"THAT LONG-DISTANCE CRYSTAL SET"

RADIO AGE

uary-
ruary, 1923

The Magazine of the Hour

Price
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OFFICIAL NEWS MEDIUM FOR NATIONAL BROADCASTERS' LEAGUE

RADIO AGE INSTITUTE

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RADIO AGE

The Magazine of the Hour

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In Which Vol. 2 Proposes Your Health

WITH this issue RADIO AGE enters upon its second year and volume and we take this occasion to say an appreciative word to those who have been going along with us through the various interesting stages of development in the wireless field.

We started modestly, but with an abiding faith in the possibility of making a middle-western radio publication that would be sufficiently interesting and helpful to find a field for itself. Long before the end of our first year readers had been registering from every state in the union, not to mention subscribers in such far-away places as Germany, Brazil, Holland and Hawaii.

It is an old axiom in the newspaper editorial office that a good story is a good story the world over. The same holds true of a good publication. If it meets with favor among the fans in the Mississippi Valley it will find friends anywhere on the radio map where English is read.

We have tried not only to present valuable and up-to-date technical information, written by authorities, but we have sought to reflect in our pages a broad vision of radio in its present social and economic aspects and in its tremendous possibilities.

Here are our thanks to the reader-family and our most cordial wishes for the new year

—THE EDITOR.

RADIO AGE
"The Magazine of the Hour"
M. B. SMITH PUBLISHER
PUBLISHED MONTHLY GARRICK BLD'G CHGO.
FREDERICK SMITH EDITOR

How to Make a Sharp Tuning Crystal Detector

(Here it is—the long distance crystal set)

By F. D. PEARNE

SINCE the atmospheric conditions have cleared up to such an extent that carefully designed crystal sets are getting distances never before dreamed of, the lowly little crystal is again beginning to attract attention. Everybody wants to know about that long distance crystal set, and in this article we are going to show how this set is made and why it is called the long distance crystal set. Some fans seem to think that the crystal set is not as sensitive as the audion bulb, which may be true to a certain extent, but is this due so much to the inefficiency of the crystal as it is to the tuning arrangements usually used in connection with them?

It is very seldom that one sees the finer type of tuning apparatus associated with the crystal. The Germans experience no difficulty in covering long distances with a crystal, but they use the same carefully made tuners in those sets as they do with the audion type, so why not give the crystal a chance, or at least an even break with the audion, before it is given up and thrown on the scrap heap?

It is usually taken for granted that any old type of a tuner is all right for a crystal and as a rule the crystal set is furnished with a single circuit inductance which, it is true, is capable of bringing in the 360 meter stations fairly well, but it will also respond to a wide range of wave lengths and as a result, any stations having waves from 200 to 600 will come in on the 360 meter wave adjustment, nearly as strong as the 360 meter station, which makes it practically impossible to hear any

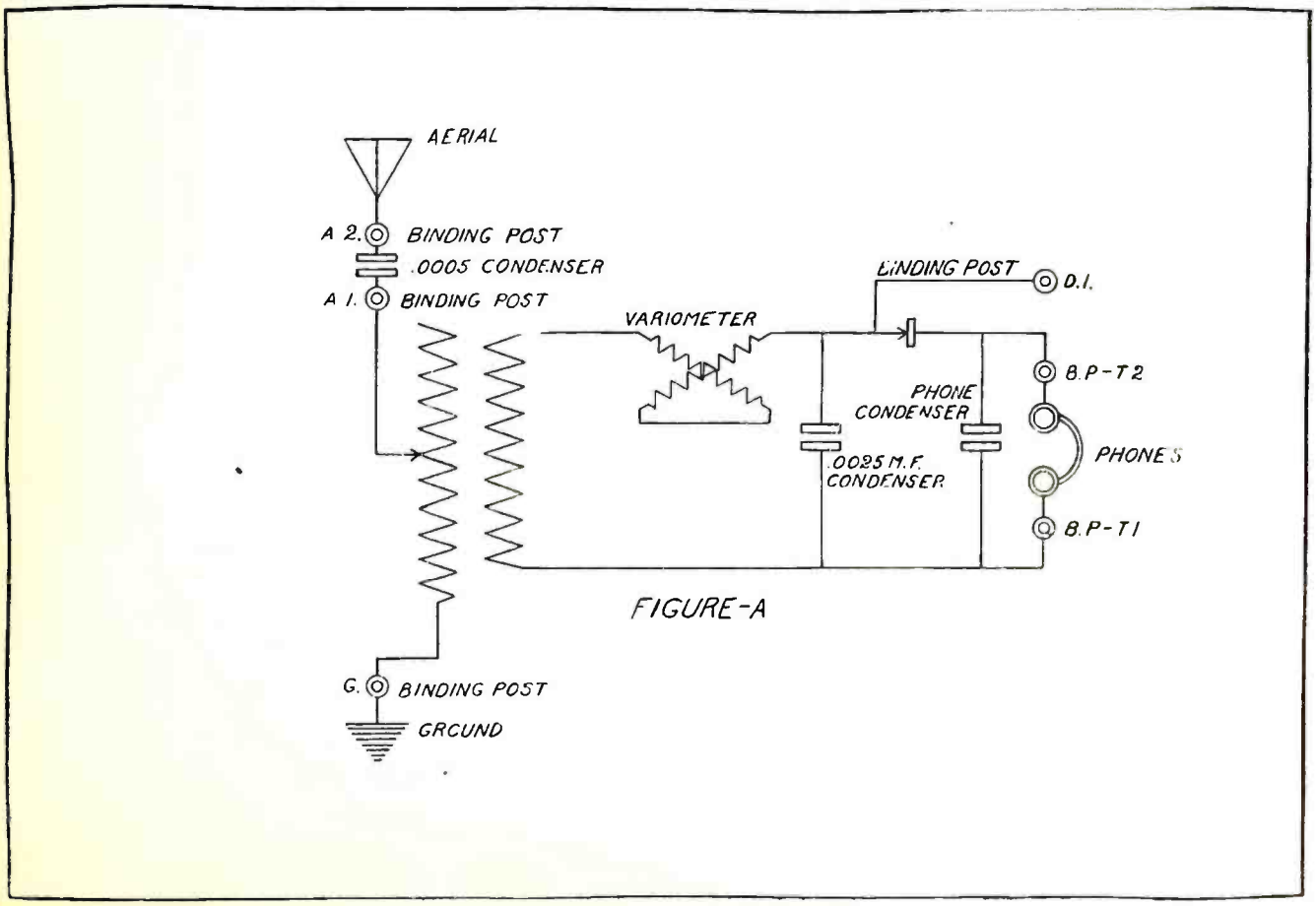

FIGURE-A

selection entirely through without frequent and noisy interruptions.

And another thing which makes confusion particularly bad is the fact that often several stations broadcast at the same time, on waves of the same length. A single circuit set is incapable of selecting any one of these waves by itself, which must be done if clear reception is to be expected.

Figure "A" shows a crystal detector receiving set, so designed that sharp tuning is easily obtained. The parts are easy to construct and yet are rugged and durable. A series condenser of .0005 M. F. capacity is provided, to permit two wave length ranges, and an extra binding post for the addition of an audion detector is also added. A vario-coupler is used for taking advantage of the sharp tuning characteristics of a loose coupled circuit, and a variometer and fixed shunt condenser allow close regulation on the secondary.

The variometer is used in place of the variable condenser in order to employ a minimum of capacity and a maximum of inductance at all times. This gives a higher voltage on the detector. The circuit as shown can be either mounted on a table, or enclosed in a cabinet as desired.

No attempt has been made to load the circuit for 1450 meters, because the dead end effect would defeat the efficient design for short wave work. If it is desired to receive waves of this length, a special vario-coupler may be supplied with a double pole, double throw switch, by means of which it may be thrown in or out of the circuit. While the construction of the crystal receiver shown is not difficult, it is intended more for those radio fans who have already experimented with single circuit sets and are anxious to obtain something which will really give continuous satisfaction and enjoyment. It is not essential that the parts used be of the highest quality which can be purchased, but if such high grade material is used, the certain result will be a more efficient, more durable, and a better looking set.

For ordinary 360 meter work, the aerial is connected to the binding post marked "A" 1, and the ground to the post marked "A-2," which will include the condenser in the aerial circuit. An audion detector may also be used with this set by connecting the audion input to the upper and lower binding posts marked "D-1" and "T-1" as shown on the drawing. An extra variometer might then be added to make the set regenerative. This of course should be placed in the plate circuit. To adjust the set, the coupling should be set at maximum, that is, the windings of the rotor of the vario-coupler should be in a horizontal position. The crystal should then be adjusted and the variometer turned until the signals are heard, then the coupling is gradually reduced, that is, the rotor should be turned at a slight angle and then the variometer is again adjusted until the signals come in. This process of changing the coupling should be carried on until the tuning becomes very sharp and the interference from other stations is entirely eliminated.

The phone condenser shown in the drawing is an ordinary fixed condenser, such as is usually sold for this purpose. It should have a capacity of .00025 M. F. The detector may be any of the standard crystals, but should be carefully tested to make sure that it is the best that can be had for the purpose. The binding posts are conveniently arranged in the proper parts of the circuit to make the addition of any of the ordinary audion circuits a comparatively easy matter.

It will be plainly seen by looking over this circuit that there is no special reason for calling it a long distance crystal set, other than the fact that the apparatus used simply makes it possible to get much finer tuning, which is really the cause of the increased range. The signals reach the crystals in most cases, but are not audible to the ear for the reason that the tuning mechanism in most cases is not sufficiently sensitive to make the signals audible.

The circuit described in this article admits of such close tuning that it is possible to pick up stations which can not be found on the ordinary crystal set. To get the best results, the aerial should be made of one single wire 150 feet in length, and as high as possible. This should be placed in a position which is as free from obstructions as possible. The ground should also be of the best, and if these conditions are followed out to the letter, the user will be surprised at the results which can be obtained with a set of this kind.

Halt Radio Tax

The proposed Chicago radio ordinance, which has been under consideration since last summer, struck another static screen and was put over for further consideration early in January.

The ordinance, drawn by the department of gas and electricity, was designed to protect radio fans and the public generally from hazard to life and property by improperly constructed outside aerials, and provides a fee for inspection, which the radio user must pay. This fee ranges from $1.50 to $3 per set.

At a public hearing of the council committee protests against the ordinance were plenty, the support coming only from the representatives of the department of gas and electricity. Chairman Adamowski gave everyone who wished an opportunity to talk and protests were voiced by Secretary John P. Tansey of the Radio Club of Illinois, George Foster of the Commonwealth Edison Company, Thorne Donnelley of station WDAP, F. D. Pearne and others.

"I do not think the city should take action in advance of the final report of the government on its plan for regulating radio," said Mr. Foster. The opposition was apparently so unanimous that a motion to file the ordinance and forget was on the point of passing, when Alderman Link asked:

"Is there any one here that favors the ordinance?"

Messrs. Tousley and Nixon of Commissioner Carlson's department declared that the electrical inspection department has knowledge that many aerials now constructed were hazards, and that it was but a question of the first heavy sleet storm when they would come tumbling down upon high-powered electric light and power wires with resultant short circuits which might mean fire or personal injury to many.

"Everybody who has protested is interested in radio," said Mr. Touslet. "Naturally they are against any restriction, but the city department owes it to the rest of the public to offer them the protection we know they need."

It was decided to lay the matter over until after the first of the year, and meanwhile carry on a campaign of education of the public as to the real protective purposes of the ordinance—[W. J. Clarke, in Chicago Evening American.

International Aspects

H. Gordon Selfidge, Jr., Assistant Manager of the Merchandising Division of the Great London Store, speaking from WJZ, the Radio Corporation-Westinghouse Station at Newark, recently addressed the radio audiences of England and America on the International Aspect of Radio Telephony. A cable was sent to the amateurs in England notifying them of the time of the address.

Fees for Composers—None for Broadcasters

By **FREDERICK SMITH**

If this were not a sob story it would make you laugh. Broadcasters of radio programs have been entertaining the American public free of charge for a year, spending thousands and hundreds of thousands of dollars, without a cent of return—and along come music composers, song writers and authors and ask for one million dollars per year in fees from the broadcasters.

It happened in New York. Most everybody was there excepting a million or so "listeners-in" who thought there was to be no alloy in this joy of hearing songs and jazz tunes from their favorite broadcasting stations. They—the listeners—had the fantastic idea that the composer of a jazz tune should be sufficiently repaid if the station announcers told the world that his "piece" was about to be played for an audience of 500,000 or more. Some advertisement of a bit of music, you might say.

But the composers are a thrifty lot after all. It seems that they are not the long-haired, temperamental scorners of money-wisdom that the popular novels and the comic strips had portrayed. They want their sixteen ounces of flesh, according to the bond. If their demand should kill radio broadcasting, why let broadcasting die!

The composers, authors and publishers had heard that the radio goose was laying a lot of golden eggs (a pretty fable) and so they decided to go after the goose. Therefore:

The American Society of Composers, Authors and Publishers served notice on all broadcasters that the broadcasters either must obtain license to broadcast copyrighted stuff or face suits for violation of the copyright law.

A conference had been held, prior to this momentous decision, at which were represented the American Society of Composers, Authors and Publishers the Authors League of America, the Music Publishers' Association, the Music Publishers' Protective Association and the Radio Inspector of New York, the American Telephone and Telegraph Company, the Radio Corporation of America, the General Electric Company, the Westinghouse Electric and Manufacturing Company, the National Radio Chamber of Commerce and I. R. Nelson & Co.

An impressive representation. E. C. Mills, Chairman of the executive board of the Music Publishers' Protective Association, made the naive suggestion that if the broadcasters paid for licenses issued by the A. S. C. P. they then would be in the fortunate position of being able to broadcast only A. S. C. P. compositions. The broadcasters would not need to broadcast anything else.

Some of the broadcasters present at the conference declared they would, in the most gentlemanly spirit, of course, see composers, authors and publishers in the notoriously bottomless pit before they would pay for giving the public the biggest kick the public has had since Mrs. O'Leary's cow kicked over the well-known lantern. They said they would go on the air with "The Old Gray Mare, She Ain't What She Used To Be" rather than pay money to the A. S. C. P. for the privilege of broadcasting the latest copyrighted Broadway and Forty-second street sensation, "My Bromo-Seltzer Bride."

J. A. White, of the Radio Corporation of America, said that there was little possibility of adding further to the burden of the broadcasters, who as yet have been unable to obtain any compensation from the public for their expensive service. Mr. White said:

"Owing to the suddenness with which the art of broadcasting has sprung into existence the fact that as yet its activities are largely unorganized and that our government has not yet legislated or regulated the operation of stations, the Radio Corporation of America does not see its way clear to accept the suggestions for compensation made by the American Society of Authors, Composers and Publishers."

"The American Society of Composers, Authors and Publishers has in its hands the power, to a certain extent to mould the future of broadcasting," said M. P. Rice, speaking for the General Electric Company. "If it is made too expensive, if it is made too impracticable to utilize popular music for broadcasting we will turn to something else. If whatever we turn to is unsuccessful then broadcasting may die.

"If we are forced out of the music field we will be forced into some other field. And if the public puts down its receiver, so to speak, and walks out, then broadcasting is dead."

The fee mentioned by Mr. Mills was a minimum rate of $5 a day. If all broadcasters paid this fee to the American society its annual revenue would exceed $1,000,000 from that source alone. Mr. Mills, however, said that the $5 figure was "a point to talk up from or down to."

Radio Entertainment For Hire by the Evening

A WASHINGTON radio company has established a radio entertainment service for hire. The concern proposes to supply radio service on call, just as an orchestra would sell its services for an evening.

This company undertakes to send an agent to homes or halls with a radio set which will be installed and with which an evening's social entertainment may be obtained or "no charge." After the concert, or whatever the program may be, the radio man packs up his receiving set and goes on his way with his fee.

Those broadcasting stations which conduct radio shops might find this method a means of getting some return on their investment.

"Send us a radio set and an operator. We want to dance."

Sounds interesting, doesn't it?

Radio Exports Increase

Domestic exports of radio apparatus during the month of October totaled $207,535 and weighed 114,309 pounds, according to figures compiled by the Department of Commerce. The value of these radio shipments was as follows: England, $70,391; Quebec and Ontario, $35,728; Argentine, $32,092; Brazil, $27,072, and Japan $11,299, the balance going to twenty other countries.

Show Postponed

Postponement of the Second National Radio Exposition has been announced. Milo E. Westbrooke, director of the exposition says that information as to the date of the show will be sent out later.

The exposition was to have been held at the First Regiment Armory, Chicago, January 13 to 20, inclusive.

Gen. Squier Sees a New Era

WASHINGTON (Special to Radio Age).—Radio development advanced several lengthy strides during the past fiscal year through broadcasting, technical research and the application of advanced design to military communications, according to the annual report of Maj. Gen. Geo. O. Squier, Chief Signal Officer of the Army.

Through the operation of the Army Radio net, established in May, numbering 60 stations on November 30, the Signal Corps saved the Government $14,357 in the transmission of official communications, over what they would have cost at commercial rates. These radio stations established in corps areas in Continental United States and in their sub-divisions handled a total of 40,494 messages in the seven months of operation, cooperating with Naval coastal radio stations in some instances.

The Army radio stations at Nome, St. Michael, Holy Cross and Iditarod in Alaska have been rehabilitated, and new and powerful sets with a range of about 150 miles have been installed at Nulato and Wrangell. Signal Corps installers were working at the Noorvik, McGrath, and Bethel stations, and equipment was en route to Fort Egbert and Ruby, at the end of the fiscal year. Equipment for the Craig station was also available, leaving only three stations in the territory awaiting new apparatus.

"The outstanding feature of the year in signal communication undoubtedly has been the phenomenal development known as 'broadcasting'", said General Squier. The suddenness of this development he believes, has no parallel in the application of science to everyday life. "In the educational field alone," he states, "we are on the threshold of a new era which will probably affect our modes of life."

Pointing out the importance of wireless communication in both peace and war, the Chief Signal Officer explains that the Signal Corps is endeavoring to keep abreast of all developments with a view of utilizing and assimilating them for Army purposes. The experiments conducted in his office broadcasting over electric light lines in an effort to reduce the interference in the ether, and with the "super-phono," a method of secret line-radio communication, are cited as examples of practical experiments undertaken recently.

Although handicapped by both a reduction of funds and personnel, the division of the Signal Corps entrusted with communication, research and development, completed 78 new specifications of radio sets and apparatus, together with 300 drawings during the fiscal year. Among the accomplishments in radio engineering was the perfection of a new radio telegraph set for Infantry batallions for communicating with regimental and corps headquarters. This set has a five-mile radius and employs waves between 75 and 77 meters, but is capable of ten settings or different notes between its extreme waves. One of its advantages is a portable square loop about 9 feet, which can be folded up. It also has directional features. These sets are now in production for the Infantry Corps. Another set, designed especially for division or corps headquarters, employs six 250-watt tubes in transmitting. This gives a telephone range of about 100 miles and a telegraph range of practically 600 miles. The set is portable in that it can be mounted in tractors for field transportation. A tube set was developed for use in permanent stations with two 50-watt tubes operated from storage batteries for both telegraph and telephone transmission. The sending and receiving units are separate and the range is about 150 miles.

For the Air Service two 100-mile range telephone and telegraph sets were especially developed; one for large airplanes like the Martin Bombers and the other for use at ground or base stations. The ground station apparatus uses two 250-watt tubes in place of ten 50-watt tubes. Since the end of the fiscal year contracts for the development of both these designs have been let to commercial electrical companies for completion. The perfection of a five-mile range set for inter-plane communication employing the Armstrong receiving system and intended to be used on pursuit planes in formation flying, has also been placed in the hands of manufacturers, due to lack of Signal Corps personnel.

Contracts have been awarded for the production of a number of new airplane radio sets with a 30-mile range, using two 50-watt tubes. The apparatus is split up into several units which are distributed in the plane and controlled from the dash board by the pilot. Work on a radio telephone mule pack for use in mountain artillery was also underway but uncompleted at the close of the fiscal year. Considerable progress in the design and testing of a radio telephone set for use in army tanks was accomplished. The development and test of a five station inter-phone set for use in the Martin Bombers was also progressing well, it is reported by the Chief Signal Officer.

Other developments included work on a field telephone repeater for use in coupling line and radio communication, especially in balloon communication; the perfection of a direction finder for the Coast Artillery Corps, and tests with the resonance wave coil antenna for the el mination of static, revealed that where large antenna cannot be erected, and on portable sets, this apparatus may be of great advantage.

Boys Start Paper

We have on our desk the first two issues of "Radio Research," a neat periodical published by the Radio Research Club of the Springfield (Ill.) high school and printed in the high school print shop. A. B. McCall, instructor of mechanical drawing in the Springfield school and faculty advisor of the Radio Research Club, writes us that the paper has aroused great interest and after carefully looking it over we are not surprised that the boys are enthusiastic about it.

The paper contains technical articles, a questions and answers department, editorials and news notes. It is supported by advertising from local merchants. The staff is comprised of Roy S. Skaggs, editor; Edward E. Henry, circulation manager; Charles F. Cochran, advertising manager.

It is probably the first publication of its kind in the country and we suggest to radio fans among the schools in other cities that they write to the circulation manager of Radio Research, Springfield high school, Springfield, Ill., enclosing two cents for a sample copy. The circulation manager says "send no stamps."

For our part we welcome "Radio Research" into the radio publication family.

Radio for Insane

A new radio receiving set has recently been installed at the Government Hospital for the Insane at Anacostia, D. C., by the Department of the Interior. The set has a receiving range of about 750 miles and enables the inmates to receive concerts every evening from many different sending stations.

Harbord's Views on Broadcasting

GENERAL James Guthrie Harbord, Deputy Chief of Staff, United States Army, and President-Elect of the Radio Corporation of America, spoke before the Illinois Manufacturers' Association at Chicago, on December 14. He discussed the interesting question as to who shall pay for broadcasting and various other radio problems. He said in part:

"Since Gutenberg invented his rude movable type blocks and made printing possible nearly five hundred years ago, no one invention has more closely touched human interest and human welfare than your new business, the public's new business, my new business, RADIO. It is of one phase of that new business that I shall endeavor to speak to you tonight, without pretense to expert knowledge or technical accuracy, or even in technical language.

"I think any of you can understand with what keen regret a man leaves a profession to which he has been devoted from early manhood, and which has been very dear to him for over thirty-three years. Yet there comes a time when a man can see that his own particular work has had the best that he could give it, and that his own and his employer's interests may be well served by attempting constructive effort in another, but not unrelated line.

"It was after much consideration that I accepted the great responsibility of the Presidency of the Radio Corporation of America, and decided to leave the active list of the Army. I believe that I can be of service not merely to the Corporation but through it to the people of our country and to our Government, and perhaps contribute to guarantee the peace of the world by helping to develop national and international communication facilities.

World Communication

"Certainly for peace or war no action could have been wiser and more far-sighted than that of certain representatives of our Navy at the close of the World War, when with memory fresh from their experiences in that conflict, they appealed to the General Electric Company to form a single independent Wireless Company for the purpose of establishing:

"1. An American owned, operated and controlled radio communications company, powerful enough to meet the competit on of the radio interests of other countries.

"2. Such an international communications system that America would not be dependent upon foreign-owned cables.

"3. Providing for the construction and operation of radio stations at home and abroad under such terms and conditions as would best serve the needs of the American people and their Government.

"4. Preserving to America the wireless apparatus which had been invented and developed in this country after many years of patient and costly research and experimentation.

"Other countries, encouraged by their practical control of the transoceanic cab es, were already in the

MAJ. GEN. JAMES G. HARBORD,
Newly Elected President of the Radio Corporation of America

wireless field, and the problem was to establish America in international communications as soon as possible. The General Electric Company, quick to heed this SOS call made by the Navy representatives, patriotically responded even though such response involved a departure from its traditional policy, and at once broke off negotiations already under way by which the domination of air communications would have passed into alien hands. The wireless patents, inventions, and research facilities of the General Electric, and American Telephone and Telegraph, and United Fruit, and the Westinghouse Companies were speedily brought together in the Radio Corporation of America, so that it might do its great work free from previously existing patent restrictions essential to the immediate development of a Communication system, all American in its ownership and control, but serving the whole wide world. This culmination of negotiations bringing these great electrical concerns together has been instrumental for making America the heart of not only the wireless systems of the world, but the chief of all the nations in the development of long distance wireless telegraph stations, ship-to-shore wireless telegraph and telephone sets, to say nothing of that art second only to the printed page—*wireless telephone broadcasting.*

"Broadcasting appeals to the imagination as no other invention of the times. Its possibilities are beyond human comprehension. It is the romance and the inspiration of the world's splendid prime. No permanent record of the last act of "Il Trovatore" as given by the Chicago Grand Opera Company in your auditorium here, three weeks ago, Saturday night, and as actually heard in New York—no record though equally perfect in its reproduction is equal or comparable to hearing it by radio at the second it was given. One is history, the other, *action*, timely and instantaneous. Think for a minute of the psychological charm in hearing the voice of Galli-Curci, or the President of the United States, before it is heard by the people sitting in the last row of the Orchestra Circle, or in the last row of the Gallery of the Senate of the United States. Think of sitting in your own homes in Springfield or Bloomington by a comfortable open fire, and being transported through this modern miracle to the Yale Bowl in distant New Haven, and seeing in your mind's eye, play by play, the men from Iowa—our own great west—defeat the sons of Yale. You are told that the weather is perfect, the Bowl is filling up; the teams come on the field; you hear the bands; you are moved by the cheers of the crowd; and when the station rings off, in the silence of your own home you share the elation of victory and sympathize perhaps with the bitterness of defeat.

The Program

"The successful program manager, in order to satisfy the public, must be an interpreter of public

taste and opinion—a musical critic —a spiritual adviser—a theatrical manager—a statesman, and an expert on education, who seeks to satisfy your wishes. I am told by my future associates that thousands of letters have been received at the large stations, intended either for the management or for the artists who perform. These letters come from bedridden individuals who never dared hope to hear again their favorite concert artists. WAM believed they were doomed to humdrum lives without ever again seeing the world outside of their sickrooms. From blind men and women and from children have come letters with wonderful heart appeal, which compensates those who have devoted their lives to the development of this art.

"Mothers, too, write in an endeavor to get the wireless telephone to assist them in making their naughty boys behave. The mother of one Johnie Owen wrote a letter, in which she said she hoped the sending station would issue a personal message to Johnnie, whose ears were glued to the radio receiver for the evening 'bedtime story'—telling him to wash his face, brush his teeth, and in other ways, be a good little boy.

"About four weeks ago, one of the large stations in New York started broadcasting the regular Sunday morning services from St. Thomas' Church. In the course of the service, Dr. Stires announced that the offering for that day would be used for the poor of the parish—and on the following Tuesday, Dr. Stires received a letter postmarked from a small up-state community. It said that the writer and his neighbors, there being no church in their immediate neighborhood, had heard the services, and had noted that the collection was for the poor of the parish; that they had taken up a collection, and there was enclosed a check representing their contribution.

Service Rendered

"The value of broadcasting to any individual or community will be in proportion to the difficulty of getting the same thing by any other means. Next to saving life at sea, radio's greatest service should be to the agricultural sections of this country. It will serve the farmer and those who live in small communities as no other utility has been able to serve him. It is already bringing him time signals, weather reports, market reports and agricultural information. Not until agricultural extension courses, religious services, opera, entertainment and education, which are now available in the cities, are regularly brought to the farmer by radio, will it have fulfilled its mission to American Agriculture. What all this will mean to you, Gentlemen, who are Executives of companies manufacturing all of the products consumed by the average American, you are better able to answer than am I. But I am sure, that radio cannot help but bring all sections of our country closer together and improve its moral, social and economic standards.

"Commercially successful wireless telegraphy is only two and one-half years old, but it is to-day handling twenty-five per cent of the international message business of the United States. While successful broadcast wireless telephony is just a year old, or I might say a year young, the progress made in that year is nothing short of a miracle. But it has only opened the door to the marvelous future, and if we are to make broadcasting of social economic, religious and educational value; a value close to the power of the newspapers, of the history and of the literature of all time, broadly speaking, the problem, except for refinements, is no longer to develop the art scientifically, but to muster our forces for the purpose of making radio of maximum service to all of the people of the country.

"There are in the United States, in round numbers, six hundred broadcasting stations ranging in power from less than ten watts to more than one thousand watts. The small stations of doubtful technical perfection are serving purely local needs with intermittent programs. The large stations—only thirty in number—technically correct and operating on permanent schedules, are serving as large group as is possible with programs of quality, varied to meet the demands of the hundreds of thousands in their unseen audiences.

Some of the Problems

"Today, we have newspapers, automobile schools, electrical manufacturing companies and chiropractic schools doing broadcasting. Can these various agencies continue when it costs from twenty-five to fifty thousand dollars a year to put on continuously a generally satisfactory program? If not, who is to do the broadcasting? Theoretically, the 600 stations scattered throughout this broad country are operating on two wave lengths, one of 360 meters and the other 400 meters. The result is man-made interference and confusion. One of two things happens, either good programs suffer from this interference, or stations capable of serving many thousands are asked to give up time on a specific wave length to a smaller station which can at best serve only small communities and a limited number of people with inadequate programs.

"It is popularly believed that radio communications being carried on through the air may be operated to an unlimited extent. That, unfortunately, is not true. The spaces that scientists call the ether, through which communications may be carried on, are very limited. They are like a definite number of paths, or a city street upon which only so many soldiers can march shoulder to shoulder. The Government can assign additional wave lengths, but there are not available in the ether 600 wave lengths which can be allocated to telephone broadcasting.

"Under existing international and national laws and regulations, twelve instead of two wave lengths could be made available immediately for this service, and if these were allocated and properly staggered over the whole country, we could even then have only 46 first-class broadcasting stations. But these 46 stations would operate with a minimum of cost as well as a minimum of interference which is more important if we are to realize immediately upon the possibilities of radio.

"Our problem is therefore national and not local. What is urgent is a national service which will take into account the best utilization of wave lengths so that the greater service will be rendered to the greatest number.

Pay for Broadcasting

"Who is going to pay for broadcasting? I cannot answer that question, but if we have a national service organized and administered, with the slogan, "*The greatest good to the greatest number*," as the watchword, it will no doubt be possible to devise some means of obtaining compensation for the cost of service either from manufacturers and distributors of apparatus, suitable contribution from listeners, or by the public-spirited endowment of a Carnegie or Rockefeller.

"Gentlemen, I have touched but lightly on the possibilities of *broadcasting*—perhaps, even less on constructive suggestion as to its problem. Think what the broadcasting to hundreds of thousands of homes would have meant to Theodore Roosevelt with a recalcitrant Congress on his hands; or what possibilities it would have held for President Wilson in rallying public opinion to the support of the Great War, in confusion to pacifists and slackers.

Description of Fixed Condensers Used With Simple Homemade Radio Receiving Sets*

By the U. S. Bureau of Standards

THIS circular describes two "fixed" condensers which are used with either of the radio receiving sets described in the first or second circulars of this series. One of the fixed condensers which is connected in series with the antenna, will be called in this circular the "series-antenna" condenser. The other fixed condenser, which is connected across the terminals of the telephone receivers, will be called the "telephone-shunt" condenser.

The effect of the series-antenna condenser is to enable the receiving equipment to give signals of somewhat greater intensity when tuned to wave frequencies above 1,000 kilocycles per second (that is, wave lengths of 300 meters or less). It will thus be seen that the effect of this condenser is just the opposite of the effect obtained by a greater number of turns of wire on a tuning coil, which, it will be remembered, permits the receiving equipment to respond to lower wave frequencies (longer wave lengths).

The effect of the telephone-shunt condenser is to increase the intensity of some radio signals to which the receiving set may be tuned. In most cases, the use of this condenser has no effect upon the intensity of signals which are received from a radio telephone transmitting station, but will increase the intensity of radio signals which are received from most spark transmitting stations.

Series-Antenna Condenser.

The series-antenna condenser is shown in detail in Figs. 1A and 1B. Two thin strips of metal (C and E) 1 inch wide and 3 inches long are used with three sheets of insulating material (B. D, and F), 1 1-2 inches wide by 3 inches long. The metal strips may be thin copper, brass or aluminum. Each of the three sheets of insulating material is made up of two pieces of heavy white writing paper which are separately dipped in clean, melted paraffin. Each pair of sheets is then pressed together by means of a warm iron, and when cold the strip is cut out to the required size. A sheet of clear mica having about the same thickness as the two sheets of writing paper mentioned above may also be used for the insulating material. Two blocks (G = 2 5-8" x 3" x ½", A = 3" x 3½" x ½") are cut out and preferably from hard wood. Two screws pass through holes, H and J, in the upper cap block G, which is placed over the base block A, so that the edges of the two blocks are even on three sides. (See Fig. 1A). The holes for the screws, H and J, are 3-8 inch from the sides of the cap block G and equally distant from the ends. Having located the correct position of the cap block G, the screws in holes H and J are loosened and the cap block is removed from A, leaving two small holes H' and J' to locate the proper position of the blocks when the condenser is finally assembled. The two screws L and M are located just far enough in from the front edge (See A, Figs. 1A and 1B) so that the block A may be screwed to the left end of the baseboard of the receiving set described in Circular No. 120 or to the primary coil support described in Circular No. 121. (See Figs. 2 and 3).

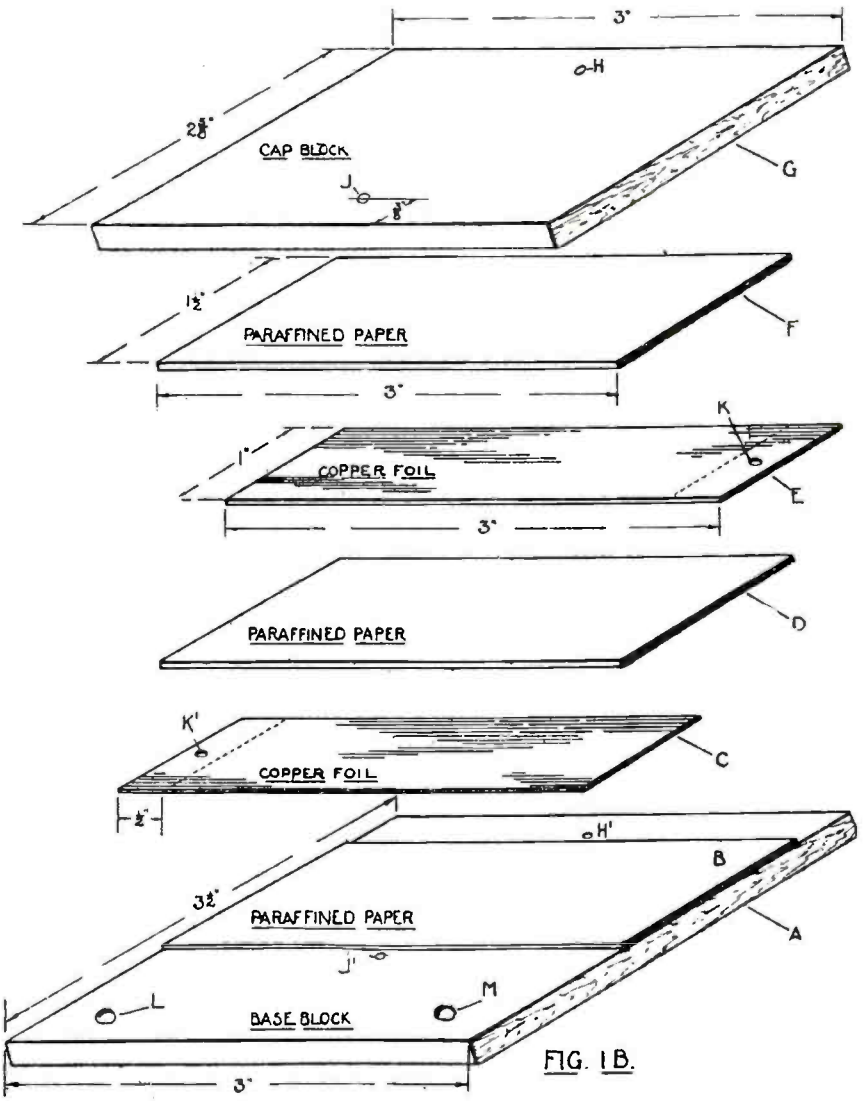

FIG. 1B.

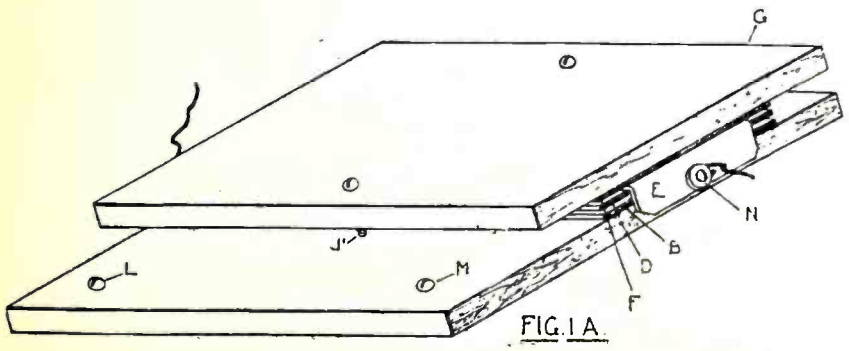

FIG. 1A.

The wooden blocks are of dry wood smoothed up with sandpaper and given a coat or two of varnish which will not absorb moisture, or treated with paraffin as described in Cirular No. 120.

A sheet of the paraffined paper or mica B is placed on the base block A between the holes H′ and J′ so that its ends are even with ends of the base block. A thin metal strip C is placed in position so that it lies in the center of B and has its right end ½ inch in from the edge of the base block and its left end projecting ½ inch over the opposite edge of the base block. (See fig. 1B).

Another sheet of paraffined paper D is placed on C directly above B. The second piece of thin metal E is placed on D above C, except that one end of the metal strip E extends ½ over the *right* edge of block A instead of the left as did C. The third sheet of paraffined paper F is placed on E directly above D and B.

The alternate sheets of paraffined paper and thin metal are held carefully in position, and the cap block G is placed over them and screwed in position. The right end of the thin metal strip E is bent down, and a round head brass screw N is passed through a hole K, punched or drilled in the end of the metal strip. The projecting end of the strip C is not visible in Fig. 1A, but it is bent and fastened in the same manner as E. The completed condenser resembles the sketch shown in Fig. 1A.

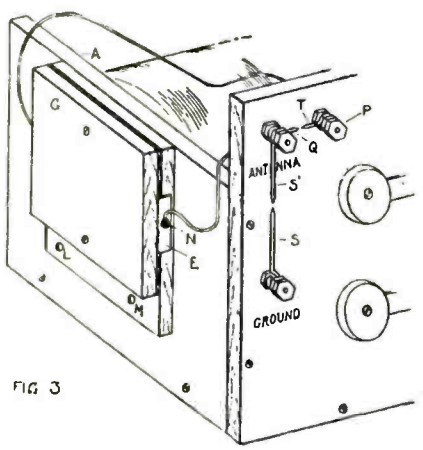

FIG 3

Mounting and Wiring.

The condenser is mounted on either the single-circuit receiving set described in circular No. 120 or the two-circuit receiving set described in Circular No. 121. Fig. 2 shows the method of mounting the condenser on the single-circuit receiving set. The condenser is fastened to the end of the baseboard by means of the screws L and M. A binding-post P is added to the panel of the receiving set about 1 inch from the binding-post marked "antenna," as shown in Fig. 2. A wire is clamped under the condenser screw N which passes through the metal strip E, forming one terminal of the condenser. This wire is led to and connected to the back of the binding-post marked "antenna" without disturbing any of the other wires which are already

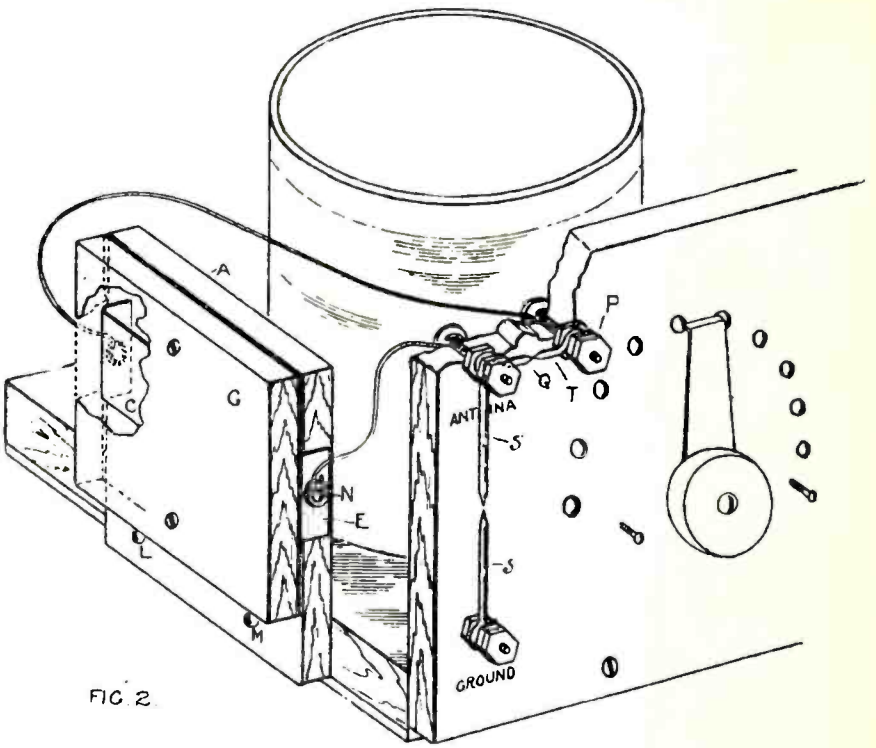

FIG 2

connected to this binding post. Another wire is connected to the terminal of the metal sheet C and led to the back of the binding-post P.

In circular No. 120 a short stiff wire is shown attached to the antenna binding-post and extending toward a similar wire attached to the ground binding-post. The wire on the antenna binding-post is removed and a longer one substituted so as to form parts, Q and S; fig. 2. A similar short piece of stiff copper wire T is attached between the first and second nuts of binding-post P. There is a very short gap between wires Q and T and between S′ and S. These gaps are for protective purposes when one forgets to throw the lightning switch to the grounded side. Another method of protection would be to install a lightning arrester in the antenna system. The arrester may be installed just outside or just inside of the building, preferably the former. This serves as an extra precaution when one forgets to throw the lightning switch to the ground terminal when the receiving set is not being used.

If the condenser is mounted on the receiving set described in Circular No. 121, it may be placed as shown in Fig. 3. In other words, it is mounted upon the vertical board which supports the pri-

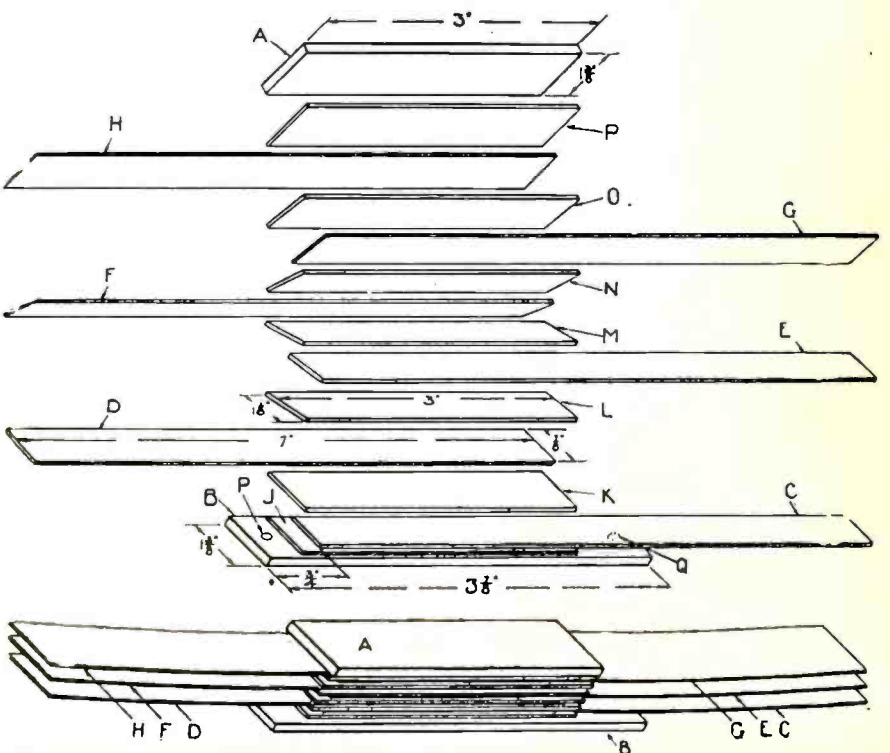

FIG. 4

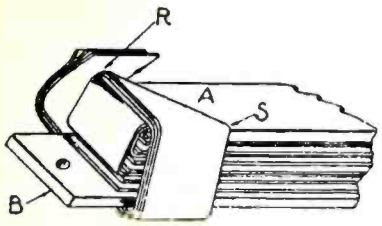

FIG. 5

mary coil tube previously described. The connections from the condenser to the binding-post on the front panel of the two-circuit set are made as described above.

If the connections to the receiving set have been made as described in Circular No. 120 or No. 121, the antenna lead-in wire is removed from the binding-post marked "antenna" and connected to the new binding-post which has been added to the front panel of the receiving set (See P, Figs. 2 and 3). The condenser

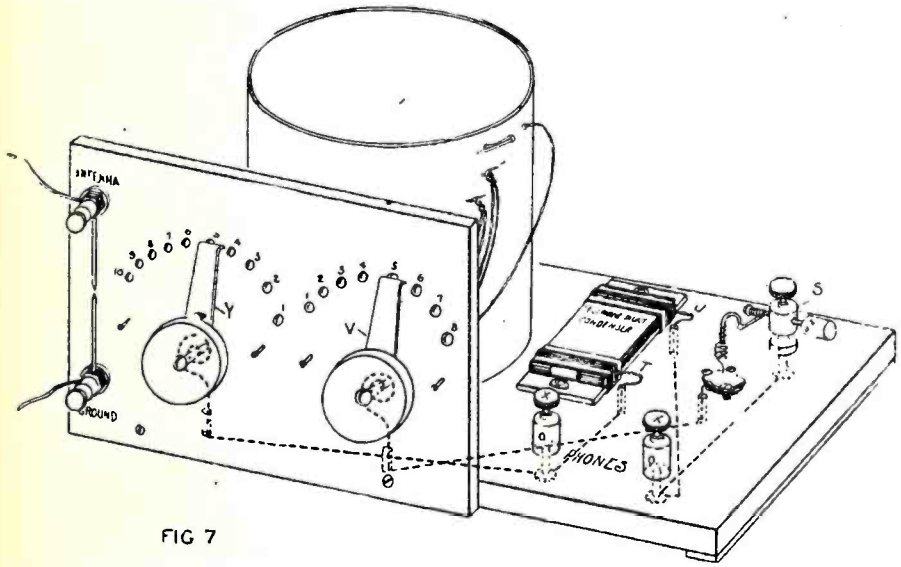

FIG 7

is now included in the electrical circuit together with the tuning coil, between the antenna and ground. This connection to the building-post is used when it is desired to receive wave frequencies of approximately 1,000 kilocycles per second or above (wave lengths of 300 meters or below). To receive wave frequencies of 1,000 kilocycles per second or below (wave lengths of 300 meters or more) the antenna lead-in will ordinarily be connected to the binding-post marked "Antenna" and the operation of the receiving set is then as described in Circular No. 120 or No. 121. In either case the set is tuned to the desired wave frequency in the same manner as described in Circulars No. 120 and No. 121. The switches are set so as to include more turns of wire on the tuning coil (or the primary coil of the two-circuit receiving set) with the antenna lead-in connected to P than when it is connected to the binding-post marked "antenna," when tuning to a given wave frequency....

Telephone-Shunt Condenser.

The parts used in the construction of the telephone-shunt condenser are: a cap piece of heavy pasteboard or wood (A) about 1 3-8 by 3 by 1-8 inches, a similar base of pasteboard or wood (B) 1 3-8 by 3 7-8 by 1-8 inches. 6 pieces of tin foil (C, D, E, F, G, H) 7-8 by 7 inches, 7 pieces paraffined paper or mica (J. K, L, M, N, O, P) 1 1-8 by 3 inches, 1 stiff paper clip or its equivalent (for temporary use), about 10 feet of No. 24 bare copper wire, and 2 round head wood screws about 1-2 inch long. The several steps in the arrangement of these parts are shown in Figs. 4, 5 and 6. The layers of paraffined paper and tinfoil are alternated as shown, starting with a sheet of paraffined paper on the base B. The paper J is placed in the center of B so that there will be a 1-8 inch margin at the sides and 7-16 inch margin at the ends of B. A sheet of tin-foil C is then placed on the paper J so that there will be 1-8 inch of margin of paper uncovered on three sides. The tin-foil C will then extend 4 1-8 inches over the right-hand edge of the paper J, or 3 3-16 inches over the right-hand edge of the base B. The paraffined paper K is placed on C directly above J. The tin-foil D is placed on K. The overhanging end of D extends to the left instead of the right as did C. The other three sides of D are 1-8 inch in from the three edges of K. This arrangement of alternate layers is followed until the seven paraffined papers and the six sheets of tin-foil are placed in position. The cap piece A is then placed as shown in Fig 4.

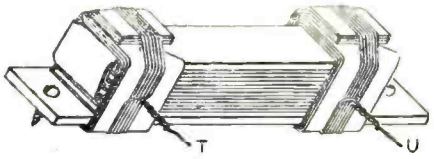

FIG. 6

The condenser now appears as shown in Fig. 4, except that the thickness of the condenser is much exaggerated here in order to better show the parts. A paper clip or other form of temporary clamp may be used to hold the parts firmly together. The tin-foil strips, D, F and H, are now bent back over the end of the cap piece A and folded over at an angle of 45 (see line RS, Fig. 5) so that the tin-foil may be wrapped evenly around the pieces, A and B, and secured by several turns of No. 24 bare copper wire (see Fig. 6). The tin-foil strips, C, E, and G, Fig 4, are wrapped in the same manner. The completed condenser appears about as shown in Fig. 6, except much thinner.

This telephone-shunt condenser just described may be added to the single-circuit receiving set described in Circular No. 120 or to the two-circuit receiving set described in Circular No. 121. The condenser is placed as shown in either Fig. 7 or Fig. 8. A somewhat simpler plan is to screw the condenser to the underside of the receiving set baseboard. This saves drilling more holes in the baseboard in order to keep the wiring on the underside. No matter with which receiving set this condenser is used, the two wires, T and D, (Figs. 7 and 8) are connected to the two telephones receiver binding-posts marked "Phones."

Fixed condensers may be purchased which will give about the same results as those described in this circular. The series-antenna condenser has a rated capacity of about 0.0003 microfarad (300 micromicrofarads). The telephone-

(*Continued on page 30.*)

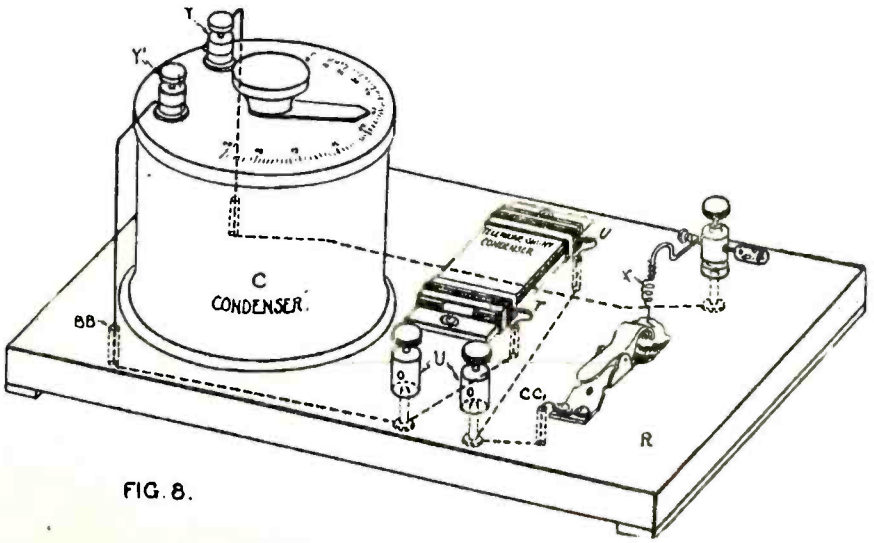

FIG. 8.

Description of a Loading Coil Used With Simple Radio Receiving Sets

By the U. S. Bureau of Standards

Introduction.

THIS circular describes a loading coil which is used in conjunction with the single-circuit radio receiving set described in Bureau of Standards Circular, No. 120. The experimenter who is interested in using it in connection with the two-circuit set described in Circular No. 121 is referred to the section entitled, "Use with Two-Circuit Set," near end of this paper.

The purpose of the loading coil is to enable the receiving equipment to respond to wave frequencies between 100 and 500 kilocycles per second (that is, wave lengths between 3,000 and 600 meters). In other words, the loading coil increases the wave frequency (wave length) range of the receiving set. The receiving set described in Bureau of Standards Circular, No. 120, has a wave frequency (wave length) range of between 500 and 1,500 kilocycles per second (wave lengths between 600 and 200 meters).

The use of the loading coil will increase the receiving distance of the equipment, because many stations using the lower wave frequencies (longer wave lengths) use a high-power radio transmitting set. For example, the station, NAA, at Arlington, Va., uses a wave frequency of about 113 kilocycles per second (2,650 meters wave length) and uses sufficient power to be heard a distance of about 200 miles when the loading coil described in this circular is used with the receiving equipment previously described. At night this distance may be considerably increased.

The cost of the parts for the loading coil is approximately $3.00.

Description.

A loading coil is simply a coil of wire connected to the rest of the receiving equipment in such a manner that a variable number of its turns are included in the circuit between the antenna and the ground connection. When longer wave lengths (lower wave frequencies) are received, more turns are used on the coil.

The loading coil is shown at A in Figure 1A, and consists of 300 turns (about 5 ounces) of No. 28 double-cotton-covered copper wire wound on a round cardboard box 5 3-8 inches in diameter by about 8 inches long. An oatmeal box is used for the cardboard tube with the cardboard cover glued to one end. Certain of the turns are provided with taps which are connected to switch contacts so that the number of turns included in the circuit can be varied. One end of the wire is fastened at the closed end of the tube by weavng it through two holes 1-2 inch apart and 3-4 inch from the end. The free end of the wire projects about 10 inches. The wire is wound on the tube in a single layer so that the turns lie closely and evenly together. When 10 turns have been wound, a 10 inch tap is taken off. After the given number of turns of wire have been wound on the tubes a hole is punched through the tube just underneath the last turn and, by using a small blunt tool or stick, a 10-inch loop of the wire is pushed through this hole. A second hole is punched through the tube about one-half inch farther along the circumference and the loop pushed through this hole to the outside of the tube again. The loop may or may not be twisted as it emerges from the second hole. See Fig. 1B. When 10 more turns have been wound, another tap is taken off in the same manner. The arrangement of these taps is shown in the left half of Fig 1A. It will be noticed that there are 13 taps on the completed coil, counting the two ends of the wire at the start and finish. Each tap is slightly offset from the preceding one so that the line of completed taps progresses about half way around the coil as indicated in Fig. 1A. After the wire is wound on the cardboard tube or oatmeal box it is placed in a warm oven to drive off the absorbed moisture. After the tube has dried for some time and while still warm, melted paraffin is brushed over the tube, inside and out. The paraffined tube is put back in the oven for a few minutes in order to more thoroughly impregnate the tube.

The switch panel B is made from a piece of dry wood about 7 inches long, 4 1-2 inches wide and 1-2 inch thick. Its general construction is similar to the switch panels described in Circulars Nos. 120 and 121. The two switch arms, C and D, which are used with this panel have also been described in Circular No. 120. Having drilled the holes for the two switcharm bolts, the switch arms are placed in position and the knobs rotated in such a manner that the ends of the contact arms describe arcs upon which the contact points are to be placed. The holes for the switch contact bolts are then drilled; the spacing between contacts depending upon the width of the end of the switch arms, as well as upon the kind of contacts which are used. For the switch arm C there are 11 contacts and for the switch arm D, 3, as shown. The wood base E is a block of wood about 7 inches square and 3-4 inch thick.

Assembly and Wiring.

Before any of the parts are assembled the base and panel are treated with paraffin or they may be thoroughly dried and coated with a good grade of varnish which will not absorb moisture. Shellac is not used. The panel B is fastened to the base E and the coil A is placed in position so that the row of taps faces the rear of the panel. The coil is fastened in this position by small wood screws passing through the cardboard end, each screw being provided with a washer. The two switch arms with the necessary contact bolts are placed in position on the panel. A wire connection is made between switch arm D and binding post H and between switch arm C and binding post I as explained in Circular No. 120, or a spring washer is slipped over each switch-arm bolt at the rear of the panel and the wires soldered to these. See Fig. 1C. The several taps from the coil are cut off to a length sufficient to reach from the coil to the contacts. The insulation is scraped from the ends of the wires and the ends of the double taps twisted together below the point G, Fig 1A. The taps are fastened between the nuts and washers of the proper contact bolts as shown in the left half of Fig. 1A.

This leading coil is used in connection with the receiving set described in Circular No. 120. The method of making the connections is shown in Fig. 1A. A 10-inch copper wire with a battery clip at one end is fastened to the binding post H with the clip attached to the receiving set binding post marked "antenna." The wire originally leading from the back of the antenna binding post was connected to the back of the switch arm bolt V. The wire is removed from the back of the antenna binding post and attached to a new bolt or binding post fastened to the *baseboard* of the simple receiving set. This bolt or binding post is located just at the rear of the receiving set binding post marked "ground." A 10-inch piece of copper wire is attached to this new bolt or binding post with a battery clip attached at the end toward the loading coil binding post I. The wire leading from the crystal to the rear of the antenna binding post, as described in Circular No. 120, remains as it was. If this wire was originally connected as described in Letter Circular, No. 43, or directly to the switch-arm bolt V, it is removed and connected to the rear of the antenna binding post. All other wiring is as described in Circular No. 120.

Method of Operating.

The wire leading to the antenna is connected to the binding post marked "antenna" and the wire leading to the ground is connected to the binding post marked "ground" as before. In order to receive messages transmitted at wave frequencies between 500 and 1,500 kilocycles per second (wave lengths between 600 and 200 meters) the switch arms, C and D, on the leading coil panel, are both set on the contacts marked O. When receiving at the shorter waves (200 to 600 meters), it is better to remove the battery clip from the antenna binding post and put the clip previously attached to I in its place; that is, attach the wire from the new binding post to the antenna binding post. The loading coil

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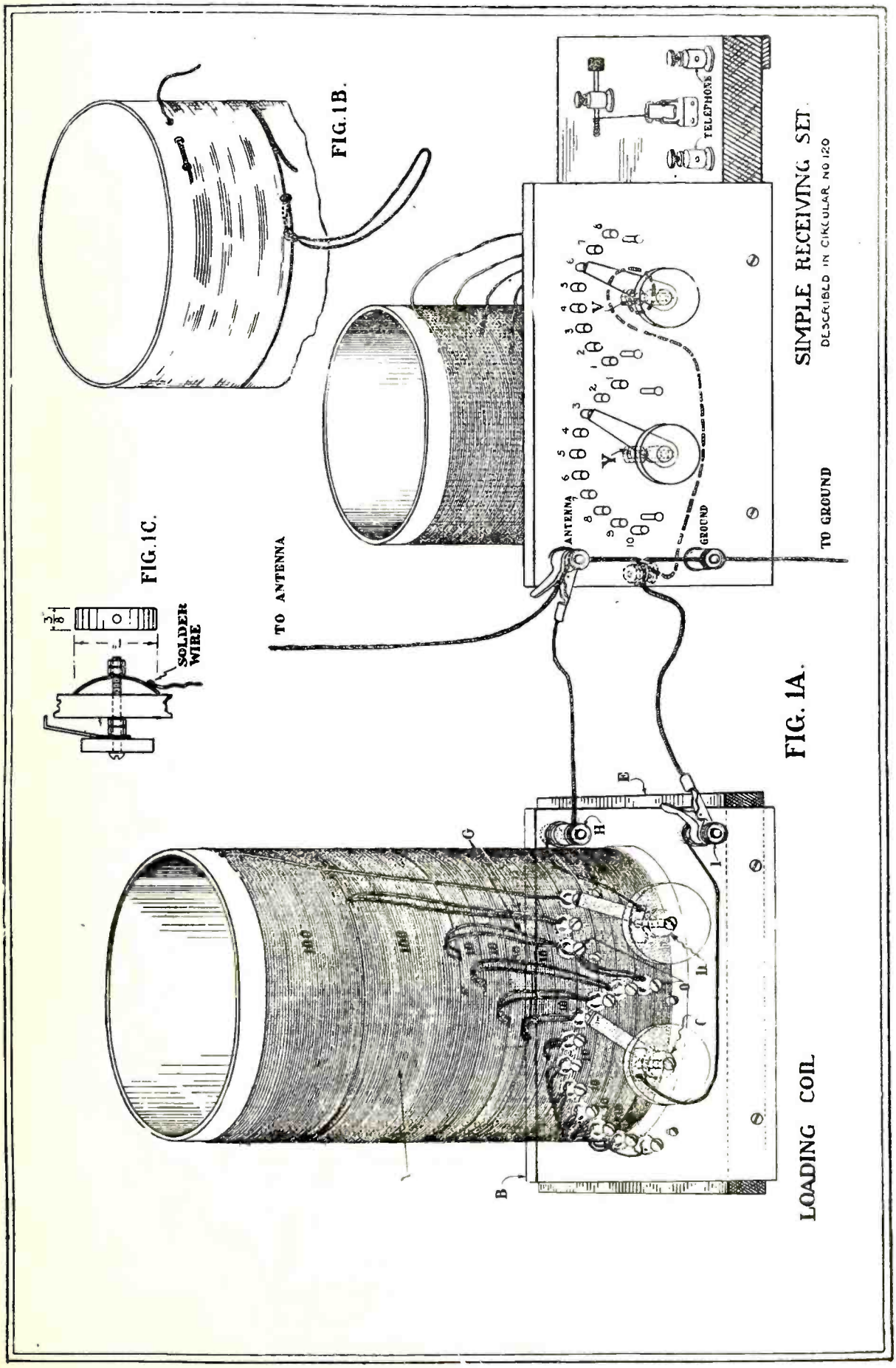


FIG. 1A.
LOADING COIL
SIMPLE RECEIVING SET
DESCRIBED IN CIRCULAR NO 120
TELEPHONES
ANTENNA
GROUND
TO ANTENNA
TO GROUND
FIG. 1B.
FIG. 1C.
SOLDER WIRE
3/8

Here's That Lawsuit Against Grebe

MERELY a reference in the December issue of this magazine to the suit brought by the Radio Corporation of America against the A. H. Grebe Company has brought correspondence from far and near. When we went to press on the last number we had little information concerning the suit and expressed a desire for more. Various radio manufacturers and dealers have forwarded us copies of a pamphlet containing the text of the bill for injunction filed by the Radio Corporation. The front cover of this pamphlet bears th. legend "What Do YOU Think of This?" This pamphlet apparently has been widely distributed on the supposition that the radio public will want to get the details.

There is enough jaw-breaking legal phraseology in the Radio Corporation's bill to put a Philadelphia lawyer fast asleep. In every-day, street-corner English the bill asks that the Grebe people be enjoined from making receiving sets which are intended to be operated with a certain sort of detector and amplifying tubes of which the Radio Corporation claims to possess all existing patents.

The Corporation also asks the court to order the Grebe people to turn over to the Corporation all of the apparatus they have in stock, built in alleged infringement of the bigger company's rights. As an alternative it is suggested that the court take possession of the receiving sets, etc., to do with them as the court may see fit. A third suggestion is that all this equipment be mashed and smashed and splashed until it bears no resemblance to anything that might be sold, leased, manufactured, supplied or installed by the Radio Corporation, proceeding under its alleged rights under the patents owned by the Corporation.

The bill names J. H. Bunnell, Inc., as co-defendant with A. H. Grebe & Co., Inc. The Bunnell concern is a distributing company, it is set forth. The bill relates that our old friend, Lee DeForest, in 1916 applied for patent rights on "Devices for Amplifying Feeble Electric Currents" and that in 1907 our old radio friend Lee came right back with application for patent rights on certain new and useful improvements in "Space Telegraphy." Letters of patent were issued to Brother DeForest in due time. Along in 1917 said DeForest sold the patents to the American Telephone and Telegraph company.

The American Tel. and Tel. sold the whole shooting match to the Radio Corporation as late as November 9, 1922. This sale included the right to sue for recovery of damages, profits and savings. The Corporation's bill relates that there had previously been litigation over these patents and that a certain Elman B. Meyers, of California, had been whipped in a court skirmish and that one Jacob Hohenstein, of New York, also had permitted himself to get on the losing end of a temporary injunction "restraining the infringement of said claims."

The most interesting section of the bill relates that Grebe and Bunnell have been making and selling "*wireless receiving sets adapted, designed and intended for use in combination with, and useful only in combination with vacuum detector and amplifier tubes embodying and employing the inventions and improvements of said Letters Latent.*"

If the foregoing paragraph means that the Radio Corporation will try to maintain that a manufacturer has no right to build and sell a receiving set into which the purchaser is expected to screw tubes invented and improved by our aforesaid Old Friend DeForest and bought from the corner radio shop, then the radio receiving set manufacturers sure are going to sit up and take notice of the result of the Corporation's prayer.

The Radio Corporation files another bill of complaint of the same character against the same defendants, with the exception that Fritz Lowenstein and not the said DeForest, is named as the original patentee of devices now controlled by the Corporation. The bill says that Fritz "being then a citizen of the United States" was the inventor of certain useful and new improvements in "Telephone-Relays" Fritz sold his rights in this new and useful improvement to the same Telephone and Telegraph company that took over our Old Friend DeForest's devices.

The bill then relates that Robert C. Mathes became in 1916 the inventor of a "Circuit for Electron-Discharge Devices" which he soon sold to the Western Electric Company. The Western Electric Company then sold the patent rights to the several times aforesaid American Telegraph and Telephone company and the Tel. and Tel. then sold the stuff to the Radio Corporation of America. That left the Corporation in sole possession of the Mathes and Lowenstein patent rights and the Corporation wants the court to enjoin Bunnell and Grebe from making and vending apparatus which embodies or employes these inventions.

It is the contention of the Grebe company that the Radio Corporation contemplates a monopoly.

Manufacturers Organize

What is described as a tremendous step forward in the clearing of patent entanglements and manufacturer's patent problems is the announcement today of the formation of an incorporated group, termed the "Independent Radio Manufacturers," with offices at 165 Broadway New York.

In an interview, Mr. Walter Russ, of Pennie, Davis, Marvin & Edmonds, attorneys for the group, declared it to be his opinion that the incorporation of the Independent Radio Manufacturers, Inc., marks the first important step forward in the clearing of the atmosphere surrounding the many patents and counter-patents clouding the radio horizon today.

"At the request of a number of important radio manufacturing concerns," said Mr. Russ, "The Independent Radio Manufacturers, Inc., was organized to join various radio interests into a common cause, for defense or offense in connection with the radio patent situation. Stock is held in equal shares by all the members and the cause of one becomes the cause of all.

"Of course, any action by the group is subject first to the approval of the board of directors, and it is very likely," continued Mr. Russ," that in the event of patent dispute between members of the organization, such differences could in all probability, be arbitrated, or some other friendly settlement arrived at.

"The advantages of concerted action are not limited to the division of expense, alone," stated Mr. Russ. "For example, the radio engineering talent represented by the various members of the Independent Radio Manufacturers, Inc., is such that much more technical data on the history of various inventions and important anticipatory material is available, to the group in a manner which would be possible in no other way. This information may at any time prove invaluable to some one member in need."

When inquiry was made in regard to new members joining the group, Mr. Russ stated that many new names have been submitted to membership accepted and will, in all probability, be acted upon in the near future. Many manufacturers of radio apparatus, learning of the real advantages to the entire industry offered by the Independent Radio Manufacturers are desirous of joining.

"Hooverising Radio"--Legislation Urgently Needed

By CARL H. BUTMAN

THE extension of the regulatory powers of the Department of Commerce over radio is imperative, Secretary Hoover, who has become a sort of foster-father to radio, states in his annual report. Otherwise the development of radio art will be greatly retarded, he explains. The sudden increase of radio telephone broadcasting during the last seven months of the fiscal year from 5 to 382 transmitting stations, and the increase from about 200,000 to 1,500,000 receiving stations, resulted in so much "interference" between sending stations the Secretary of Commerce reports, that the destruction of the usefulness of this very important invention was threatened.

A conference of experts, manufacturers, and government, public and amateur representatives, which was called by Mr. Hoover in February, unanimously recommended the immediate extension of the regulatory powers of the Government and drafted a set of technical provisions for submission to Congress.

Identical radio bills were introduced in the two houses of Congress last session by Senator Kellogg and Rep. White, but they are apparently "pigeon-holed," awaiting, perhaps, the demand of the radio public itself before any action will be taken. Department of Commerce officials handling radio matters have cherished the hope that early action would be forthcoming for some time and continued to license all broadcasters every three months, while awaiting a definite law. New legislation would aid the Secretary of Commerce in enforcing the laws and bring about a more satisfactory condition for both operators and "fans," they point out. Authority for the appointment of the advisory committee of six Governmental and six outside civilian members, would assist the Secretary in reassigning definite wave lengths and in the allotment of more bands for commercial and private uses. Congressman White's bill is expected to be pushed but action is not assured this session.

Recommendations of the Radio Conference were for one exclusive Governmental broadcasting wave band, two bands for private and toll broadcasting, and four for use by both Government and private broadcasters, which would give such transmitting stations broader scope and prevent interference to a great degree. Today only two public broadcasting waves are available, 360 and 400 meters, while the Government wave is 485, confining a very large amount of matter broadcast by many stations to only three wave lengths, and necessitating time schedules and silent periods. The assignment of waves under these recommendations, as well as other technical problems, would devolve upon the advisory committee. It is very likely that Secretary Hoover would secure the aid of the present Interdepartmental Radio Committee, or at least six of these technical experts as the Governmental representatives on his new committee.

Another feature planned if new legislation is secured is to make the wave band between 600 and 1,600 meters, now assigned for Governmental use, available to commercial and public stations. Details such as these, however, it is hoped will be left to the discretion of the Secretary. The art of radio is developing so rapidly as to demand constant changes and the permanent or specific designation of every wave or band of waves by law would be a hindrance.

Interference is actually far worse today than it was five months ago, when Mr. Hoover's report closed at the end of the fiscal year. Instead of there being 382 broadcasting stations on 360 and 400 meters, there were actually 565 such stations in operation on December 1, or 179 more than existed on June 30. During the fiscal year seven commercial trans-atlantic stations were placed in operation, providing for better communication with Great Britain, France, Italy, Japan, Norway, Poland and Germany. Another commercial station opened for business with Central America and plans for circuits to South America and China were also underway. In the fiscal year ending June 30, 1922, commercial land stations, excluding broadcasters, increased from 161 to 345.

Amateur station licenses increased from 10,809 to 15,504 between June 30, 1921, and June 30, 1922. In the past five months, however, 1,304 more stations have been licensed bringing the total amateur sending stations to 16,888 on December 1. The increase in amateur interest by 5,999 is gratifying to the officials of the Government, for they say, these young men constitute a reserve of trained operators, some of whom have already contributed to radio art. During the war many amateurs were found to be superior to the average commercial operator in resourcefulness and technical knowledge.

The necessity of an international conference on radio communication for the adjustment of international

(*Continued on page 28.*)

Button—Button Who's Got the Button?

THE old game of "Button, Button, Who's Got the Button?" has just been applied to radio broadcasting, and when the younger radio "fry," meet they ask each other how many radio buttons they have, the one with the greater number being the winner. Several stations now have individual buttons and many have their orders on file.

W. Dandridge Terrell, Jr., fourteen year old son of the Chief Radio Inspector, of the Department of Commerce, is the "inventor" and owner of the new radio button scheme. He is supplying broadcasting stations with identifying buttons of different colors bearing their name, call and sometimes their slogan. Distribution of the buttons is made by the stations to listeners-in who report having received their broadcasts.

Many fans are already pridefully displaying the buttons of their favorite stations on their coat lapels or on banners hung on the wall over their receiving sets. Those possessing the most buttons are local champions. As new broadcasters adopt buttons, the scope of the game increases and there are more buttons added to the pennants of the receiving stations. A prize pennant is planned for the receiver securing the most buttons in a given time.

The young inventor who is a pupil in the Force School in Washington, is believed to have started something new in the way of advertising and both broadcasting stations and fans are enthusiastic over the plan. Among the first stations to adopt buttons were "WSB," the Atlanta Journal, and "WFAA" The Dallas News.

With the Radio Trade

Courts Sustain Injunction

The Appellate Division of the Supreme Court of the State of New York has recently confirmed the lower court's decision granting an injunction to the Freed-Eisemann Radio Corporation in their suit against the Wireless Specialty Apparatus Co. The injunction was sought to prevent the Wireless Specialty Apparatus Company from advertising and circularizing certain statements made in regard to radio patents.

This decision has a very important bearing, and is the first step in the solution of a great many patent tangles resulting from the sudden growth of this latest "infant" industry.

Interesting developments are now expected as a result of this decision, in connection with the claim of Freed Eisemann Radio Corporation for $150,000 damages, alleged to have been suffered by them as a result of the patent warning advertisements inserted in various papers, and in restraint of which the injunction was granted.

Let's Name It "Radio!"

With nearly every new development of great popular interest there comes an era of using the new name for practically anything—and so a literal flood of articles have been christened "Radio." Some objects are aptly named, but many of them have nothing to do with the art or practice of wireless telegraphy or telephony.

Twenty-four articles use the single word "Radio" as a trade mark, according to the Patent Office records, and more applications are on file. The first use appears to have been in connection with a chemical compound registered by John B. Daniels on August 23, 1904, about six years before the Navy adapted the word to wireless telegraphy.

In 1911 the word "Radio" was registered as a trade mark for a make of hot-air fans and also a brand of varnish and paint. The type and design of the letters in the word of course were different, and sometimes the background varied. In 1913 and 1914, "Radio" was employed to designate certain forms of chemicals, medicines, insecticides, leather, threads and yarns, and furniture polish.

What was probably the first registeration of this trade word for an electrical contrivance was taken out for electrical batteries and apparatus early in 1915. A little later came a type of "Radio" ball bearing, and in 1918 the "Radio" golf ball was trade marked. A non-intoxicating beverage took on the name in 1918, and in the next two years it was used to designate certain flower and garden seeds, auto lenses, phonographs, tires, and a brand of canned fish. The past two years saw "Radio" applied to watch charms, writing paper, skirt braid, playing cards, cigarettes and dyes. It was March 14, 1922, before a piece of wireless apparatus was trade marked with "Radio," although before then it had been combined with other words to designate many things. Silk, pens, tonics, a magazine, and tea had been branded with the mystic letters. Both "radiofone" and "radiophone" were used in 1920, and 1922 came "super-Radio" and "Radio Rex."

Many articles bear the name which seem not to be trade marked, among them the recently advertised "Radio Boot," "on and off in a flash," and radio overcoat, with weather resisting qualities has also appeared. The other day the name was assigned to a ship, which curiously carries no wireless apparatus. In the field of sport the name has been appended to a race horse and "wireless," another horse is also pretty well known. Apparently "Radio" is a popular name, taken by and large, for use in any field, but there are those who would like to see to see it confined to matters connected, at least, with the art.

Pittsburgh's Show

A sparkling, scintillating electric fountain, a complete electric home, a wedding by radio, and the hall jammed with thousands of people, other thousands being turned away at the door, all contributed to making the recent electrical exposition, held under the auspices of the Electric League of Pittsburgh, a complete success. It was stated by electrical men that this show was one of the best ever attempted in the United States. During the week that it was held, the main topic of conversation in Pittsburgh and vicinity was the electric show and everyone, not seeing it, was made to feel that a great deal was missed.

The indescribably beautiful electrical fountain, designed by W. D'Arcy Ryan, was one of the world's most dazzling lighting effects. Myriads of multi-colored spectra flashed about the hall, the central water spout shot up with a rush, and the 20,000 jewels flashed, glittered and sparkled from the central beams of sixteen powerful searchlights and a multitude of smaller lights.

The $40,000 house, completely erected in ten days, with real grass growing in an iron-fenced lawn outside, was something that is not ordinarily seen indoors. The house consisted of five rooms, a bath and a reception hall, each perfectly equipped, with all the latest in furnishings and every conceivable electrical appliance. The house was broken in two so that the crowds could walk between it and so have an unobstructed view into the rooms.

Radiophone loud speakers were stationed at strategic points about the hall and the address of A. W. Thompson, president, Philadelphia Company; E. M. Herr, president, Wstinghouse Electric & Manufacturing Company; A. M. Lynn, president, West Penn Power Company; K. I. McCahill, president, Pittsburgh Harmony, Butler and New Castle Railroad. W. M. Furey, president, Pittsburgh Chamber of Commerce, could be heard and, at the same time, by reason of their speaking from a glass booth in the hall, the speakers could be seen by all attending the show. The words of these men were transmitted to the Westinghouse Radio Station, KDKA, at East Pittsburgh from where they were broadcast. A wedding was held in this booth and that night over 5,000 persons were turned away from the door.

Lighthouse Keepers' Club

Several men in the Lighthouse Bureau at Washington have been dabbling with radiotelephone receiving sets, and it has occurred to them that their experience would be valuable to keepers and other members of the service who would like to enjoy the pleasures of the radio concerts. Therefore, they propose to organize a radio club among the amateur "fans" of the service. The initiation fee will be a postal or letter stating approval of the scheme and a desire to be enrolled as a member. The dues will be a word or two from time to time telling of difficulties encountered, results secured, or asking information.

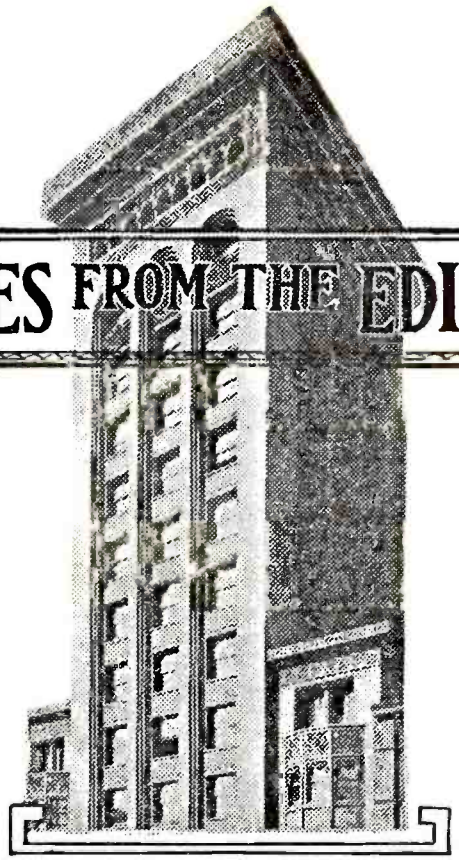
A space in the Lighthouse Service Bulletin will be reserved for answers to questions and interesting information as will enable them to construct their own sets or improve those they already have and to conduct a clearing house for new ideas. Articles will appear from time to time on different phases of the subject. Charles C. Brush is in charge of the plan.

Government List Ready

"Amateur Radio Stations of the United States, edition of June 30, 1922," is ready for distribution according to the Department of Commerce. Applications should be made to the Superintendent of Documents, Government Printing Office, the price is twenty-five cents. The publication contains 300 pages and records 15,504 amateurs licensed up to June 30, 1922, their calls, address and power together with special licenses issued to training schools and experimenters.

6,500 Mile Record

An unusual combination of atmospheric conditions is believed to have made possible a radio feat recently reported. According to the report the wireless station at Eastevan, 150 miles southwest of Victoria, B. C., on Sept. 21 spoke to an operator at Raratonga, N. Z., 6,500 miles away.



THOUGHT WAVES FROM THE EDITORIAL TOWER

SHALL broadcasting be controlled by the few? It is a question exactly as big as radio. There is sufficient evidence that the Westinghouse Electric and Manufacturing Company, associated with the Radio Corporation of America, would like to eliminate all broadcasting stations not owned or controlled by the Westinghouse interests. The argument of General James G. Harbord, published elsewhere in this issue, is that if wave lengths and locations of stations were properly allocated there would be room for only forty-six big broadcasting stations in the United States. It is General Harbord's view that by decreasing the number of stations from about six hundred to forty-six stations, interference would be eliminated, programs would be of more excellent quality and "the greatest good to the greatest number" would be accomplished. Similar views have been expressed by officers of the Westinghouse Company, notably by Mr. Davis.

But in the motive of the Radio Big Four (General Electric Company, United Fruit Company, Westinghouse Companies and the American Telegraph and Telephone Company) altogether altruistic? Is there a perfectly natural hope in the heart that, with broadcasting under their control, these giant corporations could vastly increase the sale of their Radio Corporation apparatus?

Secretary Hoover, of the Department of Commerce, is among those who predict that owners of receiving sets in the United States will soon number millions. Do our radio citizens want the vast influence, soon to be exerted on our social and economic life by radio communication, controlled by a group of corporations?

Is not radio broadcasting, with its direct contact with all the people, best left in the control of individual companies, of various political, sectional and business perferments? Is not radio broadcasting to have the same American freedom as has the daily newspaper?

Owing to mechanical difficulties it is necessary to combine the January and February issues of Radio Age in this issue. Schedules in both the subscription and advertising departments will be adjusted accordingly so that subscribers or advertisers shall receive full value on all contracts.

It is argued that independent broadcasters cannot go on supporting stations at an expense of from $25,000 to $50,000 a year. Many of them are in a position to do so and as long as they are willing to pay the fiddler who has the right to stop their dance?

We would like to see broadcasting conducted on a free-for-all enthusiastically competitive basis, of course with reasonable government restrictions as to interference, and as to character of broadcast programs.

Our broadcasting is all right; our broadcasters are all right. The radio fans will testify to it. What radio needs now is some action in Washington to end the present impossible wave-length overlapping, thereby giving broadcasters and fans the use of the air—to which they are entitled.

And if radio communication is to be monopolized let us at least make it a government monopoly. Wireless is too universal in its appeal, in its possibilities for good, in its power to reach the masses to pass from the possessive control of the American people.

RADIO is beginning to find its place in crime detection and tracing of fugitives. It was obvious from the start of broadcasting that the use of wireless could not fail to be of benefit to the police of cities and law enforcers generally.

A striking example of the use of radio in this way is presented by the search for the robbers who got away with $200,000 from a federal reserve truck in Denver in front of the United States mint. Serial numbers of the bank notes stolen were at once broadcast by Denver stations and the whole country was instantly apprised of the description of the loot and of the robbers.

With a million and half persons listening in it is difficult to conceive of a more effective way of hampering a criminal's flight and making it difficult for him to dispose of his plunder. When the final chapter of this Denver robbery is written we predict that it will be found that crystal detectors or vacuum tubes had a good deal to do with the solution of it.

FRANK D. PEARNE, technical editor of Radio Age, has received the following letter which is published in the belief that some reader may want to lend a radio hand to the convicts at the state penitentiary at Joliet, Ill.:

"My dear Mr. Pearne:

"Noticing your articles from time to time on "Radio," I have intended to write you with reference to getting information, etc., as to a receiving set. I am therefore taking that liberty now.

"I have been on the State Honor Farm for over two years now, and that occasions this letter. There are on the average, one hundred and twenty-five men here. We are two and a half miles west of

Lockport and about forty miles from Chicago. Being short on entertainment, if there is any way we can install the equipment for a receiving set so that we could have the benefit of the fine concerts, lectures, as well as many other things coming over the air, it would be a great boon to us.

"I would like to get you interested for it is a worthy cause, so to speak—and to have you give us advice, and if agreeable, lend your aid, so we could get the proper equipment at as low a price as possible.

"Under the present administration of affairs here, with Acting Warden John L. Whitman in charge, everything possible is being done to have the men realize that they *are* men, and that they *are* expected to go out and prove it by making good. It is easy to see therefore, what *great* good a radio set would do here.

"We have a dining hall, about 16x50, where the apparatus could be placed so the concerts, etc. could be heard. We have electricity, power furnished by the Sanitary District. Just what information you would want before giving us suggestions, as to what we would need, I do not know, but if you will give us an idea as to about what would be necessary, its probable cost, etc., I will be grateful."

Bank Operates Giant Radio

The most powerful radio broadcasting station on the Pacific Coast—and one of the most powerful in the United States—is now "on the air" in regular service on "Telegraph Hill," San Francisco.

The station — officially known as KFDB—was established by the Mercantile Trust Company of California, and is the first in the West to be built, owned and operated by a bank.

KFDB has a sufficient range to reach all points west of the Rocky Mountains. It is broadcasting every day (Sunday excepted) commercial, financial and agricultural information between the hours of 10 and 11 a. m., 2 to 3 p. m., with a musical program between 9 and 10 p. m.

The first attempt at broadcasting from the KFDB station—made in August—developed an interesting problem in radio engineering. The power was supplied direct from a 2,000 volt generator, but the commutator hum of the generator prevented satisfactory radio reception.

To eliminate this disturbing noise, it was decided to install a 2,000 volt 20 amphere hour storage battery, and use the generator for recharging the battery in series. The Philadelphia Storage Battery Company supplied 333 Philco Radio "A" Batteries for the purpose and regular broadcasting was started on November 1.

Broadcaster Saves $56,000

ONE broadcasting station has been issuing for some months its weekly program to 30,000 "listeners-in." This has been mailed at great expense. The station has decided not to continue this method and we publish a letter the station issued a month ago, eliminating the name of the station for the reason that we have not received permission to use it. The letter comes to us from a fan who says the decision is "somewhat of a calamity," as having the program at hand assists in identifying the station.

The broadcaster's letter follows:

"Dear Friend:

"This station has been vitally interested in the constructive side of radio transmitting. With this issue before us we are going to change one thing to better develop the other.

"We have been publishing a weekly program; our mailing list on this program has now passed the thirty thousand mark. We estimate that if continued, it would cost us fifty-six thousand dollars per year to print, addressograph, and mail this program. This overhead expense in no manner improves the character or quality of our broadcast program, which is really 'the constructive side of radio transmitting.'

"You do not listen in on the printed leaflet. It merely gives you the names of persons, selections, hours of broadcasting, etc. We believe there is a better way, at a very great saving to us, allowing us to put this saving into better radio transmitting, which is again 'the constructive side of radio transmitting.'

"The station issues a weekly newspaper advance program sheet which is mailed the newspapers free. If your newspaper prints this daily or weekly, you get the names, numbers and hours just as well as though we sent it to you individually. A one-cent stamp takes it to the newspaper; the newspaper passes it on to thousands of listeners at no further expense to anyone, whereas it now costs four cents each week to reach each person in the thirty thousand. In order to get 'the constructive side of radio transmitting' to all the listeners in your territory, we ask that you make it your individual duty to cooperate with us on this change, thus saving us a tremendous expense and accomplishing the same end in another way. It will be put to you to see that your newspaper is placed on our newspaper program mailing list. It will also be up to you to see that this program is being published daily or weekly for the benefit of yourself and everyone interested, in your territory. The amount of public demand for this service will determine your newspaper's willingness to give space for the purpose. The cooperation of yourself and other listeners in your district with the newspapers in your locality is therefore necessary

"For reasons which are obvious, it will be *necessary that the request to be placed on this list must come from the newspaper direct.*

"This station will continue with the very best programs, ever striving to improve the quality of its service to the public. It is obvious that the elimination of this one overhead expense and concentration of our savings and efforts upon the quality of our broadcast programs can only result in the improvement of that product.

"Your correspondence is solicited, now as before. Your criticisms, suggestions, and advice have helped us materially in placing our station acehigh among the broadcasting stations of the country. We need your further cooperation to further improve our service.

Very sincerely yours,

"P. S.—The program enclosed herewith will be the last copy issued to individual listeners."

Organ Recitals

Through the courtesy of the Estey Organ Company, the Radio Corporation-Westinghouse station, WJZ, Newark, N. J., has arranged to broadcast organ recitals at least twice a week during the coming winter.

The organ, because of its extreme purity of tone and great versatility, has always been the most popular of musical instruments, and the radio audience has voiced its approval of the recitals now being broadcasted by several of the larger stations. Unfortunately, however, the average organ is not well adapted for radio purposes. For both structural and artistic reasons, it is installed in several different sections; and though the player can produce beautiful effects for his immediate audience by the appropriate use of these different sections, the variation in the volume of sound is too extreme to be entirely satisfactory to the radio audience.

The engineers of WJZ studied all of the available organs with this fact in view and were delighted to find in the great Estey organ, installed in the general offices of the company at 11 West 49th Street, New York City, one that was not only of the highest musical excellence but that also seemed especially designed for radio purposes. In this organ, the sound chambers are so arranged that all of the tone emerges from a single point, regardless of which banks of pipes are being played. This greatly simplifies the transmitting problem and permits every sound intensity to be caught at its true relative value by the microphone.

An unusual feature broadcast by WJAX, the radio station of the Union Trust Company, Cleveland, was the organ recital by Edwin Arthur Kraft, at the new Cleveland Public Auditorium on Tuesday evening, November 28.

This program was of especial interest to radio fans because of the unusual character of the organ upon which the recital was played. The Cleveland Public Auditorium organ is the largest in volume of any organ in the world and has been the cause of much interest upon the part of musicians as well as much curiosity upon the part of the public. The organ was designed and built by the Skinner Organ Company of Boston, Mass.