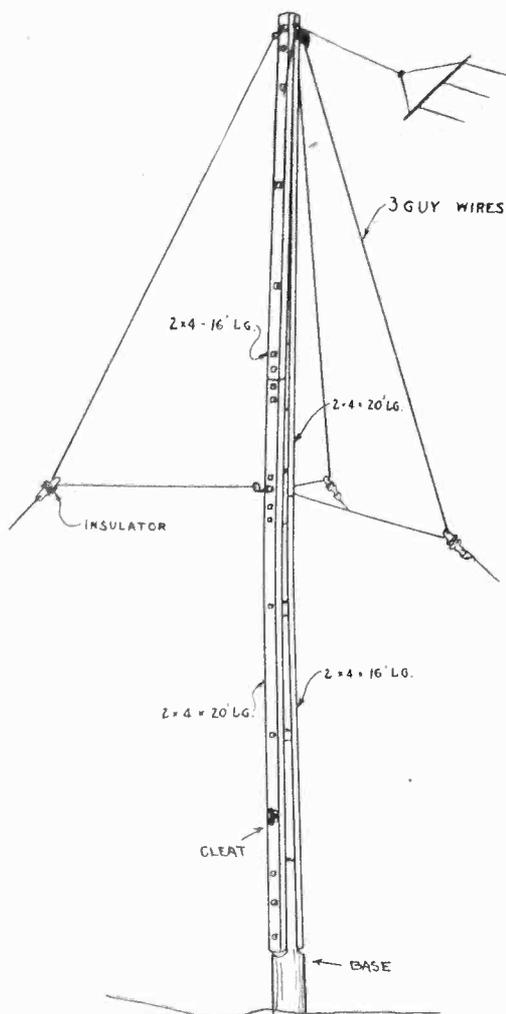


Fig. 1. Sketch of mast as it should appear when erected. It is guyed in the manner shown, which eliminates the necessity of using many guy wires.

extended to any greater height up to the reasonable limit of from 60 to 70 feet. It is easy to make, easy to raise, and once up, is guyed so that it will stay up. Its sturdiness is beyond question, yet it is neither heavy nor bulky. It has been designed for the special use of radio amateurs, and has been tried out successfully in a number of cases. A careful study of the accompanying sketch will reveal the many desirable features of this built-up, sectional mast.

It is made of the following materials: A fence post eight or nine feet long by eight inches in diameter; four lengths of studding, two pieces 20 feet long and two 16 feet long; a number of insert blocks of varying thickness; six closed hooks for the guy wires; a pulley, or block, and three insulators. To this list of articles may be added three turnbuckles to keep the guy wires taut.

The fence post is buried about five feet in the ground. It serves as the base for the mast. After being well embedded it is dressed down with an ax for about three feet of its upper portion, the dressed part being five inches wide. This rectangular head serves not only as a pivot about which to elevate the mast, but also as the initial in-

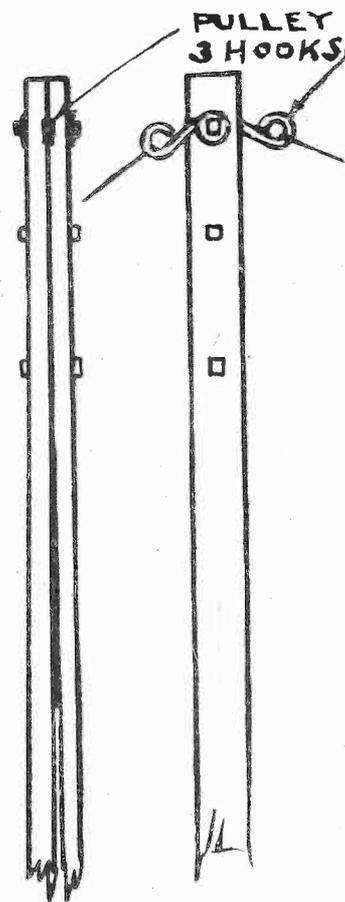


Fig. 2. Method of attaching guy wires to hooks.

sert block. In the case of a 36-foot structure as shown, the width of the mast at the bottom should be about five inches. As the mast increases in height above 36 feet, however, this block should be made wider, so that the entire structure keeps its proportion. Three bolt holes are drilled in a vertical line as shown in Figs. 1 and 2 and the spaces left between these holes are later duplicated upon the lower part of the two joints which are used for the bottom section of the mast.

The second insert block is 4½ inches wide. There are seven blocks in all, placed about as shown in Fig. 1, each tapering slightly and decreasing in width as they near the top. Note that the third and fourth insert blocks are at

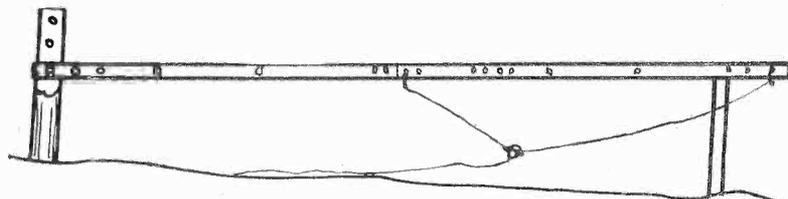


Fig. 3. Attach the guy wires before raising the mast. Then, when it is up, slip the necessary bolts in place, tighten and pull in on the guy wires by means of turnbuckles, making sure that the tension on each wire is the same.

the joints, and are therefore longer than the others. Also note that the joints are made on opposite sides and the mast is so assembled that they are six feet apart. This feature of the construction is an essential one, since it adds

(Continued on next page)

Important Meeting of Radio Interests Discusses New Wave Lengths, Royalties and Price-Cutting

NEWARK, N. J., April 26.—Matters of interest to both dealers and manufacturers were discussed at a joint dinner-meeting of the Radio Manufacturers of New Jersey and the Radio Trade Association held at the St. Frances Hotel tonight.

President LeFevre, of the Shelton Company, in opening the meeting outlined the purposes of the New Jersey Manufacturers' Association and spoke of the great interest and enthusiasm already shown by the members, though this was only the fifth meeting of the association.

Mr. C. B. Cooper of the Crosley Manufacturing Company, Cincinnati, who is a member of the Hoover Wave Length Commission, was the principal speaker of the meeting. In a very concise way, Mr. Cooper outlined the work of the recent Commission meeting held in Washington. Mr. Cooper praised the fine spirit of cooperation shown by all those present, especially by the government broadcasting officials, who agreed to broadcast on lower wave lengths. Two hundred to six hundred meters being the common wave length of broadcast reception from now on, the task of the manufacturer will be a great deal easier. Mr. Cooper also read the new allocations of wave lengths for broadcasters in the New York or Second District of the Department of Commerce.

In discussing the difficulties of the broadcasters with authors', publishers' and other associations that insist on royalties from broadcasting certain matter, Mr. Cooper voiced the opinion that the broadcasters may be forced into an association either to fight such antagonism or to publish their own songs and the like.

Selling radio in the home was the theme of the sales talk given by Mr. H. C. Gawler of the Radio Corporation of America. Mr. Gawler showed that the same methods that have sold phonographs and vacuum cleaners will sell radio sets. He emphasized the fact that the woman is the one who must be sold if the dealer wants to sell apparatus into the home.

Mr. W. H. Harkness, of the American Telephone & Telegraph Company, New York, told of the work of his broadcasting station, WEAF. Mr. Harkness said that the endeavor of his station was through research and constant study to give those programs that the people actually wanted. To do that, his company maintains a broadcasting staff of approximately fifty people. The operating staff consists of twenty, the remainder of the organization being occupied in the work of studying the matter that was broadcast.

Mr. D. W. May, of Newark, N. J., Station WBS,

discussed some of the difficulties that his firm had become involved in with the authors' and publishers' leagues.

The vital subject of price cutting was taken up by Lawrence A. Nixon of the Radio Dealer, when as secretary of the Radio Trade Association he spoke of work of that association. It was at the suggestion of Mr. Nixon that the joint meeting was called. Mr. Nixon praised the work of the trade association that has just been formed in New York to combat the evil of selling goods on a cut price basis.

The subject of price cutting occupied most of the attention in the informal discussion that followed the main addresses.

Among those present were: Mr. Bryant of the Chicago office of L. S. Brach Company; Mr. Morton of Clapp-Eastham; Mr. Salzman of the Wholesale Radio Equipment Company, Newark, N. J.; Mr. Lynch of Radio Broadcast, and Mr. Friedman of Radio World.

New Wave Lengths For Second District

At a meeting of the broadcasters of the New York (Second) District with Radio Inspector Batcheller on April 24, the following wave lengths were assigned, to go into effect May 15, 1923:

Meters	Call	Station
233	*	Radio Shop of Newark, Newark, N. J.
244	WBAN	Wireless Phone Corp. of Paterson, Paterson, N. J.
263	WSAP	Seventh Day Adventist Church of N. Y.
	WAAN	I. R. Nelson, Newark, N. J.
273	WRW	Tarrytown Radio Research Laboratory, Tarrytown, N. Y.
	WFAF	H. C. Spratley Radio Co., Poughkeepsie, N. Y.
360	WQAO	Calvary Baptist Church, New York.
	WBS	D. W. May, Newark, N. J.
	WLAW	New York Police Department.
	WHN	Ridgewood Times, Ridgewood, L. I.
	WNJ	Shotten Radio Mfg. Co., Albany, N. Y.
405	WOR	L. Bamberger & Co., Newark, N. J.
	WJY	Radio Corp. of America, Aeolian Hall, N. Y.
	WDT	Ship Owners' Radio Service Co., New York.
455	WJZ	Radio Corp. of America, Aeolian Hall, N. Y.
380	WGY	General Electric Co., Schenectady, N. Y.
	WHAZ	Rensselaer Polytech. Institute, Troy, N. Y.
492	WEAF	Amer. Tel. & Tel. Co., New York.
	WBAY	Western Electric Company.

* Not yet known.

Because it is a duplex station, the new Radio Corporation of America's station on top of Aeolian Hall, New York, was assigned two wave lengths.

(Concluded from preceding page)

too much to the strength of the mast to be omitted with safety. The best material for the studding is straight-grained yellow pine, two inches by four inches.

The insert blocks are first nailed in place and then bolted with $\frac{3}{8}$ -inch carriage bolts. Fourteen of these bolts are needed in all. This is not counting the three bolts at the foot of the mast, which are of $\frac{1}{2}$ -inch stock. The other hardware consists of six closed hooks, three of which are fastened to the top of the mast, either as shown in Fig. 3 or as required by the particular make of hook employed. The other three hooks are placed midway down the mast at about the first joint, and three bridles are made with the guy wires as shown. Three strain insulators are

placed at the head of these bridles and the main guy wires taken from them. The main guy wires are then anchored to stakes or to weights embedded in the ground, and tautened by means of turnbuckles.

When everything is ready for elevating, lay the mast out on the ground with the yoke fastened loosely to the base by a single bolt. Straighten out the guy wires and leave them in charge of helpers, who spread out and keep the tension even as the mast rises. Two men with forked clothes poles can raise it easily. Have some one ready to put in the two bottom bolts as soon as possible, for when these are in, however loosely they may be inserted, the mast cannot fall. When the guy wires are taut, raise the aerial, and the job is finished.

Latest Radio Patents

Wireless Telephone Receiving Apparatus

No. 1,448,207: Patented March 13, 1923. Patentee: William F. Gehrig, Newark, N. J.

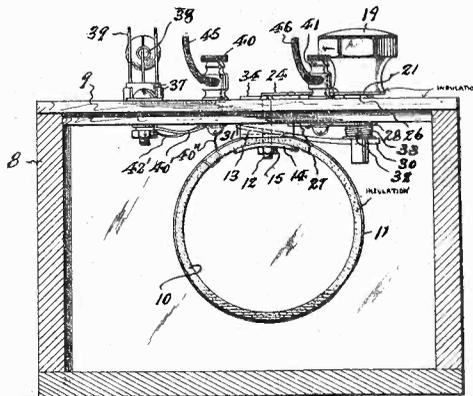
THIS invention relates, generally, to improvements in wireless telephone apparatus; and, more particularly, to a novel arrangement and mounting of tuning coil and detector devices for wireless telephone receiving sets.

The invention has for its principal object to provide a novel and simple arrangement and mounting of cylindrical tuning coil together with a novel rotary slider switch for cooperation therewith; and the invention has for a further object to provide a neat, simple, cheap and efficient arrangement and mounting of said tuning coil devices together with suitable detector devices for association therewith.

Other objects of this invention, not at this time more particularly enumerated, will be clearly understood from the following detailed description of the same.

With the various objects of this invention in view, the same consists, primarily, in the novel tuning coil and detector set for wireless telephone receiving apparatus

hereinafter set forth; and, furthermore, the invention consists in the novel arrange-



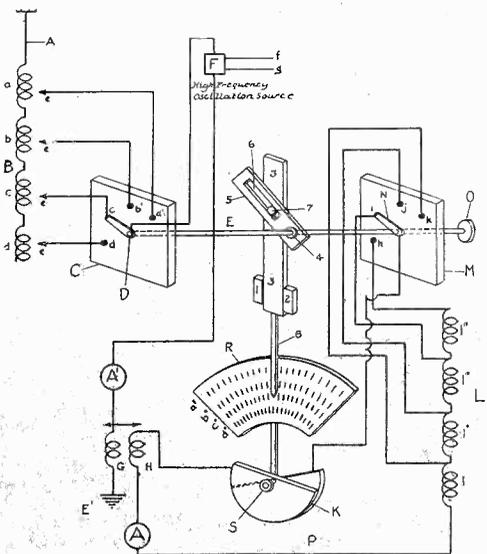
Sectional view of Gehrig's wireless telephone receiving apparatus.

ments and combinations of the various devices and parts, as well as in the details of the construction thereof.

Combined Wave Changer and Wave Meter

No. 1,450,038: Patented March 27, 1923. Patentee: Guy Hill, Washington, D. C.

THIS invention relates to radio signaling apparatus, but more particularly to a wave changer device. The primary object of the invention is to provide operative means in connection with a wave changer for accurately determining the wave length



Hill's combined wave changer and wave meter.

using a wavemeter having several scales, which are attached to the movable plates of a variable condenser.

The invention involves a method of having the indicating pointer of the wavemeter, which indicates the wave length on the various scales, so combined with the wave changer that, as the handle of the wave changer is operated, the pointer of the wavemeter is operated and picks out or selects the proper scale.

In radio transmitting sets, such as arc sets, where coupled circuits are not employed, impact sets, and certain forms of audion sets, where the radiated wave length depends upon the constants of the antenna circuit and not upon the constants of the primary circuit, the operator has no method

of knowing the wave length transmitted after the set is once tuned and adjusted in case the constants of the antenna are changed; that is, if the set was adjusted to a fixed antenna and this antenna became destroyed, and a new antenna of different constants had to be used, the operator could in no way determine the wave length being transmitted unless he was provided with a wavemeter.

If such a set includes a wavemeter, which is a separate piece of apparatus, such an instrument might easily be removed from the set, and if the transmitting set were on shipboard the wavemeter could easily be left ashore, or in some inaccessible place so that, in case of emergency, the operator might have no method of knowing the wave length he was using.

The present invention overcomes the above difficulties by having a wavemeter built into the transmitting set as a definite part of the transmitting equipment, and, in addition, so mechanically coupled to the transmitter that when the wave length is changed the indicating pointer of the wavemeter is also adjusted to prevent the operator setting his wave-changing switch on one wave length and his wavemeter indicating pointer on the wrong scale, and thereby cause confusion.

System of Telephony

No. 1,449,372: Patented March 27, 1923. Patentee: Harold D. Arnold, East Orange, N. J.

THIS invention relates to a method of, and apparatus for signaling by means of modulated high frequency waves or currents.

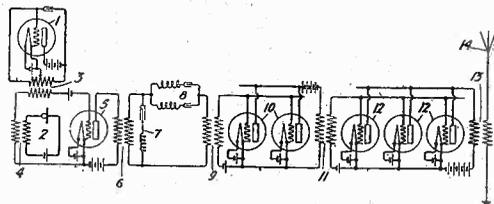


Diagram of Arnold's system of telephony.

More specifically its object is to increase the efficiency of telephonic communication by modulating a high frequency oscillation

and eliminating from the antenna, or other sending circuit, constant amplitude oscillations of the carrier-wave frequency, which, in present practice, are impressed upon it. Further objects are to improve the quality of speech received and to make possible the secret transmission and reception of messages.

These objects are accomplished by providing an arrangement of circuits whereby current is suitably modulated and is supplied to the antenna only when the characteristics of the high frequency current to be impressed on the antenna are changing in accordance with the wave form of the signal to be transmitted, and by providing at the receiving station a small auxiliary generator which shall furnish a wave of the frequency of the unmodulated carrier wave.

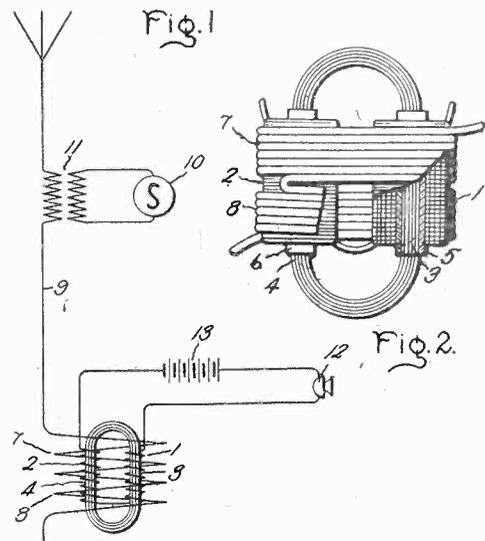
Heretofore in high frequency carrier wave telephony it has been customary to employ a generator of unmodulated or carrier high frequency oscillations, which oscillations are modulated in amplitude in accordance with the low frequency signals to be sent, and are then radiated. At the receiving station, detecting devices are used to respond to low frequency modulations only.

Modulator

No. 1,449,871: Patented March 27, 1923. Patentee: John B. Pratt, Schenectady, N. Y.

MY present invention relates to modulators of high frequency current, and more particularly to modulators of the type commonly known as magnetic amplifiers.

Devices of this general type as used in the past, described for example in U. S. patent to Alexanderson 1,206,643, have ordinarily been constructed with the closed magnetic core made up of thin laminations. They have been constructed either by first assembling the laminations of the core and then winding

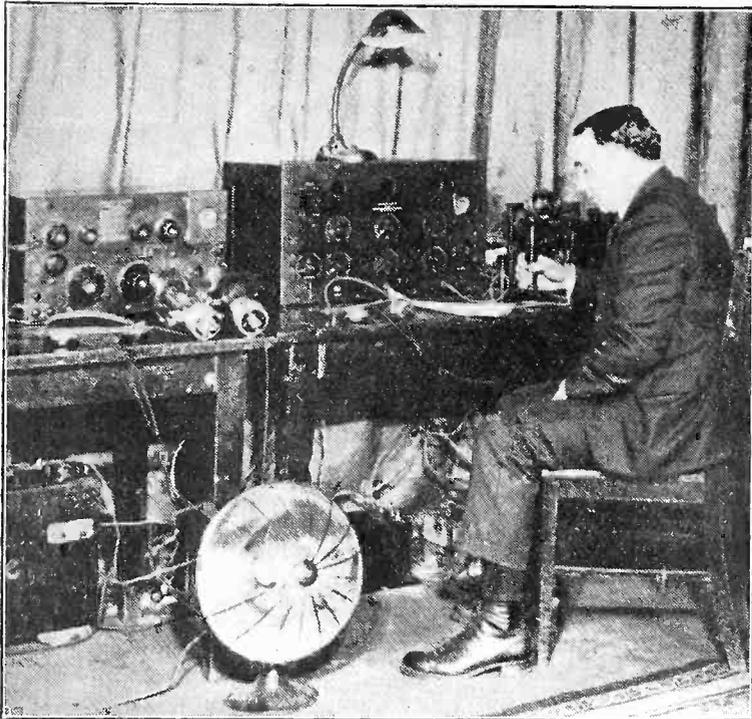


Details of Pratt's modulator of high frequency currents.

the coils on this core by threading the conductor through the opening or by first winding the coils and then assembling the laminations making up the core. This latter method requires that the laminations instead of being continuous must be cut in order to permit them to be inserted within the coils.

The object of my invention is to provide an improved method of constructing the magnetic core of such a device which will be simpler than previous methods and result in an improved product. In carrying my invention into effect I first wind the coils which are to surround the closed magnetic core and then form the core by threading a thin ribbon of magnetic material through the coils making enough turns in this ribbon to provide the desired cross sectional area of the core.

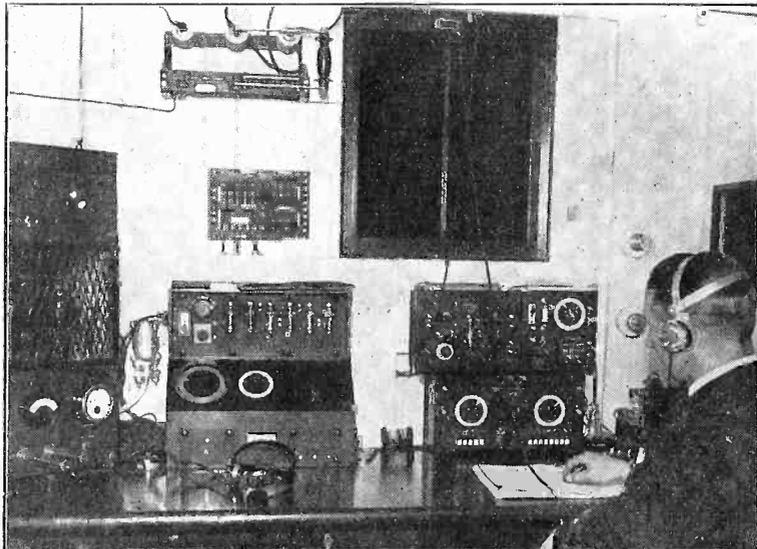
All Important Radio Events Snapped



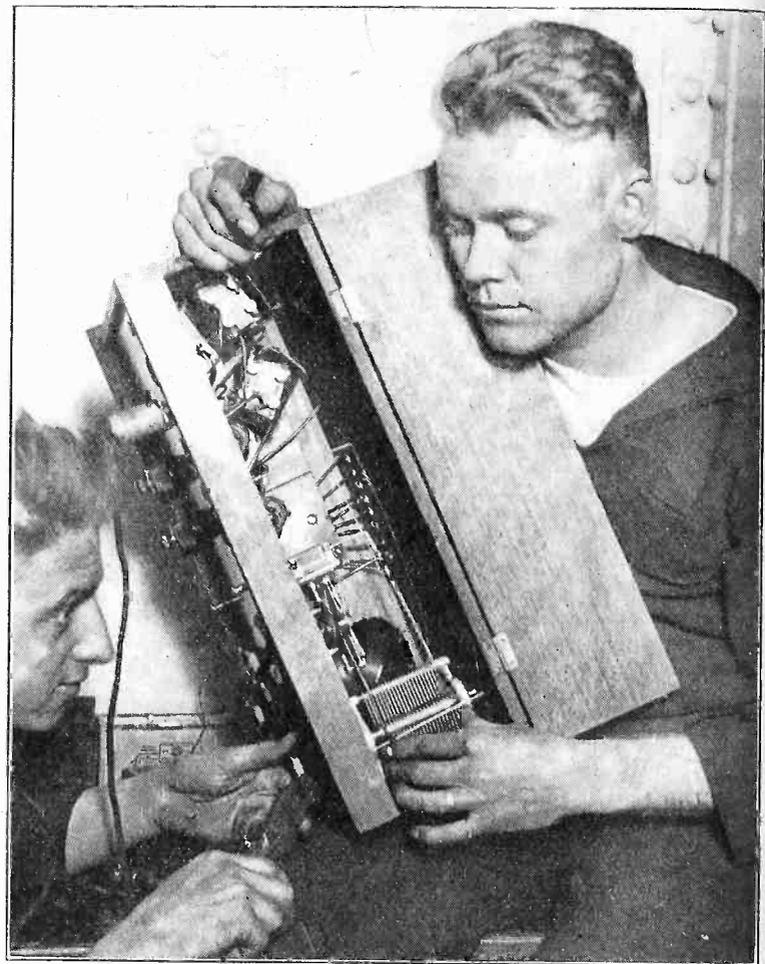
(C. Fotograms, N. Y.)
 During these days of uncertain weather, when you can't tell whether the next minute is going to be cold and your bunions are paining so steadily that you can't rely on them for a barometer, the farmers are very grateful to the report service as broadcast from the market centers of the country. The above photo shows the broadcasting station at Roselle, N. J., where they send out the latest market reports on all produce and thereby keep the man on the farm "in the know."



(C. Kadel and Herbert)
 A new feature that has created much interest among public school pupils and teachers is the broadcasting through their local stations. Station WHN, of Ridgewood, L. I., was the first to inaugurate this method of procedure. The pupils all compete in composition to get the opportunity of broadcasting their work through this station. The photo shows Violet Miller, an eighth grade pupil, broadcasting her prize winning composition.



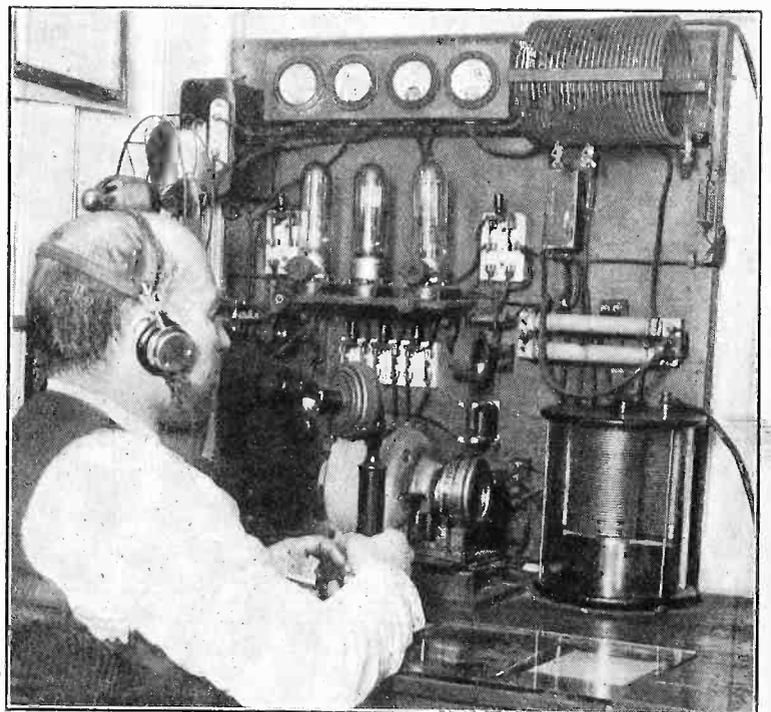
(C. Kadel and Herbert)
 The radio room of the S. S. "Belgenland," the newest Red Star liner. This ship is fully equipped with high-speed transmitters and receivers which enable it to handle messages five to eight times as fast as manually.



(C. Kadel and Herbert)

Unofficial Radio in the Navy

Every one knows that the United States Navy is equipped with the most modern and powerful radio apparatus in the naval world. Nowadays they even control battleships by means of radio, fire explosives, and operate hidden mines. Because of that fact few people realize that there are many hundreds of radio fans aboard Uncle



(C. Kadel and Herbert)
 150-watt transmitter of Frank Frimerman which has been heard in Honolulu and by ships in the Atlantic at the same time. The set uses three 50-watt tubes on either phone or CW. They are shown in the center of the board right below the four meters. The motor-driven chopper, used when uninterrupted CW is desired, can be seen directly next to the condenser on the right.

By Our Vigilant Photographers

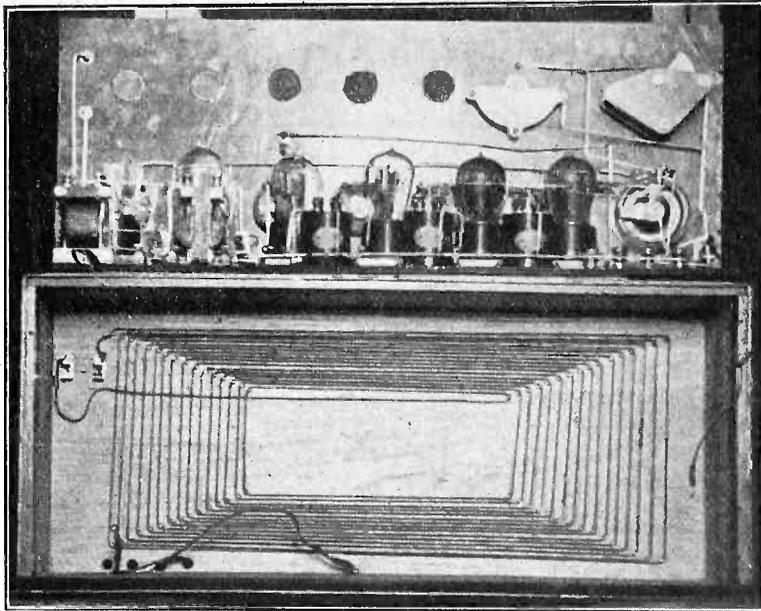


(C. Kadel and Herbert)

Sam's big boats, but merely consider the naval radio as something to occasionally listen to, and copy if they can.

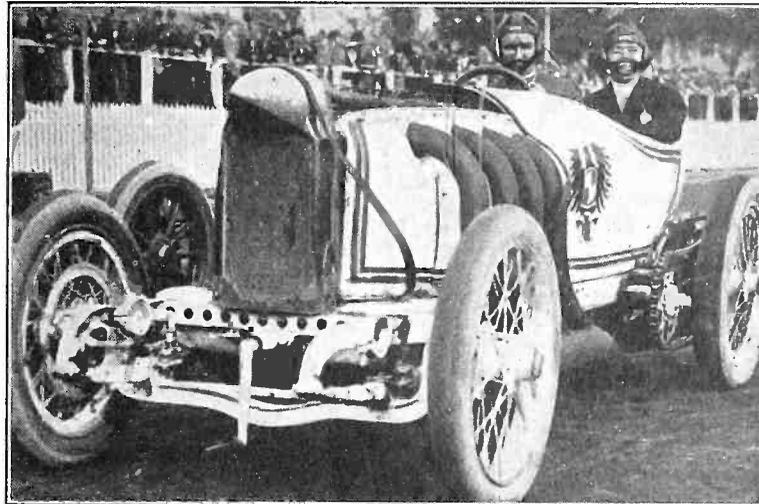
The illustrations herewith show what a hold radio has on the men in the navy. The illustration to the left shows Seamen Mummee and June with their three-tube set, which received WJZ in the Canal Zone, using the auxiliary antenna of the ship. The smaller picture above shows Lt. Commander Vanauken with his set consisting of one step of radio frequency detector and two of audio-frequency. The transformers for this set were made by the constructor and are of the air core type. They can be seen directly in front of the set.

Even though there are many constructors on board the ship, it is not always easy to get an antenna, because of the fact that Uncle Sam won't let everybody string a lot of wire around the ship, where it may be a nuisance, so therefore the boys are called upon to exercise a little bit of ingenuity in the matter of antennae.



(C. Kadel and Herbert)

Compact and self-contained receiver designed by Rutledge Mayo, of New York City. It uses three stages of radio frequency (the first three tubes counting from the right), detector, and two stages of audio-frequency. The loop is contained as shown in the cover of the cabinet. The set can be operated by simply turning on the tubes and swinging the cabinet in the direction of the desired station and tuning with the two condensers shown on the upper right hand corner. The condenser on the left is a three plate vernier, necessary to fine tuning. A 1,500-mile radius is claimed for this set, using the loop and a loud speaker.



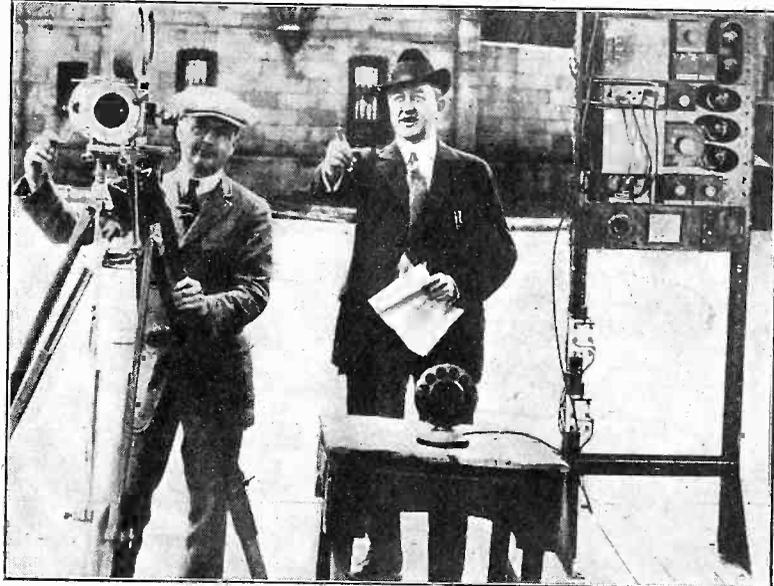
(C. Kadel and Herbert)

Equipping fast racing autos with radiophone is the latest wrinkle developed in the radio field, utilizing the invention of Bernays Johnson which was described in RADIO WORLD some time ago. The photo shows one of the "rip-snorters" equipped with the apparatus, just after a race, in which all the sensations of riding at a mile a minute clip were faithfully reported by the man seated next to the driver. The transmitter and receivers are concealed in the helmet, and the apparatus, needing neither high voltage batteries nor generators, and the transmitter taking but very small space without the necessity of using an antenna and ground.



(C. P. and A. Photos)

The latest wrinkle for keeping the busy children of busy mothers busy while busy mother is busying around the house after daddy goes to work. It entirely supplants the rattle and rubber doll. The only precaution necessary is to see that Imogene does not get busy and chew a few yards of insulation off the wire, which is not according to the strict diet rules of the younger class.



(C. International Newsreel)

As a means of keeping the poor movie director from yelling himself hoarse when directing big scenes, they are installing loud speakers with the regulation power amplifying and speech amplifying panels and microphones. The director, instead of using a megaphone, can now speak gently into the microphone, and the actors will hear him as though through the ears of a thousand amplifiers.

Answers to Readers of Radio World

Kindly inform me where I can obtain a circuit of a two-tube reflex set using a crystal detector and a three-tube reflex set using a tube detector, with antenna and ground, and also loop. Can a loop be used at the same time as the outdoor antenna? Which is better, the crystal detector or the tube detector in reflex circuits? Should I use the same type R. F. transformers in both stages, or are different ratios necessary?—L. M. Rickerson, Laraby Place, Baltimore, Md.

If you will refer to the March 3 issue of RADIO WORLD, you will find the desired information and hook-ups on page 4, under the heading "Multi-tube Reflex Circuits," by W. S. Thompson. Fig. 1 is a diagram using two tubes with a crystal detector, and Fig. 2 is a diagram of a reflex circuit using three tubes. With these circuits you can use either antenna and ground with a tuner, or a loop. If you use the antenna and ground it is connected across the first variable condenser in place of the loop. A loop should not be used when an antenna and ground with a tuner is used. For extra volume, we suggest that when using a loop, you connect a lead from the ground to one side of the loop at the point where it connects to the variable condenser. The advantage of using a crystal detector in a reflex set is its extreme clearness and quietness of operation. The crystal detector is the most perfect rectifier of radio signals, as concerns original tone and clearness. It is a slight but less sensitive than the tube and for that reason many people prefer the tube detector, but at the same time the difference in volume is so slight that it is better to use the crystal in view of the extreme faithfulness of reproduction. Unless you intend using tuner radio-frequency, it is not essential to use different ratio transformers.

* * *

In connection with the article on the "Universal All Wave Receiver," described by F. J. Rumford in the April 7th issue of RADIO WORLD, is it possible to use the new U. V. 201A tube, instead of the WD-11? Would I have to make any changes in the original wiring? What does the U. V. 201A cost? In using the tuner for a detector what plate voltage would be necessary, and also what is the bias voltage in the grid lead circuit?—Raymond Dabney, Harber, Texas.

The tube you mention can be used in this circuit, with no changes other than using the regular socket instead of the WD-11 socket. This tube sells at \$6.50 list. You should use 22½ volts on the plate for a detector, and 45-60 volts for an amplifier. There is no bias battery necessary—use a grid leak and condenser, as shown.

* * *

In the article published in RADIO WORLD for January 20, 1923, by Ortherus Gordon it states that a brass rod must be used as the standard of the tickler coil. I am unable to obtain a brass rod. Will an iron rod do?—Theodore F. Fehlandt, 917 Watson Street, Ripon, Wis.

If you cannot obtain a brass rod use a wooden or copper rod. Iron has a peculiar effect on radio signals when used in or around an inductive circuit, due to hysteresis which would cause you to lose some of the signal strength.

* * *

I have constructed the set described by Mr. Shults in a recent issue of RADIO WORLD, but, being within 10 miles of WBZ, cannot tune him out and get other stations with success. He operates on 422 meters.

What do you advise?—M. L. Cramer, 46 Cleveland Street, Holyoke, Mass.

We advise the use of a filter circuit embodying a honeycomb coil and .0005 condenser in parallel in the antenna circuit. Such a filter was described in RADIO WORLD for January 27, 1923, by F. J. Rumford.

* * *

I constructed the set described in RADIO WORLD for March 10, on page 19. I note that the grid connects indirectly through the tuner to the positive A battery. The set will not function. Is this the trouble? Should it not connect to the minus?—Frank Haas, 120 East Iowa Street, Evansville, Ind.

You are correct. The grid return should be negative, and connect to the minus side of the circuit you mention. A potentiometer would be of use in this circuit.

* * *

In your diagram of the set described in RADIO WORLD for January 20 by Ortherus Gordon it states that the top coil (50 turn) goes to the plate and phone. Is this right, or should the 50 turn be the bottom coil?—Roland C. Hetherington, 404 Portage Avenue, Sault Ste. Marie, Mich.

The 50-turn coil in this circuit is the primary or bottom coil, and the larger 75-turn coil is the tickler, and goes to the plate and phones.

* * *

In RADIO WORLD for March 3, 1923, you published an article by C. White. Should the condenser C-1 be 13 plate or 43 plate? Should the "B" battery be 22½ or 45 volts? How is the copper shielding grounded?—G. D. Greneman, General Delivery, West End Station, Colorado Springs, Colo.

This condenser should be 13 plate, as a 43 plate would have too much capacity and the tuning would be too fine. Only a very small variations of capacity are necessary to obtain regeneration and fine tuning.

The "B" battery should be 22½ volts, although using 45 would not hurt the tube, outside of making it harder to control the oscillations.

Shield the copper foil on either the ground post or the negative side of the "A" battery by means of a strip of the same foil that you are using.

* * *

In RADIO WORLD for February 17, 1923, you published an article by M. C. Batsel on Radio-Frequency vs. Audio-Frequency. In his eighth paragraph he states that the simplest form of radio frequency without the use of addition tubes is the Armstrong regenerative. I have never seen the particular diagram referred to before, although I understand that Armstrong has several circuits. Is this particular one the super?—A. H. Cosman, 728 Royal Ave., New Westminster, B. C., Canada.

The circuit referred to is the three circuit regenerative, utilizing a variocoupler and two variometers. Numerous hook-ups of this particular circuit have appeared in past issues of RADIO WORLD.

* * *

I am considering building the set described by C. White in the March 3, 1923, issue of RADIO WORLD. He states that you must use a variocoupler, but does not state the size of the wire that is to be used. Will you please advise me what size wire to use, and also how to wind it?—Wm. F. Grimes, East Gloucester, Mass.

We refer you to the Anniversary Number of RADIO WORLD, March 31, 1923, where you will find a descriptive article by Arthur S. Gordon on how to make a variocoupler,

under the heading of "The Ultimate Coupler—How to Make It," on page 12. It is completely descriptive, giving all the details. This will help you out.

* * *

I am constructing the set described by Mr. Shidler in RADIO WORLD for March 10, on page 20. He mentions the fact that the tickler coil has 50 turns of wire. Where is this coil, and where does it go? Also what is the dial above the vernier, in the center of the top row on the panel layout?—Michael Shapiro, 2834 W. 30th Street, Coney Island, New York.

When he used the words tickler coil, he was referring to the rotor of the coupler which is used as a tickler in this particular single-circuit set. As can be seen it connects with the plate and phones, to effect feed back for regeneration. The bulb socket is located in the space you mention and he has drawn the tube in this manner with the rheostat on one side and the primary variations on the other.

* * *

We have a six-tube receiver using a loop three feet square of nine turns of No. 18 lamp cord, each turn three-eighths inches apart. Would a series condenser in one side of the loop make it more selective? We have a one-wire antenna 125 feet long, 50 feet high at one end and have tried to work it with a variocoupler, but have obtained poor results. What can be the trouble?—S. C. Olson, Pablo, Montana.

You do not state what type of receiver you are using, but from the fact that you mention six tubes, we surmise that radio-frequency is used. You should be able to get great selectivity with a loop, and it is not necessary to put the loop in series with a condenser as it will not work properly. The correct method is to shunt the loop with the condenser. Try using a flat loop, winding the wire in a square spiral instead of a solenoid. Better selectivity can sometimes be had by doing so. The set should function properly if connected to antenna and ground by a variocoupler. The secondary should connect across the terminals of the variable condenser that originally shunts the loop. More volume can be had when using a loop if a tap is taken off one of the connections of the loop and connected to the ground.

* * *

In the March 24 issue of RADIO WORLD you published an article by C. White on the subject of combining radio-frequency and regeneration. What should be the range of such an outfit? At present I have a three-step radio-frequency detector and two steps of audiofrequency, working on a loop. Would the set described give any better reception, as concerns clearness and distance?—E. W. Moreau, 668 Meadowbrook Ave., Detroit, Mich.

There can be no definite range set for any receiver, as there are too many conditions upon which good reception depends to actually state the range for any receiver. You ought not to have trouble getting 1,500-2,000 miles easily when you learn how to operate it properly. This distance is of course approximate and you may do much better than this, but a conservative estimate is always best when considering receivers in terms of miles.

You ought to get better results as to distance with this receiver than with your loop receiver, because an outside antenna will increase the distance. The advantage of a loop receiver is its extreme selectivity and quiet operation when hooked-up to a good circuit.

A MAGNAVOX Power Amplifier *for your* Magnavox Reproducer

MAGNAVOX products are made for people who judge Radio equipment as expertly as the engineer judges a locomotive or a musician a violin.

To answer such requirements, the Magnavox Power Amplifier was developed for use with the Magnavox Radio, the Reproducer Supreme.

Under present conditions, the combination of Magnavox Reproducer and Power Amplifier represents the last refinement in Radio reception—a demonstration at your dealer's is the convincing proof.

R2-18 Magnavox Radio (With 18-inch horn)

This instrument is intended for those who wish the utmost in amplifying power; for clubs, hotels, dance halls, large audiences, etc. It requires only .6 of an ampere for the field.

Price \$60.00

R3-14 Magnavox Radio (With 14-inch horn)

As illustrated

The ideal instrument for use in homes, offices, amateur stations, etc. Same in principle and construction as Type R-2.

Price \$35.00

AC Magnavox Power Amplifier

As illustrated

For use with the Magnavox Radio and insures getting the largest possible power input.

2-stage, \$55.00

3-stage, \$75.00

Magnavox Reproducers and Power Amplifiers can be used with any receiving set of good quality. Without Magnavox, no receiving set is complete.



On the Veranda of the Country Club

WHERE Radio apparatus, like a professional entertainer, must meet the test of satisfying really discriminating people, Magnavox is certain to be installed.

The first requisites—tone clearness, pitch and quality—are fulfilled by the Magnavox Reproducer; the addition of a Magnavox Power Amplifier supplies the other requisite, volume.

Magnavox Products can be had from good dealers everywhere. Our interesting new booklet will be sent on request.

The Magnavox Co., Oakland, California
New York: 370 Seventh Avenue



MAGNAVOX Radio The Reproducer Supreme

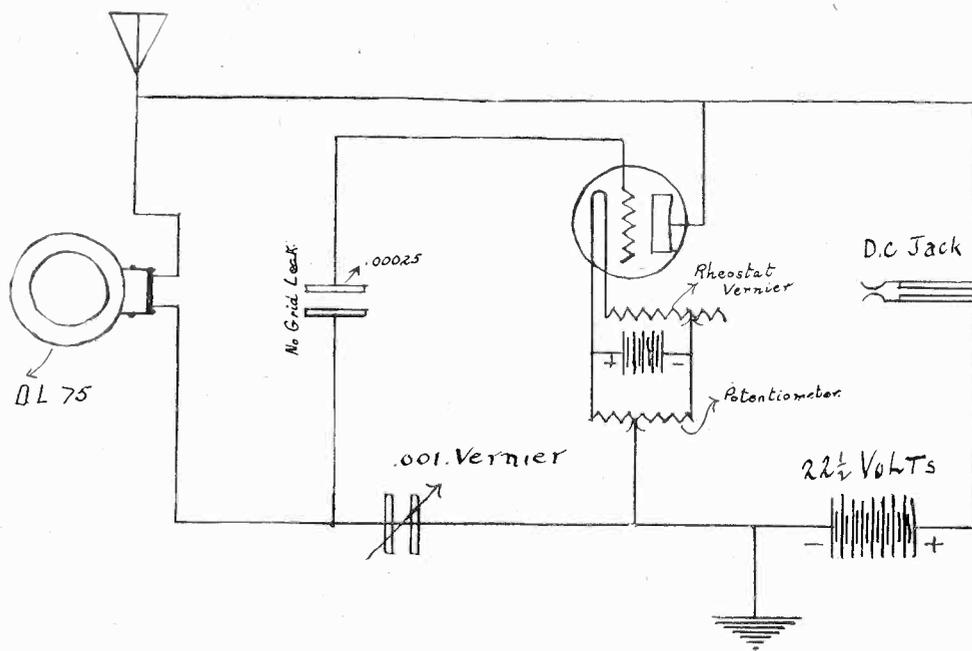
Some DX Records to Shoot At

Another Miller Circuit Booster

From D. Alexander, 607 Hastings Street West,
Vancouver, B. C.

AS requested by you in RADIO WORLD for October 21 in connection with the Miller circuit, wish to advise that I have been operating such a set for the past month, built according to your diagram with the exception of two minor changes. Instead of using a 50-turn honeycomb coil I find that, with an aerial of 150 feet, it is necessary to use a 75-turn coil for the 360-meter stations, and, for sharper tuning, a coil of 100 turns brings in the 400-meter stations better. I also have eliminated the grid leak.

To say that this hook-up is good would be putting it mild. I have been getting remarkable results with it, and it is by far the best I have tried in my two years of experimenting with different circuits. The signals come in with great volume, and the tuning is very simple. To give you an idea of what I have accomplished I am attaching a list of stations tuned in from February 13 to March 16. Most of these stations are received every night in the week if desired. For Madison, Chicago and Indianapolis I used one stage of amplification after tuning in, all of the others being received on



Miller circuit as used by Mr. Alexander, with which he has done some wonderfully fine work. One improvement on the original circuit is the potentiometer in the filament leads which gives greater selectivity and control of the signals.

detector tube alone. The mileage shown is via direct air line measured from a radio map. I have received as many as 18 stations in one evening.

For local stations the signals are so strong that I find it necessary to use only one stage of amplification to operate my Magnavox at sufficient volume to be clearly heard all over a large sized room. For distant stations two steps are necessary.

At times I use a UV-200 detector tube, but for best results a VT-1 is used. My aerial is a single-wire, L-type, 150 feet long and about 30 feet high. I find that by using a variable B battery, with switch for changing voltage, much better control is obtained. Within a space of four degrees on the condenser dial I have tuned in as many as six stations by simply turning the dial half a degree, decreasing or increasing the filament, and decreasing or increasing the plate voltage. I would strongly recommend any one trying out this circuit to use a Bradley-

THE editor of RADIO WORLD will be pleased to receive sketches of hook-ups drawn carefully in black ink or heavy pencil from the "DX Nite Owls" who send in records with a view to publishing them.

Send hook-ups of your sets, provided they contain something unusual. Send, also, the names of the various makes of apparatus you are using.

Make your letters brief and informative. Write on one side of the paper only.

The letters and hook-ups will be published in the earliest possible numbers of RADIO WORLD.

stat. I tried out all the best known wire-wound rheostats, but the Bradley has them all beat for strength of signals and clearness.

STATIONS HEARD

February 13 to March 16, 1923.

Call Letters	Location	Distance (Miles)
CHCA	Victoria, B. C.	70
KMO	Tacoma, Wash.	165
KFV	Yakima, Wash.	230
KGW	Portland, Ore.	280
KGG	Portland, Ore.	280
7XI	Portland, Ore.	280
7XF	Portland, Ore.	280
KFAE	Pullman, Wash.	360

Come Right In, You Have Plenty of Company

From Felts Cooper, 316 Melba St., Dallas, Tex.

I AM sending you my record of stations I have heard each night on my crystal set. This set consists of a home-made loose coupler, a crystal detector and a pair of Ciessmann 3,000 ohm phones. No condenser of any kind is used in my set. My record is: WHB, WDAF, both in Kansas City; WOC, Davenport, Ia.; WOS, Jefferson City, Mo., and WMC in Ohio. I hear KSD, St. Louis, about three nights each week. I think this is a good record for a crystal set. I am working on a three-tube set and when it is completed I am going to join the DX Nite Owls. There is no powerful tube set near me, and besides I hear these stations every night.

* * *

A Little Bit of Something Else

From C. G. Montgomery, 609 1/2 Park Place Ave.,
Bradley Beach, N. J.

I READ with interest the article "An Improved Single Circuit for Nite Owls," by F. N. Hollingsworth, in your issue of RADIO WORLD dated March 10. Mr. Hollingsworth talks as if it is good work for a Nite Owl to get Canada, Cuba and Porto Rico using one tube. I get WKAQ, San Juan, P. R., almost every time he is on, and could get PWX, Havana, the same but for local interference.

I received the following on detector only: WHAD, WDAF, WMAQ, WGM, WSAJ, WEAS, KSD, KDKA, WOS, WBT, WBZ, WFI, WGI, WGY, WHB, WHN, WIP, WJZ, WLW, WOC, WOO, WOR, WSB, WWJ, WAAM, WBAM, WCAE, WFAF, WFAS, WHAS, WHAV, WHAZ, CFCA, PWX and WKAQ.

* * *

Eventually, Why Not Now?

From J. J. Chapman, 3129 Holmes Ave.,
Minneapolis, Minn.

HERE is another record for the DX Nite Owls.

On the night of March 23, 1923, I tuned in 25 stations, with a total mileage of 17,820 miles.

The stations heard during that evening were: KFI, KGW, KSD, KYW, WAAN, WAAW, WBAP, WCX, WCAE, WDAF, WDAP, WDAR, WFAA, WGY, WHAS, WJZ, WMC, WOC, WOS, WSAJ, WSB, WSY, WLAG, BN7, 8XI.

The apparatus that I use consists of a variocoupler and a variable condenser and one tube. The hook-up is somewhat unusual, but is very simple to operate.

The farthest distance I have covered is: PWX, Havana, Cuba; KFI and KHJ, Los Angeles; KGW, Portland; WOR, Newark, and WFAF, New York.

I think that this is quite a good record for one tube.

* * *

Doing DX with a CR8

From Erwin Grau, Chicago, Ill.

I AM a constant reader of RADIO WORLD, and buy it weekly. I have noticed the column devoted to the DX'ers, and am sending in my list, which I would like to have published next week. I use a Grebe CR-8. The following is a list of my local and DX work so far:

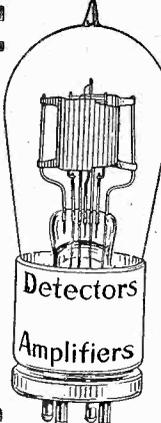
KNT	Aberdeen, Wash.	180
CFCN	Calgary, Alta.	450
CHBC	Calgary, Alta.	450
CFAC	Calgary, Alta.	450
7YL	Boise, Idaho	540
KFAU	Boise, Idaho	540
KDYS	Great Falls, Mont.	600
KFBK	Sacramento, Cal.	780
KFBB	Havre, Mont.	655
KPO	San Francisco, Cal.	835
KFDB	San Francisco, Cal.	835
KUO	San Francisco, Cal.	835
6XB	San Francisco, Cal.	835
KLX	Oakland, Cal.	835
KZN	Salt Lake City, Utah	850
KFI	Los Angeles, Cal.	1,135
KJC	Los Angeles, Cal.	1,135
KHJ	Los Angeles, Cal.	1,135
KWH	Los Angeles, Cal.	1,135
9XM	Madison, Wis.	1,760
KYW	Chicago, Ill.	1,885
WOH	Indianapolis, Ind.	2,010
9BM	Montreal, Que.	2,460

DX—WJZ, WOR, WOO, WIAO, WGY, WOS, WSY, WBAP, WPA, WWJ, WCX, WDAF, WSB, WOC, WDAS, WOAN, WFAF, WGI, WGR, WDAK, WAAY, WLAP, WKAD, WWB, WAAK, WBAD, KDKA, KSD, WGAB, KYI, Bakersfield, Cal.; KFAD, Phoenix, Ariz.; KFAY.

Local—WDAP, WPAD, KYW, WMAQ, WWAY, WBU, WIAF.

W. T. 501 DETECTOR TUBE
 For tube sets, or to convert crystal sets into tube sets at small cost. **\$2.00**
 Special Socket 40c extra
 Special Adaptor 75c extra
RADIO RESEARCH GUILD
 40 Clinton St. Newark, N. J.

GUARANTEED REPAIRS
 Broken and Burned Out **VACUUM TUBES**
 W.D.-11 not accepted for repair
 Your dealer should know, but if he does not, send direct to
HARVARD RADIO LABORATORIES
 Boston 9, Mass.
 Tubes returned parcel post C. O. D.



Can Wireless Set Off a Blast?

The increasing use of wireless and radio apparatus has led industrial users of explosives to speculate whether the electrical currents released by this might not cause premature explosions when charges are connected up for electrical firing, according to the Explosives Engineer. Obviously, this is a startling line of inquiry, the answer to which will deeply interest all those who engage in electrical blasting.

The matter has been put before the electrical bureau and the radio division of the Bureau of Standards at Washington, and representatives of each expressed the opinion independently that it would be impossible for an electric blasting cap circuit to collect enough energy from a radio station to fire a cap, unless the cap circuit were less than one mile from the radio station. This opinion was based on the assumption that one-quarter of an ampere is a dangerous current.

Four-tenths of an ampere is usually the minimum current that must pass through the bridge wire to fire one cap; but this would be too weak a current to use in series because of the leakage that occurs in most circuits. The manufacturers recommend at least one and one-half amperes to the circuit when caps are connected in series, and three-quarters of an ampere per cap in parallel connection. It would seem, then, that this estimate allows a liberal margin of safety and that blasters need have no fear of radio currents one mile or more from the station. This refers, of course, to high-power stations. The small radiophones used in dwellings need not be considered.

Remarkable Regenerative Receivers  **Ace Model V \$20**
 Formerly known as Crosley Model Vc

This one tube receiver is astounding the radio world with its wonderful achievements. Stations more than 1000 miles away are being regularly copied on this set. In comparison to its price, there is no receiver on the market today to equal it in performance.

Licensed under Armstrong U. S. Patent No. 1,113,149. The trade name Crosley is used by permission of the Crosley Mfg. Co.

Live Jobbers and Dealers are eagerly taking advantage of the sales this instrument and the rest of the Precision instruments and parts bring them.

Free Catalog on Request.

THE PRECISION EQUIPMENT CO.
Powel Crosley Jr. President
 GILBERT AVENUE CINCINNATI, OHIO

"The Little Wonder"
 FOR BOYS AND GIRLS
CRYSTAL SETS
 Unassembled-Net **\$3.50**

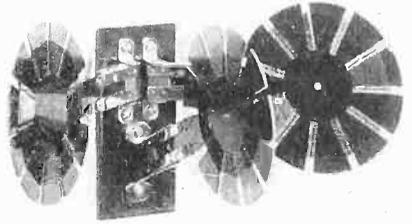
Catches distinctly everything broadcasted within 30 miles. We also manufacture the "Little Wonder" assembled set at \$5.00.

GUARANTEED TESTED CRYSTALS
 Galena 15c Radiosite 20c
 Write for Free Catalog
 It lists all our radio parts and supplies.
Holloway Elec. Supply Co., Inc.
 238 Third Ave. New York City

German Radio Patents Confiscated by French

THE Interministerial Committee appointed by Premier Poincaré has decided on the immediate seizure of German inventions patented in France, the most important of which is the Meissner patents on wireless. These patents immediately will be put at the disposal of the French War and Marine departments, according to a press dispatch from Paris. The seizure is held to be justified under Article 306 of the Versailles Treaty, which gives the right "to impose such limitations, conditions or restrictions as are considered necessary for the national defense or public interest." The Meissner patents are considered of the highest importance by the Ministry of Posts and Telegraphs.

THE GOODMAN



PATENT PENDING

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

L. W. GOODMAN
 DREXEL HILL, PA.

The GOODMAN is really a high grade instrument, well and sturdily constructed. The PANEL and FANS are GENUINE BAKELITE—the best material known for the purpose.

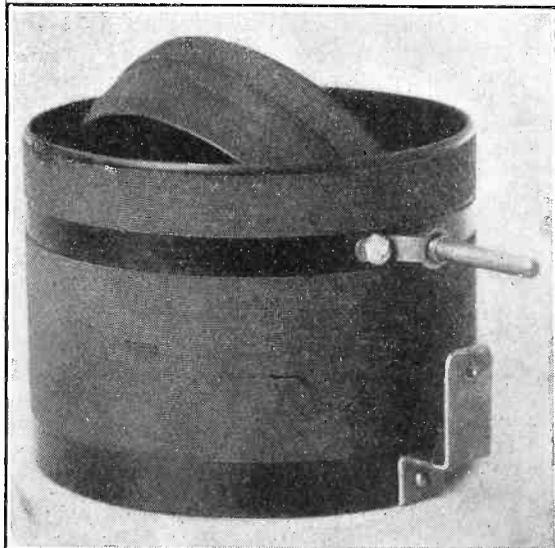
Subscribe for RADIO WORLD, \$6.00 a year, \$3.00 six months, \$1.50 three months.

TO GET THAT DISTANT STATION
USE A COAST COUPLER

This coupler is designed along strictly scientific lines, and is the result of eighteen months' experiment. Wound with green silk covered wire on Bakelite tubing. Very selective.

Following are a few of the many DX stations received with this coupler, and detector tube only, at Long Beach, California:

- PWX, Havana, Cuba
- WWJ, Detroit, Mich.
- WSB, Atlanta, Ga.
- WDAP, Chicago, Ill.
- CFCN, Calgary, Can.
- WBAP, Ft. Worth, Texas



Our adaptation of a popular hook-up furnished with coupler. Coupler fully guaranteed when hooked up according to instructions.

Coupler and diagram, sold only under our money back guarantee. Mailed anywhere in the United States upon receipt of \$5.00. Post Office or Express money order.

Make All Remittances Payable to

COAST COUPLER COMPANY
 321 WEST SEVENTH ST. LONG BEACH, CALIFORNIA

Radio Merchandising

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

Telephone Bryant 4796.

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:

- Nelson Russell, 135 Glen Ave., Phillipsburg, New Jersey.
 William Ruddiman, 292 Berkshire Ave., Bridgeport, Conn.
 S. Marchese, P. O. Box 417, Brooklyn, N. Y.
 M. H. Kurtz, Elkin's Bakery, 603 East 11th St., N. Y. City.
 Clayton J. Taylor, 824 West Seventh St., Chester, Pa.
 G. E. Edson, 306 North Willomet Ave., Dallas, Texas.
 Toben Brothers, 32 Gilmore St., Whitehall, N. Y. (Dealers.)
 Wm. C. Mateer, 872½ West Vernon Ave., Los Angeles, Calif.
 Jacob's Cash Store, Sweetwater, Tenn. (Distributors.)
 W. Claude Strange, Walnut Springs, Texas. (Wants dealers' prices.)
 Edward E. Salley, Woonsocket, Rhode Island.
 H. F. Crandall, 128 West 64th St., N. Y. City.
 Joseph A. Tagliabue, 1605 John St., Baltimore, Md.
 Joseph Weyand, 53 Twenty-seventh St., Guttenberg, N. J.
 Golden's Garage, Walnut, Ill. (Retailer.)
 Antonio Bosch, San Jose 216, Havana, Cuba.
 A. E. McCullough, 649 East Buchtel Ave., Akron, Ohio.
 M. A. May, 202 Hubbard St., Yoakum, Texas. (Retailer.)
 C. A. Henderson, Belle Fourche, South Dakota. (Interested in amplifying transformers.)
 H. J. Linkins, 636 Woodland Ave., Springfield, Ill. (Is an agent selling direct to consumers.)
 A. D. Turnbull, 57 Union St., Sydney, Nova Scotia, Canada.
 Gale Blaisdell, 427 Eighth St., S. W., Le Mars, Iowa.
 A. J. Carlo, Steger, Illinois.
 S. S. Stanley, 3206 Champion St., Oakland, Calif.
 B. D. Waldron, 724 Union St., Brunswick, Ga. (Dealer.)
 William Jordan, Irma Cloak & Suit Co., 242 West 36th St., New York City.
 George Campbell, 870 Ashbury St., San Francisco, Calif.
 Joe J. Vance, 316 South Bellaire St., Kansas City, Mo.
 Walter C. Clark, Bunker Hill & Sullivan Mining & Concentrating Co., Kellogg, Idaho. (Interested in first class equipment only.)
 Maxwell Schmidlapp, Box 735, Taft School, Watertown, Conn. (Will build a receiving set.)
 John D. Cushing, Taft School, Watertown, Conn. (Builds and sells sets.)
 Tom H. Scholes, 4 Warren St., Lawrence, Mass.
 Fred J. Landry, 272 Maple St., Holyoke, Mass. (Will soon open a radio store.)
 Forest W. Harshbarger, 29 North Ave., Burlington, Vt.
 C. J. McPherson, 4500 Walnut St., Philadelphia, Pa.
 "Tex" Lynne, 411 Fannin St., Houston, Texas.
 Donald S. Clark, 103 Early St., Morristown, N. J.
 Campbell Garage, 602 Avenue A, Palestine, Texas. (Now stocking largest radio store in the city.)
 Harry Williamson, Maryville College, Maryville, Tenn.
 Harry M. Feintuch, 1495 St. Marks Ave., Brooklyn, N. Y. (Will establish retail radio business at once.)
 Erwin Newell, 1827 West 45th Street, Cleveland, Ohio. (Manufacturer's agent. In the market for radio supplies of all kinds.)
 E. W. Jobe, 5041 Davison Street, St. Louis, Mo.
 W. F. Worrell, Box 52, Bernice, Louisiana.
 Chas. Larson, Minneapolis, Kansas.
 F. B. Dougherty, 803 Goodrich Avenue, St. Paul, Minn.
 Heraldo De Cuba, Radio Department, 32-40 Calle Manrique, Havana, Cuba.

Radiall Moving to Larger Quarters

THE trade is advised that, after May 1, the main office of the Radiall Company, now located at 99 Warren Street, New York City, will be at 654 Grand Avenue, New Haven, Conn. All letters and communications should hereafter be sent to the new address.

The Hartzell Sales Co.

PRESTON M. SMITH, formerly sales manager of the Dubilier Condenser & Radio Corporation, New York City, has been appointed general manager of the Hartzell Sales Company, a manufacturer's sales organization, well and favorably known throughout the eastern and southern states. They represent some of the highest type radio accessory manufacturers, among these being: Alden Mfg. Co., Springfield, Mass.; American Transformer Co., Newark, N. J.; C. Brandes, Inc., New York City; Dubilier Condenser & Radio Corporation, New York City; H. H. Eby Mfg. Co., Philadelphia, Pa.; Electrad Corporation of America, New York City; Mu-Rad Laboratories, Inc., Asbury Park, N. J.; Tait Knob & Dial Co., New York City; The C. D. Tuska Co., Hartford, Conn.; U. S. Tool Co., Newark, N. J.; Witherbee Storage Battery Co., New York City.

The Hartzell Sales Company maintains offices at: 623 Victory Building, Philadelphia, Pa.; 705 Granite Building, Pittsburgh, Pa.; 1028 Fourth Avenue, Huntington, W. Va.; 302 Flatiron Building, Atlanta, Ga. Within a month they will open a fifth office at Dallas, Texas. The territory they cover includes, on the north, New York State (excepting the metropolitan district), west to and including Indiana, and all states south to and including Texas and Oklahoma.

The Hartzell Sales Company has a high-type, clean-cut sales policy, offering the products of the manufacturers they represent to the high-grade, legitimate jobber and manufacturer only, giving such their fullest co-operation.

Radio Stocks

(Quotations as of April 25, 1923, furnished by Frank T. Stanton & Co., 35 Broad Street, New York, Specialists in Wireless Securities.)

Stock	Bid	Asked
American Marconi Stamped	5c	15c
Amer. Marconi Unstamped	\$5	\$7½
American Tel. & Tel.	122½	123
Canadian Marconi	2¼	3½
De Forest Radio	\$7	\$10
Dubelier Condenser	12	12¼
English Marconi com.	11	16
English Marconi pfd.	11½	16½
Federal Tel., Calif.	5½	6
General Electric	177¼	177½
Hennessey Rad. Pub. 8% pfd.	9	11
Marconi Int. Marine	7	10
Manhattan Elec. Supply	55	57
Mackay Companies com.	114	116
Radio Corporation com.	3½	3¾
Radio Corporation pfd.	3½	3¾
Spanish Marconi	1½	2½
Western Union	111½	112
Westinghouse Elec.	57½	57¾

Small But Efficient

The Electric Service Engineering Company, 105 West 47th street, New York City, have called their latest achievement in circuits "The Radio Pup" set. "Pup" is evidently appropriate to the circuit only because of its size and the small number of parts involved; for if the circuit does what its makers claim for it, it is certainly no junior affair.

Coming Event

ANNUAL HOME AND CITY BEAUTIFUL EXPOSITION, featuring radio exhibits. Atlantic City, N. J., June 16 to September 8, 1923.

New Radio and Electric Firms

Criterion Radio Corp., New York City, makes radio outfits, \$5,000; A. I. and J. Gancher, M. Fleischer. (Attorney, N. M. Hutner, 297 Fourth Avenue.)

Harle Electrical Supply Co., Dover, Del., manufacture, \$100,000. (Capital Trust Co. of Delaware.)

Radiotel Manufacturing Corp., Wilmington, Del., electric work, \$1,050,000. (Corporation Trust Co. of America.)

Glaser Nature Phone Co., Wilmington, Del., manufacture, \$2,000,000. (Corporation Trust Co. of America.)

Sun Electric Corp., Wilmington, Del., agency, \$100,000. (Delaware Registration Trust Co.)

Public Service Electric Power Co., Wilmington, Del., build generating stations, \$120,000,000, of which 100,000,000 shares without par value or for taxation purposes. (Corporation Service Co.)

Kansas City Electric Supply Co., Wilmington, Del., \$150,000. (Corporation Service Co.)

Elgin Electric Corp., New York City, incorporated for \$15,000. Directors, L. Weisberg, E. Gettinger; attorney, S. B. Lillienstein, 280 Broadway, New York City.

Paducah Electric Co., operate lighting and power plants, \$1,200,000. William T. Crawford, Westwood, Mass.; E. I. Doe, Waltham, Mass.; John T. G. Nichols, Cambridge, Mass.; Theodore T. Whitney, Jr., Milton, Mass. (Corporation Trust Co. of America.)

Williamsburg Radio Supply Co., Brooklyn, N. Y., \$10,000; B. Suchar, B. Firstenberg. (Attorney, A. J. Suchar, 801 Flushing Ave., Brooklyn.)

Sterling Electric Co., New York City, \$150,000; A. W. Palmer, V. A. Roberts, G. M. Hesler. (Attorneys, Morrell, Bates, Topping & Anderson, 27 Cedar St.)

Chicago Telephone Supply Co., Elkhart, Ind., increase from \$150,000 to \$300,000.

Deforest Phonoflms, New York City, \$50,000; H. Bogdish, A. Powsner, H. A. Deimel. (Attorneys, Fishers & Deimel, 129 West 42d St.)

Brilliant One Radio Products, New York City, \$25,000; S. S. Goldstein, G. Mitchell, N. Krauss. (Attorney, S. Rosenberg, 309 Broadway.)

Schachmer Electric Co., Brooklyn, N. Y., \$5,000; A. I. Schachmer, A. and B. Kampel. (Attorney, G. Wolf, Astor House Building, New York City.)

Protectophone Corp., New York City, make sanitary mouth piece, \$25,000; W. M. Barry, E. H. Faulkner, W. Armstrong. (Attorney, E. A. Eichner, 1545 Broadway.)

Todd Electric Co., New York City, \$5,000; A. I. Todd, B. Weiss, I. Katz. (Attorney, I. Silverman, 299 Broadway.)

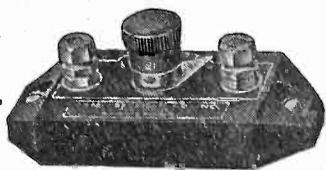
"1,000 Miles on One Tube"

That's rather a strong statement, but The Radio Parlor, 2671 Broadway, New York City, say that they have the actual proof that their new one-tube set does it. They are merchandising the circuit with a complete list of parts and a simple diagram for the hook-up.

MANUFACTURERS AND DISTRIBUTING AGENTS!

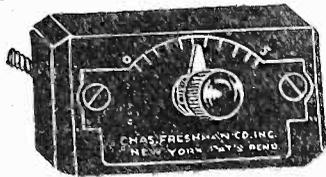
Radio Salesman of wide experience wants popular line of apparatus to sell to radio dealers while on transcontinental tour by auto. Commission basis. References guaranteed satisfactory.

Address MR. ARTHUR G. SHIRT
87 Smith Street Fall River, Mass.



NEW CONSTRUCTION
of all **FRESHMAN**
Variable Resistance Leaks

guarantees long life and permanent resistance—no pencil markings—assures an unbroken range of 180 degrees. Eliminates hissing. Clarifies signals.



A New Leak for
PANEL MOUNTING

Mounted on any panel in a few seconds—2 mounting screws serving as connections behind the panel.

Complete with either .00025 or .0005 mfd. Micon Condenser **\$1.00**
Without Condenser **75c.**

A necessary essential for every tube receiving set

At your dealers—otherwise send purchase price and you will be supplied postpaid. Also ask your dealer for our free diagram of the Kaufman and Flewelling circuits.

Chas. Freshman Co. Inc.
Radio Condenser Products
106 Seventh Avenue New York City
Home of Micon and Antenella

WGY Will Celebrate
The Centenary of
"Home Sweet Home"

THE centennial of "Home Sweet Home" will be observed by WGY, the Schenectady broadcasting station of the General Electric Company, Tuesday evening, May 8. It is particularly appropriate that WGY should observe the hundredth anniversary of this song because its writer, John Howard Payne, lived for three years in Schenectady as a student at Union College.

He entered Union at the age of thirteen years in 1809 and that year, while homesick and penniless, he wrote a poem which he called "Home Dear Home." The manuscript of this poem is now treasured in the archives of the college. During his third year at Union Payne was obliged to leave college to relieve the financial burdens of his father and at the age of sixteen began a stage career which gave great promise.

Eleven years after he left Union and seventeen years after he had written his poem "Home Dear Home," Payne wrote a second poem on the same theme and called it "Home Sweet Home." This poem was included in a batch of play manuscripts which he sold a London producer for £250. On May 8, 1823 "Home Sweet Home" was sung during the opera "Clari, or Maid of Milan." The opera was a failure, it is unknown today, but the song achieved almost instantaneous popularity. Its popularity was not that of the songs of today for it touched intimately the lives and experience of people of all times and places. Today, one hundred years later, "Home Sweet Home" has lost none of its appeal and that one spark from the genius that was Payne's still glows.

After twenty years' absence from the United States Payne returned and for several years engaged in literary work. In 1842 he was appointed consul at Tunis, was recalled in 1845 and reappointed in 1851. Two years later on April 9 he died in Tunis. Thirty years later the body was brought to America and reinterred in Oak Hill Cemetery, Washington, D. C., with the highest honors.

Dr. Charles Alexander Richmond, president of Union College, will give an address from WGY, May 8, telling the radio audience about the boyhood of Payne. The Union College Glee Club will sing "Home Sweet Home." W. T. Hanson, Jr., author of a book on the early life of Payne and possessor of a large collection of Payne letters and manuscripts, will also deliver an address.

Broadcasted!

IN no less a journal than the London *Spectator*, appears the verb "broadcasted." There is no more reason for using "broadcasted" than there is for saying "casted" and "forecasted," contends the Providence, R. I., *Journal*. Long before radio came into existence the verb "to broadcast" was in good and regular standing. Its meaning, of course, was, and still is, "to disseminate widely." We do not say: "He casted a stone at me," or "The weather bureau forecasted a storm yesterday." And there is no justification for tacking on a superfluous "ed" in the case of broadcast.

Something Radio Cannot Reach

Scientists can magnify the human voice 12,000 times, according to the Brockville, Ont., Recorder, but they seem unable to do a darned thing for the voice of conscience.

Ready For You

Now you can sit on summer like a Polar Bear on a cake of ice—No Troubles at all!!

When our investigators first spoke of it we were surprised ourselves, but now we have the actual instruments in stock and ready to ship to the real radio fans who are determined to eliminate summer troubles. You can sit on the verandah this summer and with the NAVY TYPE D TRANSFORMER in your hook-up, hear the best the U. S. A. has in entertainment. We have enough NAVY TYPE D TRANSFORMERS on hand to fill the first 300 orders. Send at once for yours.

THE RUBICON NAVY TYPE D
(Trade Mark)
Audio Frequency Transformer

Value \$6.00—
Selling Now at **\$4.95!!**

Pronounced by Eminent Radio Authorities
Most Perfectly Balanced

Here is a Summary of Their Verdict
NO Magnetic Leakage—NO Distortion—Low Distributed Capacity Permitting Application of Maximum Voltage to Grid of Tube—Scientifically Determined Portion of Iron within Core Delivers Energy Undistorted in Wave Form to the Secondary and Grid of the Amplifying Tube—Necessary for Critical Tubes—Builds Up Weak Signals.
Primary 1100 Ohms. Secondary 5750 Ohms. Ratio 5/4 to 1.

Write out your order and pin a Post Office Money Order to it. Mail to us. Ask for our FREE CATALOGUE. It tells how to get distance by using D X instruments built for Distance. Send Money Orders; checks and stamps not accepted. Merchandise shipped postpaid east of the Mississippi.

D-X-Radio Co.
123 Liberty St. New York City

Good Bye Aerials!
So Long Static!



(Pat. Pending)

Replaces aerials, loops, electric light plugs, etc. Eliminates lightning dangers. Reduces STATIC interference and distortion. Brings clearer signals and truer tone. Works on all standard vacuum tube sets.

Postpaid, Anywhere, for
\$5.00

Satisfaction Guaranteed, or Money Refunded.

Short Cut Radio Corp.
243 West 54th St. New York

Makes Your Set Portable.

Size only 3/4 by 2 1/8.

Cockaday Circuit

The newest and the most startling development in radio.

Exceedingly Selective. Simple to Operate. Highly Sensitive. Verified C.W. Range of 3200 Miles. Telephone Range of 2400 Miles. Complete Parts for This Circuit.

\$12.71

Include the following:

1 Special Coil	\$3.25
2 Variable Condensers (Bakelite Ends)	3.00
1 Socket (Genuine Condensite)	.50
1 Vernier Rheostat (Cutler-Hammer)	1.30
1 Panel (Genuine Bakelite) 7 x 18	2.50
1 Grid Condenser, Mica Dublier .00025	.35
1 Switch Lever, 7 Points, 2 Steps	.31
8 Binding Posts	.40
1 Grid Leak (Cartridge Type) and Bakelite Holder	.60
2 Dials, 3 Inch	.50
Total	\$12.71
One Stage Amplifying Unit to This Set	
Additional	\$5.00
Two Stages, Additional	11.00
Cabinets, Piano Mahogany Finish, One Bulb Set	\$3.75
Two and Three Bulb Set	4.75

Complete Parts for Flewelling and Reflex Circuits.

U. V. 200 Tubes	\$3.95
DeForest DVGA. Wonderful as an amplifying tube	6.00
2 1/2 Volt "B" Battery	.89
Nathaniel Baldwin Type C, Double Phones	8.50
Nathaniel Baldwin Type C, Single Phones	4.50
Brandes (Superior) Phones	5.95
45 V. "B" Batteries (each)	2.25

All orders must be accompanied with a money order, postage included.

GRAND RADIO CO.
1789 Third Ave. 1714 Second Ave.
NEW YORK CITY

WOULD YOU LIKE TO RECEIVE RADIO LITERATURE?

Are you in the market for radio goods of any kind, either as a consumer, a distributor or a retailer? If so, send us your name and address on a post card and we will see that your name reaches the right people so that you will receive pamphlets, circulars, etc., regarding the goods you want.

ADDRESS SERVICE EDITOR, RADIO WORLD, 1493 BROADWAY, NEW YORK CITY

ROBBINS RADIO DESK

An attractive piece of furniture so constructed and designed to meet all the requirements in making a neat installation of the radio in the home. Its many advantages and moderate cost make it almost indispensable.

For Sale By First Class Furniture and Radio Dealers or Write

ROBBINS WOODWORKING CO.
LIBERTYVILLE, ILLINOIS

Radio Bugs and the Radio "Buggy"

By C. W. TUCKER

HEY, look at the crazy guys!" shouted a boy to his playmates across the street as an automobile containing three serious-looking men wearing radio head phones passed through Greenwich Village in New York City. "They got a radio in that car!" But they weren't crazy; not even mildly insane. They were three New York radio engineers—Col. N. H. Slaughter, L. M. Clement and A. S. Santos—returning

from an all-night vigil at the radio station at Deal Beach, New Jersey, where they had been "listening-in" on SPE, the International Western Electric Company's radio-broadcasting station at Rio de Janeiro, Brazil, 5,000 miles away. But that isn't the burden of this story. Five thousand miles is not a record for SPE, which has been heard 8,000 miles away, at Honolulu.

Shortly after leaving Deal Beach Mr. Clement, who occupied the rear seat, holding on his lap the seven-tube "baby" which did such good work the night before, became restless, put on a headset and started twisting the knobs and swinging the loop antenna. Soon the strains of an organ floated in on his sensibility, which he knew could be nowhere else but at John Wanamaker's, Philadelphia.

"I got WOO! I got WOO!" What the driver, Col. Slaughter, got was "Whoa! Whoa!" And he brought the car up with a jerk. The other members of the party, when they learned what was going on behind their backs, donned head phones and started merrily on their way.

Rounding a turn in the road Handel's "Largo" on the pipe organ was replaced by "Runnin' Wild," being played by a remarkable jazz organization at WAAM, Newark. This, of course, was caused by a different pointing of the loop. Just then a big truck lumbered by, and the "bing, bang, bang, bing, bang, bang" of the ignition system registered in the ears of the listeners. Every spark was a bang that obliterated broadcasting for the moment.

About two miles ahead, at the top of a hill, could be seen the garage at which it was expected to replenish the gas tank. Just at this time the operator swung the loop around, and WJZ at Newark said: "After the reaction in yesterday's market oils opened strong this morning. South American oils advanced slightly, and Standard advanced a half point." The chauffeur bent over his wheel and stepped on the gas. He must make yonder hill before the price of oil rose. Just then the engine began to miss and sputter. Then she suddenly ceased her circumlocution with a mighty cough. Soundings of the gas tank showed that the slant of the hill was keeping "Maud" from getting the fluid which gave her the kick. Undaunted he turned the car around, backed up the hill, and saved the day.

In Red Bank, New Jersey, a woman stopped spellbound in the middle of the street on seeing the autoists wearing radio ear-muffs. The brakes were applied sharply and the horn gave voice to angry protests against the blockade before she decided to let the "radio buggy" go by. The traffic cop on the next corner paused in wonderment, and said something under his breath before giving the signal to go ahead.

On entering Newark WJZ was transmitting the time signals, and as the radio conveyance passed the Newark market the market quotations were coming in. Apples at four simoleons a barrel; potatoes at 14 kopeks the bag; Bermuda onions at 4,000,000 rubles per crate. But time would not permit these radio fans to check up with the retail prices. But here is a hunch for the hurried housewife.

While crossing the meadows the barrenness of the expanse was relieved by the beautiful figures of speech used by Dr. S. Parkes Cadman in his noonday sermon from WEAF. Just as he finished the discourse and uttered the words "Let us pray" a cop rode up alongside of the speeding car, and for the moment the speeders joined in silent supplication. But he passed on, and the trio sighed in relief.

In driving onto the 23d Street ferry boat the once eloquent receiving set was sealed in silence on account of the shielding of the steel frame of the boat. But, by pointing the loop antenna at a steel upright instead of toward the station, the radio travelers were comforted as the vessel embarked on its voyage by "Eternal Father, strong to save, whose arm hath bound the restless wave."



SUNBEAM

The Best Combination, Boys!

SUNBEAM QUALITY goods to complete the Cockaday Circuit
One guaranteed, accurate set of coils consisting of one plain and one Bank-wound coil sent postpaid for \$2.75.

17 plate SUNBEAM QUALITY condenser, heavily nickel-plated, handsome finish, all Bakelite Mt'g. Adapted for the COCKADAY circuit.....\$2.88

PHONES

\$12.00 Baldwin, double	\$9.80
6.00 Baldwin, single	5.25
8.00 Brandes	5.75
8.00 Federal	4.90
6.00 Murdock No. 56	4.25
7.00 Auth	4.00
RADIOSEAVE LOUD SPEAKER UNIT.....	3.75
AMPL.-TONE PHONES, 2200 Ohms, TESTED AND GUARANTEED	3.75

MISCELLANEOUS

Federal Potentiometer	\$1.25
Klosner Rheostat .....	.79
Filkostat	1.75
Bradleystat	1.65
Cutler-Hammer Rheostat .....	.85
Cutler-Hammer Vernier Rheostat	1.25
JEWELL VOLTMETER—zero to 50 volt.....	3.00
Sterling Voltmeter—zero to 50 volt.....	2.50
Cutler-Hammer Battery Switch for panel mounting, Nickel Plated.....	.75

Another hummer. Triple Bank-Wound Coil, Silk Wound. To meet the new Government regulation wave-lengths now being allotted. Furnished with hook-up and instructions.....\$3.25

TRANSFORMERS

\$7.00 U. V. 712 R. C.	\$5.85
7.00 Federal	4.75
5.00 Acme	3.75
5.75 Kardon	3.50

CONDENSERS

Radio Stores Corp., Bakelite Ends, 23 Plate...	\$3.75
A. B. C., 23 Plate	1.60
Radiant with Geared Vernier:	
23 Plate	5.50
43 Plate	6.00

MIGNON, FORMICA INSERTS

Type A, Plain, 14 Plate	\$4.50
Type B, Plain, 26 Plate	5.00
Type C, Plain, 46 Plate	6.00
Type A, Vernier, 14 Plate	6.00
Type B, Vernier, 26 Plate	6.50
Type C, Vernier, 46 Plate	7.50

SOCKETS V. T.

Bestone, Solid Bakelite	\$0.75
Eagle, Bakelite .....	.60
Good Bakelite Sockets .....	.50
John Firth .....	.50
Composite Base .....	.39

DeForest, Eveready and all Radio apparatus of SUNBEAM QUALITY available at Best Prices. Our Radio mechanics will complete any radio set to your specifications.

SUNBEAM ELECTRIC COMPANY

71 THIRD AVENUE (Between 11th and 12th Streets), NEW YORK

Farm Lighting Plants at Bargain Prices. For Yachts, Motor Boats and Country Homes.

ASK ANY "ALL WAVE" COUPLER USER. THEY ALL GET

DX STATIONS LOUD AND CLEAR

WITH THE GENUINE AND GUARANTEED

"ALL-WAVE"

(Trade Mark)

COUPLER

And anyone of the Six Simple Super-Sensitive Single Circuit DX Hookups

GIVEN FREE

with each Genuine and Guaranteed "All-Wave" Coupler



Patents Granted

It is an established fact that any one of the simple Capital Single Circuit hook-ups used in conjunction with the Genuine and GUARANTEED "ALL WAVE" COUPLER will bring in "DX" stations louder and clearer than any double circuit can.

WAVELENGTH
150 to 3000 METERS
PRICE\$9.00
effecting a real saving, in-
asmuch as ALL
VARIOMETERS,
VARIOCOUPERS AND
LOADING COILS ARE
ELIMINATED

6 efficient hookups sent upon receipt of 10c. to cover cost of mailing

Capitol Phonolier Corporation 60 Lafayette St.
New York

Major Mott's Interesting Station on Catalina Island

EDITOR, RADIO WORLD:

Your request of recent date—for a photograph of my Station — has been received—friend.

* * * *

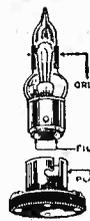
Herewith one that has just been taken, and I append a short description of

Grebe I hear all the larger power stations of the world. POZ is so loud that signals may be read 200 feet from horn.

8. Transmitter, using four 5-watt WE tubes, or one 50 watt. Used for work up to 1,000 miles, though effectively used in '21-'22 in working 3ALN, 3FS, 8BUM, 8AWP, etc.

Twenty-six tubes are used in the sets—chiefly WE. Nearly 1,000 cards and a vast number of telegrams, cables and letters have been received in the passed season. All four walls of the operating room are entirely covered with cards. Only a few

ECONOMY! QUALITY! SERVICE!



The Delta is a 3-volt dry cell tube, using a 22½-volt B Battery. Can be used as detector in any successful circuit. Guaranteed 1000 hours' service.

\$2.50 Each

Composition Delta Socket, 40c each. Standard Socket Adapter, 75c each.

DELTA MIDGET TUBE CO.
241 Market St. Newark, N. J.

Selectivity Sensitivity Simplicity

ALDWIN CIRCUIT

Complete Set in Cabinet—Will Operate Loud Speaker

\$25.00

Two Stage Amplification with Loud Speaker

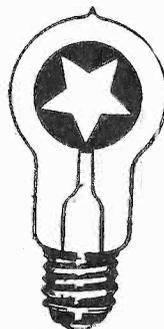
\$100.00

A. R. J., N. Y. City—“Gets Havana and Atlanta clear as a bell,” says he.

ALDWIN RADIO CO.

676 Eighth Ave. New York City
We will ship our sets anywhere in the U. S. and guarantee satisfaction.

The NEON LIGHTNING ARRESTER



Price \$1.50

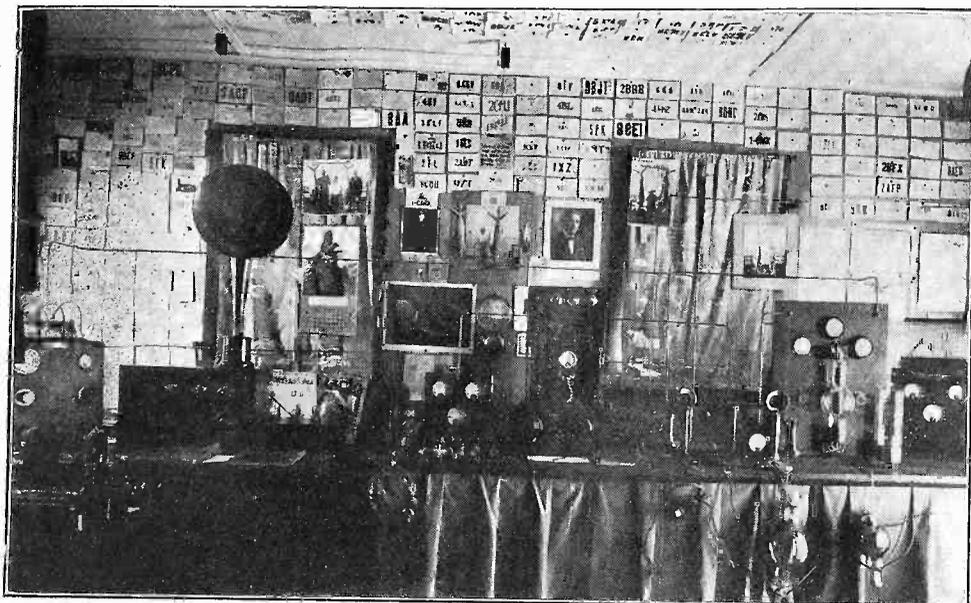
Best Protective Arrester for Aerials on the Market

Helps Eliminate Static

Can also be used as a Rectifier for small currents

Approved by Underwriters' Laboratory N. Y. Tribune Laboratory

Neon Lamp Works
62 W. 14th St., New York



Station 6XAD-6ZW, Owned and Operated by Major Lawrence Mott, Avalon, Santa Catalina Island, Cal.

apparata on the tables. This I would BEG of you to use, as — each time that a foto of the Station has appeared in the various publications—without a description—I have been pestered to death by operators from ALL over the country—asking for DESCRIPTIONS!!

You can save me all this bother by publishing that which I send!

I—THANK—YOU!

Cordially—

LAWRENCE MOTT,

Avalon, Major—Signal Corps—
Catalina Island, Cal. O.R.C.—U.S.A.

DESCRIPTION OF 6XAD-6ZW.

(Owned and Operated by Major Lawrence Mott, Signal Corps, O.R.C., U. S. A.; U. S. Deputy Game Warden.)

Apparatus, from right to left:

1. Combination telephone and telegraph set, using four 50-watt tubes. Power derived from special design m-g set, giving up to 3,000 volts.

2. The big transmitter. So built as to use either a WE-250 (shown at right of panel), a GE-250 (shown in circuit), or either of the two British tubes (Mullard), shown hanging below; one a 500-watt and the other a 250.

3. Special design transfer switch that, by one motion, throws over antenna, counterpoise, ground and power from one to another of the four transmitters, as desired.

4. Antenna switch.

5. Grebe CR-5, with WE design, 2-step amplifier above, and above that a WE-7A amplifier, giving, in tandem, a wonderful result.

6. 100-watt transmitter, using two WE-50's on 220 meters, rad. 61. On this set, during season '22-'23, I have been reported from Australia, New Zealand, Europe, off the coast of Brazil, in northern Alaska, and from many parts of both the Pacific and Atlantic Oceans. This transmitter has effectively worked every district, been heard in every state, and in every Canadian province.

7. Another WE-7A amplifier (in front of magazines). Used in conjunction with new type Grebe CR-7, shown next, with WE loud-speaker horn on top of it. On this

shown in the photograph. The ceiling is partly covered.

PATENTS

promptly procured. Trade Mark designed & registered. FREE INVENTION RECORDING BLANK Phone Vanderbilt 7312

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

THE WONDER BOOK OF RADIO

This book, which gives all the latest information in simple language, is endorsed by Radio experts.

THE RADIO CONSTRUCTOR

Volume 1, Number 3

CONTENTS { ONE TUBE REFLEX AMPLIFIER. REINARTZ TUNER (With Spider Web Coil). TWO STAGE RADIO FREQUENCY AMPLIFIER. REGENERATIVE SET (with Two Stage Amplifier for W.D. II Tube.)

FULL SIZE PANEL LAYOUTS for Each Set. The template can be placed on the panel and holes drilled where marked, thereby saving TIME AND MONEY.

COMPLETE LIST OF BROADCASTING AND MERCANTILE STATIONS in United States and Canada.

In great demand. Get your copy today. At your DEALER'S or direct by mail. Per copy prepaid..... **50c**

S. NEWMAN & CO., Publishers

74 DEY STREET, Dept. G

NEW YORK CITY

Send coin or money order—cheques or stamps not accepted

FOR ONLY \$7.00

You get all the parts necessary to build complete

"RADIO PUP SET"

We get favorable comments from all who have built it.

This unique one-tube set is a wonder, most simple in construction—yet gets the distance and has the tone-quality of a three-tube set

We have all the "Hard-to-Get" Radio Supplies at Prices That Are Right.

MAIL ORDERS PROMPTLY FILLED

Electric Service Engineering Co., 105 West 47th Street, New York
Bryant 2743

Mr. York, Scranton, Pa., has had Minneapolis, Minn., and Kansas City, 1,250 miles from Scranton.

1000 Miles Guaranteed on One Tube

A real Radio one tube set for a real low price.

Oak cabinet, two dials, drilled panel, vern. rheostat, vern. button for dial, eight rubber top binding posts, 23 p. A.B.C. condenser, variocoupler, socket, two fixed condensers, busbar and spaghetti. Together with simple diagram. Any boy can hook it up. Price....\$14.00

Without cabinet\$11.50

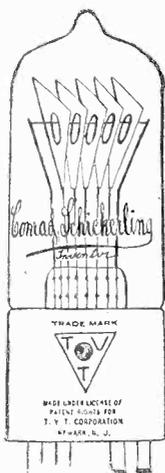
The above can be used with any tube having standard base or W.D. 11 and U.V. 199 by using adapters. This set has been and is being used in many of the Eastern States. We can furnish names of owners who have received Havana, Cuba, and Los Angeles from New York, Chicago, Davenport, St. Louis, Kansas City, Atlanta can be tuned in from N. Y. any night.

Mr. E., Riverside Drive, N. Y., claims he gets Los Angeles any night after midnight. Express or P. O. money orders accepted. Set shipped same day order received. Full description given above. At this low price we cannot bother with unnecessary correspondence.

The Radio Parlor, 2671 B'way (Bet. 101st and 102d Sts.), New York

T. V. T. Detector Tubes

BELOW MARKET PRICES



We have just made an exceptionally fortunate purchase of T. V. T. Detector Tubes at much less than regular prices and we offer the public an opportunity to participate in an advantage, which seldom occurs.

The new Triangle Plate Tube is a new invention, making unnecessary the use of grid. It has been thoroughly tested by many of the foremost radio experts and claimed to be far superior to the fragile grid tube in strength, durability and results.

It completely eliminates all the rasping, howling grid noises and distortion caused by the vibration of the grid in all grid tubes.

T. V. T. Tubes are gridless. They are better tubes, scientifically made to reproduce the sound of voice or music free of distortion and harshness, in clear, soft, natural tones.

Every tube thoroughly tested before leaving our firm

6-Volt	List Price, \$5.00	Sale Price, \$3.50
2-3-Volt	List Price, \$6.50	Sale Price, \$4.00

P. O'BRIEN

310 LERNER BUILDING

JERSEY CITY, N. J.

FILL OUT AND MAIL NOW
SUBSCRIPTION BLANK

RADIO WORLD

RADIO WORLD

1493 Broadway, New York City

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

SUBSCRIPTION RATES:

Single Copy\$.15
Three Months 1.50
Six Months 3.00
One Year, 52 Issues..... 6.00
Add \$1.00 a Year to Foreign Postage; 50c for Canadian Postage.

Radio Forces Cable Rate Reduction

ANNOUNCEMENT was made last week by the French Telegraph Cable Company, New York City, of substantial reductions in cable rates, effective at once to various countries of Europe. An official of the company explained that the reductions were made because of the increasing competition offered by the radio field.

Both the Western Union and the Commercial Cable Company previously had made announcement of the lowering of their rates, and it was explained that the action by the French company was merely to equalize theirs with the others.

Under the new schedule the rate to Great Britain of all three companies is 20 cents instead of 25; France, 22 instead of 25; Switzerland, 27 instead of 30, and Italy, 26 instead of 31.

Survey of Vacuum Tube Supply Is in Progress

ANNOUNCEMENT was made last week that the National Radio Chamber of Commerce, 165 Broadway, New York City, has undertaken a national survey of the vacuum tube supply in the United States.

This survey, the first to be made, and reported to be well under way, "vitality concerns every one in the radio industry, as well as the public," according to a statement issued after a meeting of the Board of Governors, at which numerous groups were represented. The governors, it was stated, acted at the request of the chamber's membership and of other elements in the radio industry.

Specifically, the supply of the following tubes is concerned: 200, 300, 201, 301, 201-A, 301-A, DV-6, DV-6A, WD-11 and WD-12.

This movement, it is asserted, is part of a program to aid in the orderly development of the radio industry in the interest of both the industry and the general public. Cooperation with the Department of Commerce and other government departments, as well as with universities and public and private institutions, is embraced in the plans.

Partial Program of WGI, Medford Hillside, Mass.

360 Meters

Saturday, May 5, 1923

- 6:00 P. M.—New England Weather Forecast furnished by the U. S. Weather Bureau. Late News Flashes. Early Sports News. Boston American.
- 6:15 P. M.—Condition of Massachusetts Highways furnished by the Automobile Legal Association.
- 6:30 P. M.—Boston Police Reports—Boston Police Headquarters. Amrad Bulletin Board.
- 6:45 P. M.—Code Practice, Lesson Number Forty-Five.
- 7:00 P. M.—Evening Program.

1. Fifth of a series of talks on New England Problems under direction of the New England Business.
2. "The Thirteenth Chair" presented by the Amrad Players, W. Eugene Hammett, Director.

Sunday, May 6, 1923

- 4:00 P. M.—Twilight Program.
 1. Concert by L. Doersam, Baritone, accompanied by Miss Florence Doersam.
 2. "Adventure Hour" conducted by the Youth's Companion.
- 8:30 P. M.—Federation Church Service conducted by Mass. Federation of Churches.

FREE

Phonograph attachment with all orders for \$5.00 or more.

1000-Mile Range Guaranteed on This One Tube Set, consisting of the following: Drilled Panel, Variocoupler, Condenser, Rheostat, Socket, Grid Leak and Condenser, 2 Dials, Switch Lever Point Stops, Binding Posts, Bus Wire, Spaghetti, Lugs and Complete Instructions. Can be assembled in half hour. All for the

Special low price, \$15.00

Long Range Receivers	.....	\$4.50
\$5.00 Audio Transformers	.....	2.95
Electric Solder Iron	.....	4.25
\$5.00 Variocoupler, 180°	.....	2.25
\$5.00 Detector Tube	.....	3.00
\$6.50 Amplifier Tube	.....	3.25
3 Plate Vernier Condenser	.....	.45
23 Plate Precision Condenser	.....	1.10

Economy Radio Company

132 Nassau Street New York, N. Y.

Write for price lists

Nova Scotia Radio Station Wanted

APPLICATION to the Canadian Department of Marine, Ottawa, has been made by C. F. Crandall, president of British United Press, on behalf of American Publishers' Committee on Cable and Radio Communications, for a license to erect and operate a wireless station on St. Margaret's Bay, Nova Scotia. For nearly a year an experimental station of moderate power has been operated at Halifax. This service has proved so successful that a larger station is desired.

RS 12000-OHM List Price 75c.

RESISTANCES IN STOCK
For the New Super Circuits

RADIO STORES CORPORATION
DISTRIBUTORS

220 W. 34th St., N. Y. City Longacre 16110-9219

"Loops is Loops"

MANY radio fans, when a loop is mentioned, always visualize a set operating with six or seven tubes, a loud speaker, and in general about three or four hundred dollars worth of apparatus. That is, of course, if they make their own sets. They do not realize that there are numerous advantages to a loop that can not be obtained by the use of an outside antenna. Of course, it is to be understood that for really long distance work you have to use an outside antenna, unless you incorporate three or four tubes, with radio-frequency, etc. But if you are content with quiet reception, over a medium distance, with freedom from disturbances such as interference and numerous other things, no better antenna could be used than a loop.

It is not necessary even to incorporate multi-tube reflex circuits, but if the apparatus is handy, a one or two-tube reflex, using a crystal detector will work surprisingly well, and will give you the advantage of wonderful selectivity.

Apart from that, the one other big advantage lies in the fact that you will not be bothered so much in your tuning with the tuning proclivities of your neighbors which sometimes amount to bedlam when they all get going at once, trying to get in PWX, while their neighbors are trying to hunt for KFI, and a hundred others.

Try it out on a loop and let the other fellow howl when he is bothered by interfering stations.

Finds RADIO WORLD Newsy, Interesting and Helpful

EDITOR RADIO WORLD: I am a "news-stand subscriber" to your paper and find it very helpful and interesting.

I think RADIO WORLD is about the best of its kind because it comes out every week and has all the latest "dope" on radio.

Yours truly,

FRED GOLDIN.

Bryant Hotel,
San Francisco, Cal.

Who Did This?

EDITOR, RADIO WORLD: I would like to ask, through your columns, if any fan heard a broadcasting at 4:30 to 5 a. m., April 23, as follows: A Duet from "Il Trovatore," Soprano and Tenor; Military Band playing "Stars and Stripes Forever" and "The American Patrol."

Call letters were not given, and seemed to be at a great distance. Who was it? Woodhaven, N. Y. CONSTANT READER.

"GRANOLITE"

UNIVERSAL LOUD SPEAKER RADIO HORNS

THE ALL-WOOD, PERFECT REPRODUCING HORN YOU HAVE BEEN LOOKING FOR

They will not warp, crack or peel

"GRANOLITE" Universal Radio Horns are positively superior to all others because we have embodied in their construction perfect acoustic qualities, careful workmanship, high grade, carefully selected materials, strength and beauty of design. The base construction and equipment is universal, permitting the installation and use of any of the standard and well known loudspeakers and receivers.

LIST PRICES

No. 1 Horn, 15" high	.....	\$8.00
No. 2 Horn, 19" high	.....	\$10.00
No. 3 Horn, 25" high	.....	\$12.00

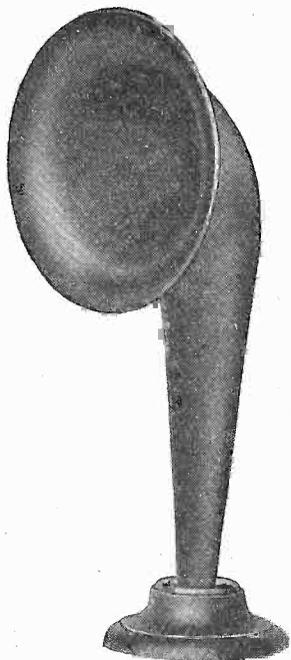
Immediate Delivery Prepaid on Receipt of price. Above prices apply to horn and base only. If horn is wanted complete with receiver add \$6.00.

Dealers, write for own special trade proposition.

Granolite Horns Are Manufactured Solely by

Granolite Art Products Co.

222-224 4th STREET MILWAUKEE, WIS.



"Granolite"

Made in three sizes.

- No. 1 with - 71 inch bell; height, 15 inches.
- No. 2 with - 91 inch bell; height, 19 inches.
- No. 3 with - 14 inch bell; height, 25 inches.

NOW IN PREPARATION

Radio World's Special Vacation Number

Advertisers who want to reach proprietors of summer hotels, summer camps, etc., and owners who contemplate equipping their country homes, yachts, motor boats and automobiles with radio sets can reach them quickly and effectively by using space in RADIO WORLD'S SPECIAL VACATION NUMBER.

Our Circulation Department is making special efforts to reach all these potential buyers of your goods, and to see that a copy of THE VACATION NUMBER is placed in their hands so that they cannot fail to read the advertising announcements as well as our text pages.

RADIO WORLD'S VACATION NUMBER will be unusually interesting, be profusely illustrated with outdoor radio pictures, full of the snap and go of outdoor life, and its many special articles and illustrations are designed to make readers want the goods offered by our advertisers.

REGULAR RATES WILL BE IN FORCE AS FOLLOWS:

One page: One time—\$150.00.	On four consecutive issues—10% discount.
Half, Quarter, Third and Two-thirds pages at proportionate rates.	On thirteen consecutive issues—15% discount.
One inch, one time—\$5.00. Per agate line—\$0.40.	Cover and preferred-position rates made known on application.

Terms: 30 days net. 2% 10 days.

CLASSIFIED ADVERTISEMENTS

Five cents per word. Minimum, 10 words. Discount of 10% on 4 consecutive issues—15% on thirteen consecutive issues. Cash with order.

SELL THEM YOUR GOODS!

Wire, write or phone now about special positions.

RADIO WORLD, 1493 BROADWAY, NEW YORK CITY

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

RADIO WORLD'S QUICK-ACTION CLASSIFIED ADS

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

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

VACUUM TUBE RESULTS FROM A CRYSTAL SET! A "PT" Ultra-Sensitive Contact will increase the range and audibility of your crystal set. We guarantee this wonderful Contact to be **MORE SENSITIVE THAN ANY OTHER CAT-WHISKER MADE;** and that **IT WILL NOT JAR OUT.** WITH A "PT" MYRLE WOOD HEARD 46 PHONE STATIONS, IN A THOUSAND-MILE RADIUS! Others likewise testify that the "PT" has given results equaling tube equipment. Simple to install in any crystal detector. Price only twenty-five cents coin. "PT" CRYSTAL CONTACT COMPANY, Box 1641, BOSTON.

MOVIE FILMS—For Professional and Toy Machines. Wonderful complete stories with best Movie Stars. **SPECIAL BARGAIN**—1,000-foot reels, **ONLY \$3.00.** Stock up, **BOYS,** while they last. Monarch Theatre Supply Co., 724 South Wabash Avenue, Dept. 69, Chicago.

CASH FOR OLD GOLD, Platinum, Silver, Diamonds, Liberty Bonds, War, Thrift, Unused Postage Stamps, False Teeth, Magneto Points, Jobs, Any Valuables. Mail in today. Cash sent, return mail. Goods returned in ten days if you're not satisfied. **OHIO SMELTING CO.,** 337 Hippodrome Bldg., Cleveland, Ohio.

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

BUILDERS AND EXPERIMENTERS. Do you know that the Reflex circuit is one of the most interesting circuits to construct? You can not guess how much fun you are missing if you fail to try out at least one of these circuits. See **RADIO WORLD** issues of Feb. 24 and March 3. They contain two fine articles by W. S. Thompson, with plenty of new Reflex circuits to experiment with. Don't miss these! 15c a copy. **RADIO WORLD,** 1493 Broadway, New York City.

IF YOU ARE A REGULAR RADIO fan and like to hear the stations in the four corners of the United States come in with a bang, then you will want the **Flewelling Circuit.** If you do, send 15c for **RADIO WORLD,** issue of Feb. 24, which contains complete description and directions for the manipulation of the circuit. **RADIO WORLD,** 1493 Broadway, New York.

EXCHANGE JOLLY, INTERESTING LETTERS through our club. Stamp appreciated. **Betty Lee, Inc.,** 4254 Broadway, New York City

GRAM'S RADIO BROADCASTING MAP of the UNITED STATES & CANADA. Scale 100 miles to the inch. In two colors, size 34x28. Printed on high-grade map paper, up to-the-minute information, indicating all amateur and standard broadcasting stations, with complete index to stations. 35c postpaid. The Columbia Print, 1493 Broadway, N. Y. C.

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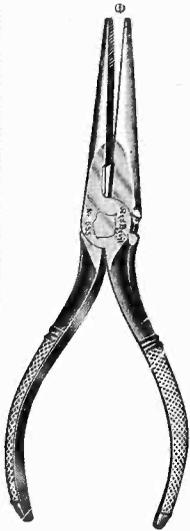
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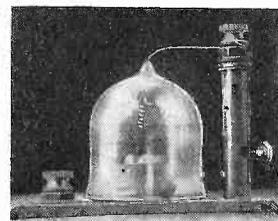
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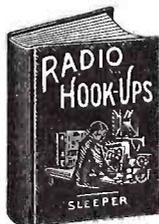
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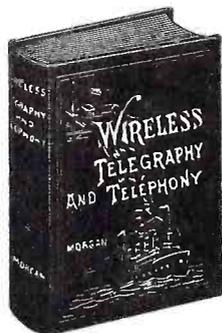
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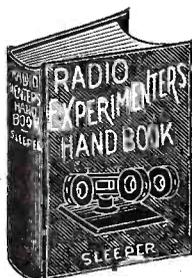
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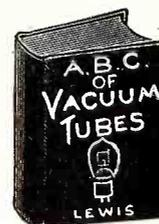
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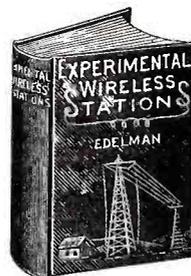
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