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September
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Panels, sheets, bases, tubes, rods, dials, vacuum tube sockets, variometer rotors and stators, vario couplers, receiver shells and caps, condenser supports, antenna insulators, insulated connectors and bushings, horns, lightning switches, lightning arresters, transmitter key knobs, binding posts, switcharm knobs, dial knobs, and any other style of knobs.

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VOLUME 9

THE WIRELESS AGE

NUMBER 12

Edited by J. ANDREW WHITE

Contents—September, 1922

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CHANGE OF ADDRESS—Notify us of any change in your address, giving both the old and new location.

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Owing to the fact that certain statements and expressions of opinion from correspondents and others appearing in these columns from time to time may be found to be the subject of controversy in scientific circles and in the courts, either now or in the future, and to sometimes involve questions of priority of invention and the comparative merits of apparatus employed in wireless signalling, the owners and publishers of this magazine positively and emphatically disclaim any privity or responsibility for any statements of opinion or partisan expressions if such should at any time appear herein. Printed in U. S. A.

Advertisers' Index

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AMPLIFIES AS IT DETECTS

—enjoy clear reception by using Cunningham Tubes

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The Magnavox Power Amplifiers insure getting the largest possible power input for your Magnavox Radio. They can be used with any "B" battery voltage the power tube may require for best amplification.

Switching from stage to stage is made easy by master switches, as illustrated. *2 and 3-stage.*

More wonderful day by day grows the range of entertainment, recreation and information supplied by central broadcasting stations in all parts of the country.

It is the development of Magnavox Radio which has made these wireless programs fully enjoyable—removing the restrictions and limitations imposed by the telephone headset.

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Every radio user (present or prospective) will be interested in reading this new folder on the Magnavox Radio.

It contains full information about this wonderful reproducer, with illustration, description and list price of the various instruments.

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On receipt of request we shall be pleased to send you free copy by return mail.

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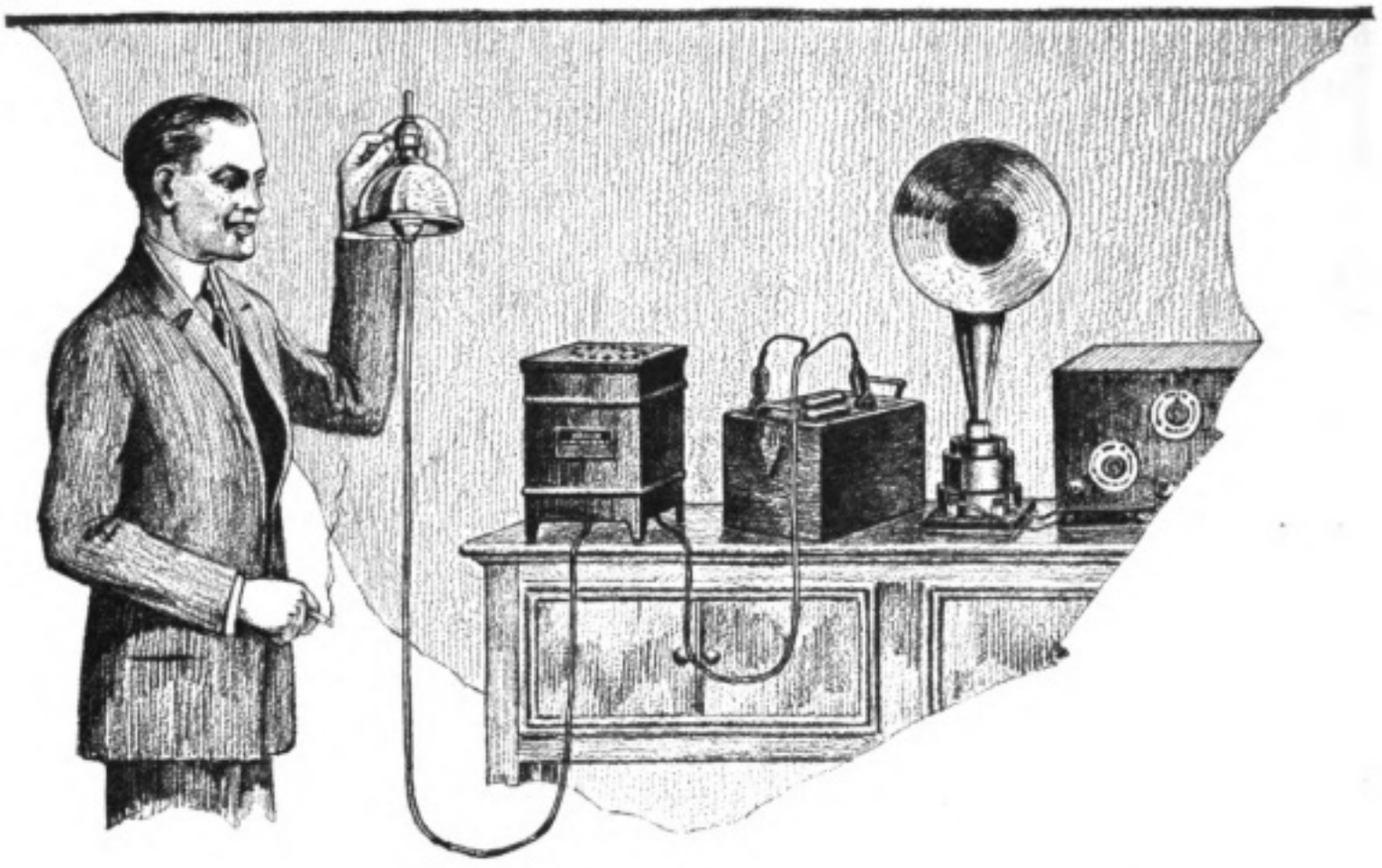

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The device that keeps batteries at home

Charging Storage Batteries Easy as Turning on the Light

Tube sets require storage batteries, and they in turn require charging. You can do this at home merely by turning on the electricity, if you have a Tungar Battery Charger.

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Tungar Battery Chargers were developed in the Research Laboratory of the General Electric Company over six years ago. Thousands have been in successful operation ever since.

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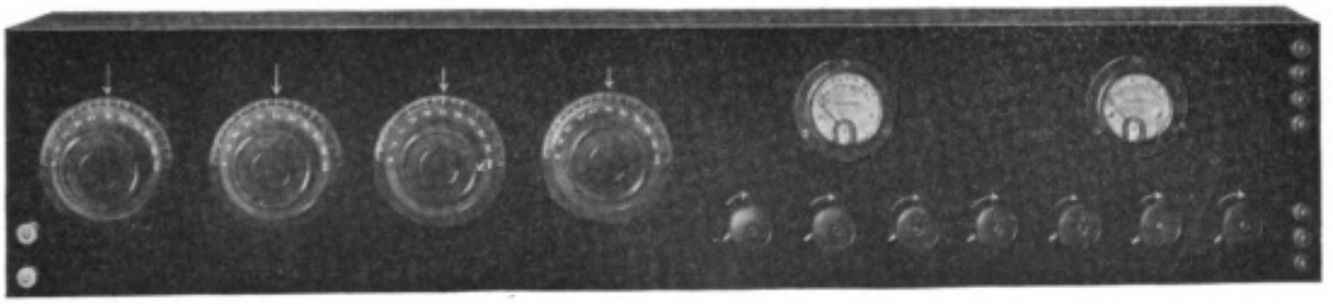
35A-76

Armstrong
Super-Heterodyne Receiver



"The Rolls-Royce Method of Reception"—"Armstrong"
This Method of Reception

USED BY

Paul F. Godley at Ardrossan, Scotland, in last December's Amateur Trans-Atlantic Tests.

The Commercial Radio Companies for long distance ship-to-shore communications.

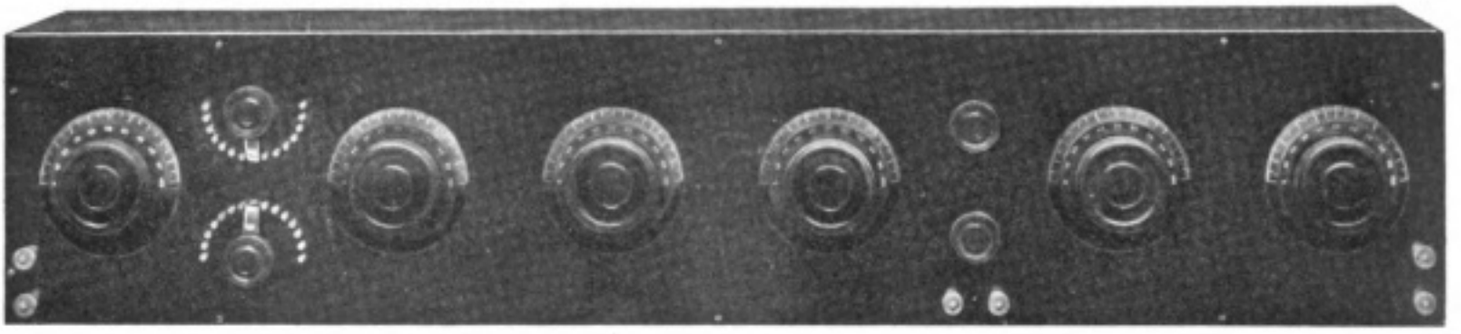
Progressive amateurs for exceptionally long distance reception of radiophone, spark or CW signals.

WAVE LENGTH RANGE

150—850 meters with Heterodyne. 850—25,000 meters without Heterodyne.

Complete constructional details of this receiver are covered in our blue prints Nos. 30035—38A showing assembly views, individual details, wiring diagram, technical data and bill of material, price $4.00.

Armstrong Super-Regenerative Receiver



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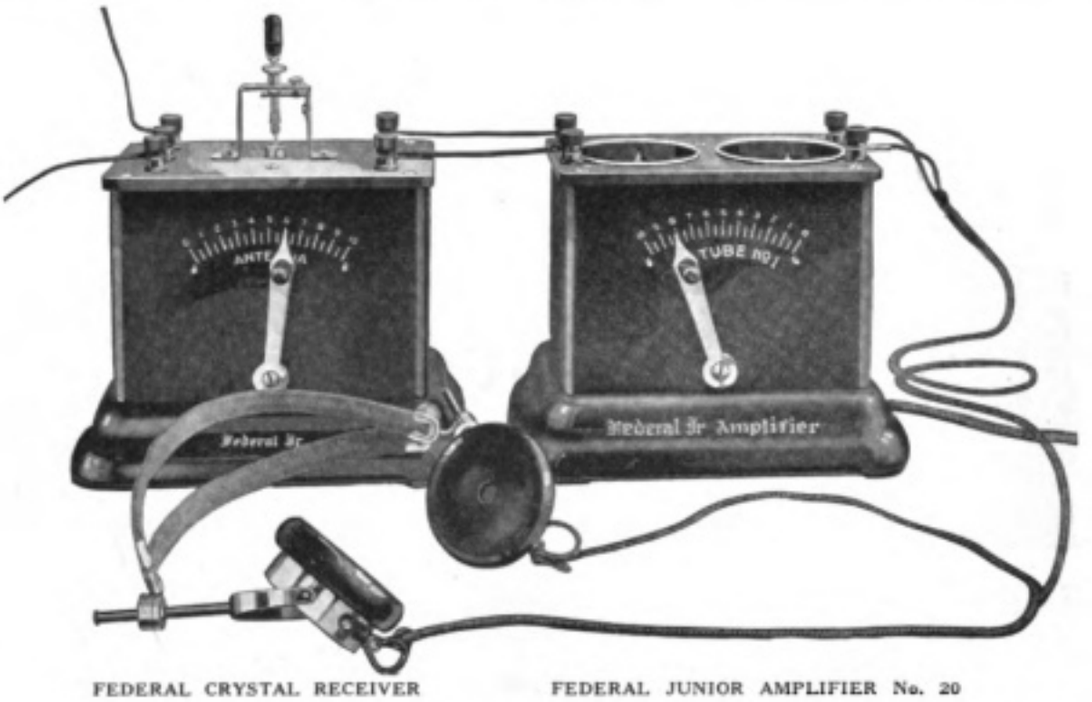

FEDERAL CRYSTAL RECEIVER FEDERAL JUNIOR AMPLIFIER No. 20

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IF YOU HAVE A RECEIVER of any other type increase its efficiency by using

Federal HEAD TELEPHONES

THE **Federal** BATTERY UNIT is arranged to contain both "A" and "B" Battery in a most compact and convenient manner.

The metal container is beautifully finished—a style peculiar to

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The Name **Federal** Is a Guarantee

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Utilize the exceptional qualities of the tone box on your phonograph for a loud speaker. Fits Victor, Columbia, Edison and others. Uses both phones. Can be instantly attached.

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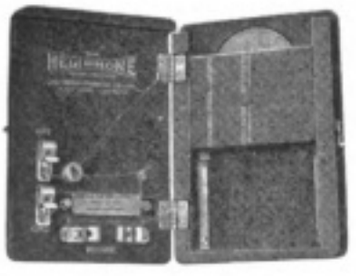
Positive contact assured by phosphor bronze brushes at each bearing. Wire is insulated. Wave length range with suitable condensers, 150 to 700 meters.

Catalog No. 400 Price $6.50

Phonoscope

Extra headphones are unnecessary. The Phonoscope permits four people to "listen in." Does not cause distortion.

Catalog No. 83 Price $5.00



Pocket Receiver

The most convenient small set. Fits the coat pocket. Range 30 miles — permits sharp tuning.

Catalog No. 38 Price $5.00

A Lightning hold up

A BLINDING flash....crash....not your house ....but pretty close. There's more than just the discomfort of listening to the heavenly artillery at such times. Your radio set can be ruined by the high induced charges always present in such conducting mediums as your antenna wires during electrical storms, if the charges are allowed to go to ground through the delicate instrument.

A Radisco Lightning Arrester holds up Old Man Lightning and sidetracks these high induced charges peacefully to earth. You can take your choice of two different types. The Outdoor Type sells for $3.00 and is weatherproof. The Indoor Type of Radisco costs only $2.50. Do not accept substitutes. Your dealer should have RADISCO in stock. If not, send direct to the Radio Distributing Company, Newark, N. J.

Other Radisco products which will interest you include complete receiving sets ranging in price from a few dollars to several hundreds depending upon the range and whether or not you desire to employ a loud speaker. Also parts for improving your sets including amplifying transformers, vario-couplers, variometers, variable condensers, switch sets, dials, binding posts, detector and amplifier units, etc. Send 10 cents for our new catalog.

RADIO DISTRIBUTING CO.
Newark, N. J.

RADISCO
LIGHTNING ARRESTER

In Our Opinion

Amateur Transmission and Broadcast Reception

WITH the number of radiophone stations broadcasting on 360 meters constantly increasing, necessitating a lengthening of broadcasting hours, the problem of the transmitting amateur is becoming more and more difficult. Where a transmitting amateur using a spark transmitter, for instance, is located in a thickly populated section, it is next to impossible for him to transmit without causing interference to several, or many, nearby broadcast listeners, even though his station strictly conforms to all laws and regulations. The same is practically true, although in a much smaller degree, in the case of a tube transmitter of high-power, say of the order of 100 watts or more. At a little distance the effect of the tube transmitter is, of course, confined to the 200-meter wave, but next door, across the street or down the block some interference will result on the broadcasting wave, particularly in the case of listeners who are not skilled in selective tuning, or whose receivers are not of a high selective quality, although otherwise entirely satisfactory for broadcast reception.

While the operators of 20,000 general amateur transmitting stations are up against this interference problem, the case of the 200 or more special amateur station operators, authorized by their government licenses to transmit on 375 meters, and to use more power, in many cases than is allowed the general amateurs, are practically out of business, unless they are willing to do their transmitting after broadcasting hours, which, in the case of the New York district, means after midnight.

In addition to the two classes of amateur stations, there are many experimental stations, known as the X class, and many school and university stations the Y class, which are authorized to transmit on wavelengths in the neighborhood of the general broadcasting wavelength, but cannot do so, between 9 A. M. and 12 P. M., without causing interference with the programmes of the many broadcasting stations now in operation.

While all these classes of stations are licensed by the government and authorized to transmit in accordance with specified rules for power, decrement and wavelengths, a large proportion of them are idle at present, owing to the provision in the radio laws against interference, to the effect that any operator shall not willfuly interfere with any other radio communication. The Department of Commerce has ruled that broadcasting is radio communication and that the operator of any station who interferes with it is liable to penalties.

The whole situation, so far as the transmitting amateur is concerned, is highly unsatisfactory. It would seem that the use of moderate powered tube transmitters, on 150 to 200 meters, offers the best solution of the problem.

* * *

Municipal Licenses for Radio Installations

MUNICIPALITIES in various parts of the country are showing a disposition to require inspection and licensing of radio receiving installations. Thereby there is raised the bogy of oppressive restrictions that may limit the benefits of radio to the comparative few who may have the courage to follow official red tape to its crimson and bitter end.

As yet the sole excuse offered for the various local licensing plans is that the public must be protected against the danger incurred by careless installation, or installation not in accordance with the rules of the Fire Underwriters.

As a reason for restriction it is a poor one, for such dangers are not to be overcome that way. The careless few will continue to hurt themselves with radio, and with tack hammers, scissors, needles and pins, as well. The radio receiving set is no more dangerous than is the telephone, and is less so than the electrical lighting, heating and fan equipment in use in millions of homes.

In principle, the proposal to license receivers is unjustly discriminatory as long as such appliances as electric fans, toasters and heaters go unheeded.

In practice, licensing will prove a severe handicap to the radio industry in such cities as may adopt it. By creating an atmosphere of difficulty and danger, no matter how unjustified, the public purchase of apparatus will be hindered. Moreover, it is not at all unlikely that appointment of city "inspectors" detailed to inspect and license sets will prove to be other than a means for petty politicians to hand out sinecures.

* * *

Possibilities in Short Waves

THE fact that considerable work has been done by a few amateur stations during the summer on wave lengths below 200 meters is an indication that a new field for investigation and experimentation has been opened to amateur operators, for which no special permission by government authorities is required.

As a general rule, however, the receiving sets used by transmitting amateurs do not work efficiently below 200 meters. Some of them will, it is true, record signals on wave-lengths as low as 180 meters, but the result, especially in the case of C. W. signals is not satisfactory owing to instability caused by capacity and other effects when such high frequencies are concerned.

The results so far obtained, however, seem to indicate that there is an interesting field for amateur investigation on wave lengths between 100 and 200 meters. —The Editor.

She Sings to Famous Husband 3,000 Miles Away

WHEN Adele Rowland, musical comedy star, sang recently from WJZ, near the Atlantic coast, her husband, Conway Tearle, was listening in out on the Pacific coast. She tells of the experience on page 31

Says South America Will Accept and Enjoy Radio

REGINA VICARINO is peculiarly fitted to tell her radio audience, who know her well, just how South America will take to radio. On page 43 she tells why Brazil and the Argentine will lead

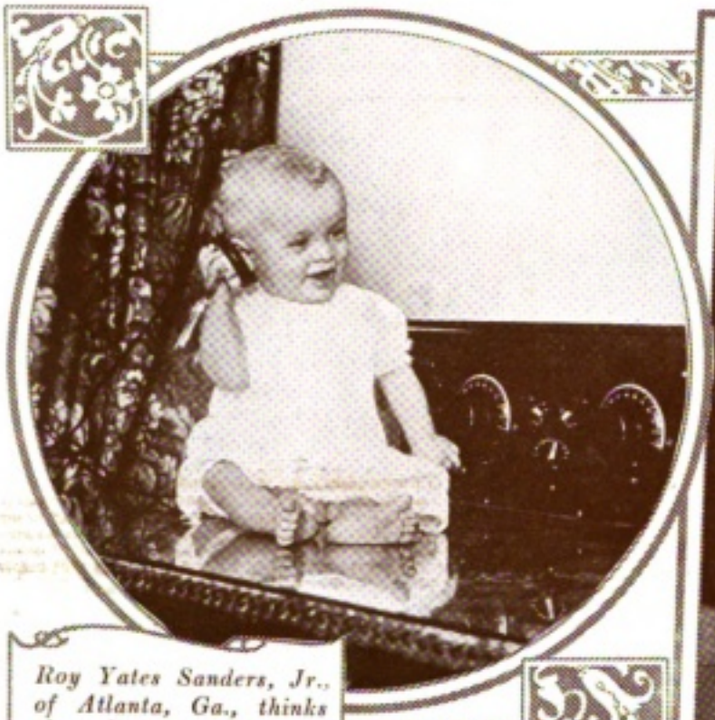
adio Artist Must Have Good Diction"—*La Forge*

E Americans, says Frank La Forge, the noted composer-ist, are prone to forgive the a star if her diction is not per- No such generosity will be nded the radio artist. He gives easons on page 32 of this issue

One Thousand Radio Concerts at the Same Time!

RADIO concerts, with paid admissions, are a future probability, Grace Kerns, concert artist, believes. That is why, on page 27, she says the future will permit a singer to give a thousand performances at once to as many audiences

Radio Telephone Music Charms All the Children



Roy Yates Sanders, Jr., of Atlanta, Ga., thinks the radio concert is almost as good as his bottle.

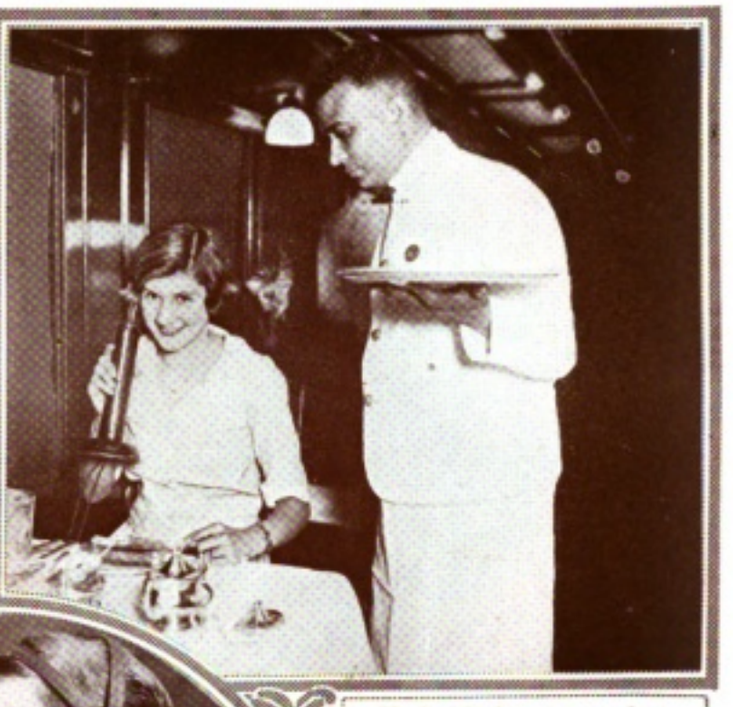
Little Marylyn Bucher, daughter of E. E. Bucher, sales manager of the Radio Corporation of America, listens joyously to a radio broadcast concert

What is stated to be the first receiving set to be licensed for use in an English elementary school has just been installed at Foxhole, Cornwall, and is giving the children both thrills and instruction

Bonnie Brae Maternity Hospital, Los Angeles, finds radio is just the thing for singing babies to sleep. It's quieter there than it ever was before

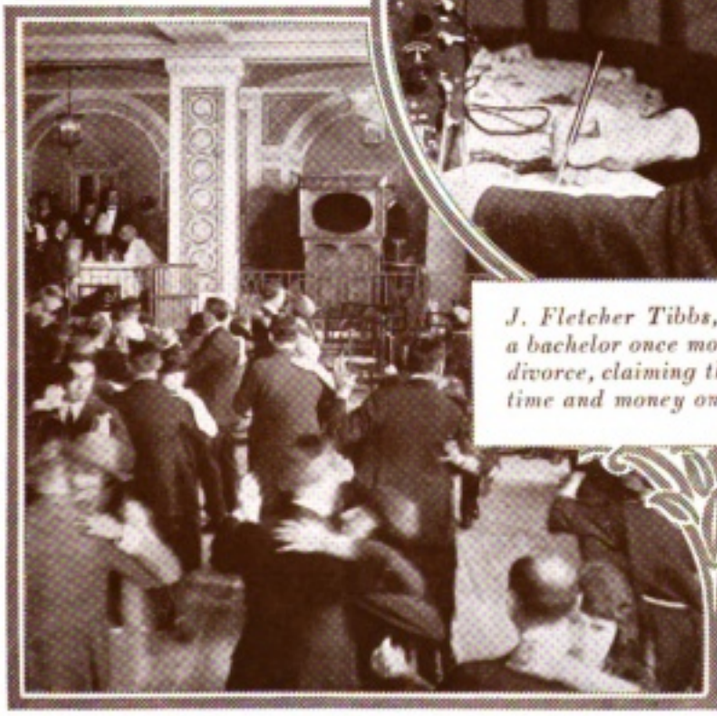
Diverse Utility of Radio from Coast to Coast

With a home-made vacuum tube set mounted on the handles of his bicycle, Francis Murray, of Washington, D. C., pedals ahead with radio music



H. S. Mather, steward on one of the crack Illinois Central trains, has constructed a radio receiving set according to his own designs and entertains passengers in the diner as they speed along the rails

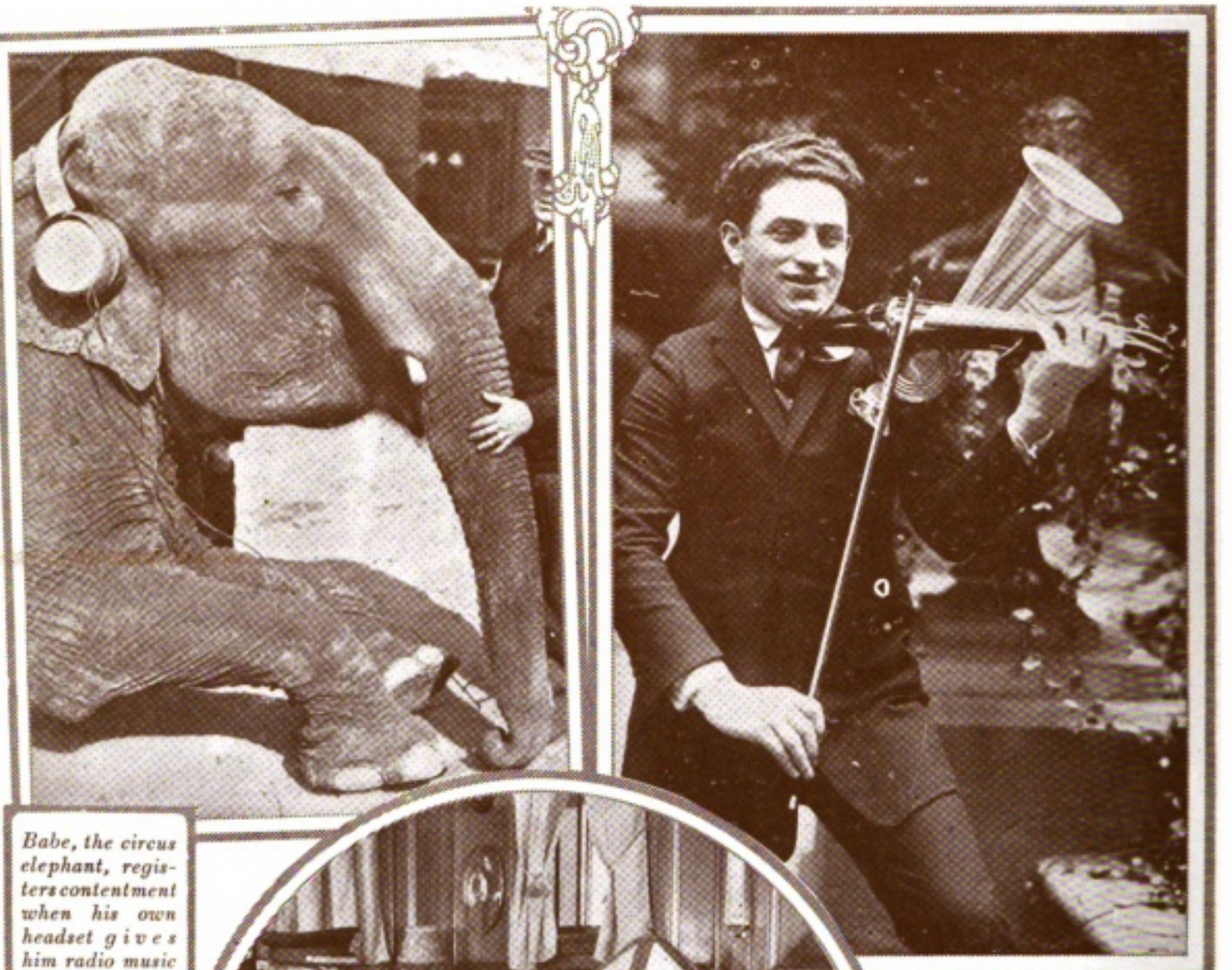
J. Fletcher Tibbs, radio inventor, is a bachelor once more. His wife got a divorce, claiming that he spent all his time and money on radio



Radio dances have become popular in the Hotel Pennsylvania, New York City. The receiving set and loud speaker are contained in the big phonograph-like cabinet seen in the background

Diners in this San Francisco hotel no longer listen to the hotel orchestra, willy nilly; the tables are equipped with headsets that vibrate with the music of the whole Pacific Coast

Radio Proves Its Interest for Man and Beast



Babe, the circus elephant, registers contentment when his own headset gives him radio music from far away, cheering his rests between performances

Harold Stern, orchestra director, uses this violin in playing for the radio, its transmitted tone rivaling that of a rare Stradivarius instrument

Captain Rind, of the S.S. "America," discusses radio matters with G. Harold Porter, of the Radio Corporation, in the captain's homelike cabin on board his ship

Progressive California Uses Radio Continually

Marie Prevost and her director take a rest between scenes at Universal City to listen to the broadcast programs on one of the receiving sets installed in the studio

Erich von Stroheim, author, director, and motion picture star, is a radio fan who combines business and pleasure. Here he listens to the daily broadcast film report

Pretty Helen Lynch says that radio is a great help to the Sandman, who welcomed the appearance of a radio at her bedside as much as she did herself. In her luxurious California home radio is a daily feature and has taken its place beside the phonograph, the piano, and even the electric lamps and fans. The rag doll is jealous, its nose is out of joint, for Helen now takes her radio to bed with her

Alexander Graham Bell

DR. ALEXANDER GRAHAM BELL died in the early hours of Wednesday, August 2nd. The world of wireless has lost a faithful servant.

His name is not commonly associated with radio, but the fact remains that much of the present-day success of radio-telephony rests with his pioneer accomplishments in wire-transmitted speech.

Dr. Bell, however, is more widely known for his invention of the telephone than for the other devices in which he took just as much pride and pleasure.

He passed away at his home in Beinn Breagh, his estate near Baddeck, Nova Scotia. He was in his 76th year. Each of those years from the 24th on had been devoted to the science of invention.

His special ability was inherited, for generations the Bell family having had the same knack of creating devices to alleviate the suffering of humanity or to shorten their labors. Means of communication in fact had been a hobby in the Bell family long before he was born. His father perfected a system of visible speech for deaf mutes and when Alexander was only fifteen years old he made an artificial skull of gutta-percha and India rubber, that would pronounce weak voice tones when blown into by a hand bellows, and the following year he became, like his father, a teacher of elocution and instructor of deaf mutes.

When young Bell was twenty-two years of age he was threatened with a serious illness and the family left its home in Edinburgh, Scotland, where Alexander was born, and migrated to the healthier climate of Canada. When he was twenty-four years old he realized that only one field of endeavor could make him happy—invention—and now an entire world is grateful for the forces that influenced the direction of this mind into such useful channels. He lived to see many of his prophecies realized.

It cannot be said that Dr. Alexander Graham Bell has died. Dr. Bell can never die. His inventions bearing his name live forever.

His body rests in a grave on the crest of Beinn Breagh Mountain, a burial spot chosen by the inventor himself. It will in the years to come be a shrine where thousands will go to pay homage to the man who unquestionably will live as long as civilization exists in this world.

"I CAN see the time when one theater in each of a thousand cities and towns would advertise a concert by a prominent artist, sent from a central point like New York or Chicago"

Grace Kerns

Prominent Concert Artist, Makes a Prophecy to Edwin Hall, Her Interviewer

Grace Kerns

ALONG, long time ago, someone decided to compose a bit of wisdom that would ring through the ages. So he thought, and thought. . .

And finally his face lighted up with the smile you see so often in the movies, which says oh, so plainly: "By Jove, I have an idea!" And he scribbled hurriedly a moment and then held up his remarkable effort, which read:

"A man can't be in two places at once!"

And so, just as this wise man figured, his bright thought lasted through the centuries, being repeated ever and often, sometimes as an alibi, more often in the effort to console a disconsolate friend.

And now, in the year 1922, this supposed truth has been smashed to bits.

So says Grace Kerns, soloist at St. Bartholomew's Church, New York City and successful concert artist.

"A singer only can not be in two places at the same time, but in a thousand places at the same time," was the emphatic way she put it to her interviewer.

The radio telephone makes it possible, she explained.

"In order for a concert singer to be heard throughout the country," she said, "usually it is necessary for her to travel continually. She must often make one-night stands, go without sleep, eat hurried meals in poor hotels, and suffer a general running down of her health.

Travel Becomes Monotonous

"The novice in concert work does not mind this. In fact, beginners look upon it as thrilling and exciting. But for those who have been in the work a long time, it becomes monotonous. Travel does not appeal to the veteran, whether he or she be singer or salesman. Ask the first one you meet.

"When I sang from WJZ during the early days of that station's existence, I was impressed with the great possibilities. I felt that at last something had come within our grasp that would enable us to provide entertainment and pleasure to audiences numbering millions, while our own efforts would be much less than when formerly we reached only hundreds and thousands.

"I broadcast on Thanksgiving Day of 1921, before the radio fever had developed to the contagious stage it now has reached. Of course I had the usual experience of receiving many letters. It seems the night was particularly clear, or whatever it is in radio language, that makes a night especially adapted for reception of music by wireless.

Will Increase Demand

"Letters came to me from as far as Ohio and Indiana—written by persons who declared that it seemed as though I was singing in their very homes. The letters startled me even more than I had been thrilled by the actual sensation of singing in the broadcasting studio.

"When I commenced to think how this new medium would affect the future, I did not hold the general impression of many artists that radio would lessen the demand for their personal services. I felt it would do just the opposite, that it would be the story of the phonograph over again.

"I saw that sooner or later the better grade of artists would ask for remuneration for their radio performances, but it seemed that to assure their getting it, someone would have to invent wireless apparatus of a particular type that would send music in such a way that only special, rented sets could pick it up. That, from the artist's viewpoint, would be the ideal arrangement, but even if it cannot be perfected, the situation is not hopeless.

"I can see the time when one theater in each of a thousand cities and towns would advertise a concert by a prominent artist, sent from a central point like New York or Chicago, at a specific time in the evening.

"The concert would be heard in these thousand cities and towns at the same time. During the period of three hours the artist would be in a thousand places at once. Her traveling expenses and touring trials both would be eliminated. True, the audiences would not have the pleasure of seeing her, but on the other hand the small admission price would compensate for this.

"I am sure the American people would welcome such an enterprise, and would gladly pay for it, just as they now pay for telephone service. The result would be less work for the artist, more money for her, and less to be paid by the public for hearing the better performers oftener."

Miss Kerns had launched into her subject in earnest enthusiasm. She has vision, and an appreciation of the changing trend of the times. In her words she showed the result of her deep study of the problem that all artists have considered.

Recalls the Present

"But," she concluded with a smile, "that time has not come, for next Fall I start on another tour, which will carry me into almost every State."

Miss Kerns prizes those letters she received from her radio audience—even those which appealed to her sense of humor, as the following from Mr. X, postmarked in a small town in West Virginia:

"The music and singing was enjoyed very much by a few friends as well as myself. Your voice was perfectly clear. Kindly acknowledge receipt of this if only your card. Am married. Age 50. Two boys and one girl. Come see us."

Public Health Broadcasts

THE Public Health Information Service by Radio, the only national education by radio in the world, came back on the air through NOF, the Naval Radio station at Anacostia, D. C., on August 8th.

This service, together with all voice broadcasting through naval stations, was temporarily suspended in order to effect a reduction in the existing interference pending decision on a government radio telephone policy.

The development of a radio policy has progressed to a point where it is possible for the Public Health Service broadcasts to be resumed. Since this educational service was suspended, hundreds of letters have been received from operators all over the eastern half of the United States asking that the public health broadcasts be continued.

"While we regret the temporary suspension of this service since April 16," an official of the Public Health Service said recently, "we realized the necessity for a government radio policy and appreciated fully the wisdom of suspending service until such a policy could be established and a program for avoiding interference devised. The letters received indicate that the broadcasting of educational material for the consumption of the general public has met with popular approval."

With the resumption of broadcasting public health messages through NOF, the station through which the Public Health Information originally began, stations cooperating with the Public Health Service in spreading the "gospel of health" will number seven, including WGI, American Radio & Research Corp. station at Medford Hillside, Mass.; CKAC, La Presse of Montreal, Canada, releasing in both French and English; KDKA, Westinghouse Electric & Manufacturing Co. East Pittsburgh, Pa.; WRK, Doron Brothers Electrical Co., Hamilton, Ohio; 7XF, Northwestern Radio Corporation, Portland, Oregon; and KFC, Seattle "Post Intelligencer." Seattle, Washington.

Radio Proves Its Economy

STRIKING evidence of the superior economy of radio telegraphy over wire communication is shown by the report of the U. S. Signal Corps for the month of June. During that month the messages it handled by radio cost only $1,923.67, while the same matter, if sent by wire at Government rates would have cost the country $3,742.47. This means a net saving of $1,818.80, or nearly 50 per cent. As the number of messages sent through the Signal Corps radio net is constantly increasing, it is expected that the total saving for the year will be at least $30,000. The Government enjoys special wire telegraph rates, and thus these figures of radio economy are all the more remarkable. Practically all departments of the government are using radio more and more, including not only the most obvious users, the Navy, War and Shipping Board offices, but even the Post Office.

Labor Department Will Broadcast

THE activity in radio broadcasting by the Navy and Post Office Departments for the Government, apparently has aroused a bit of jealousy in the Department of Labor. At any rate Secretary Davis has decided that the air was the proper medium through which to tell the world of the accomplishments of his department and so with the cooperation of the Navy Department, labor activities and news relative to arbitration, inauguration, employment, etc., will be put on the air.

Plan Collegiate Radio Net

BRINGING about more complete cooperation among the colleges and universities west of the Rocky Mountains is to be accomplished by the radio telephone. The Western Inter-Collegiate Radio Association has just been formed in California. It will operate a broadcasting station by which it will keep in touch with all the institutions of learning having radio apparatus. The radio telephone net thus woven will catch and hold, the students think, the unified interest of all western colleges.

Radio Spreads Market Reports Over United States

THERE are now 51 Governmental and private radio telephone stations sending out the national crop and market reports of the Department of Agriculture, so that the country's territory is being more and more thoroughly covered. There are awaiting approval 29 applications in several states for broadcasting the reports, and it will not be long before every farmer in the country will be able to get his reports by radio on even the most simple sets. The Bureau of Markets has official market report stations at Boston, New York, Philadelphia, Pittsburgh, Cincinnati, Chicago, Minneapolis, St. Louis, Kansas City, and Omaha, as well as 73 branch offices in 46 large market centers, 16 of which are connected to Washington by a direct wire. With these stations some 15,000 individuals, firms and railroads co-operate in gathering data on fruits, vegetables, grain and live stock. Besides the daily telephone broadcast crop reports, the Bureau of Markets also sends out reports in code through the Navy stations at Arlington and at the Great Lakes Training Station.

Radio Apparatus Makers Are Organized

FOLLOWING the formation last March of the Radio Apparatus Section of the Associated Manufacturers of Electrical Supplies, much organization work has been done, and the new division of the big electrical manufacturers' association now is getting into its stride after several months of quiet development. Its membership includes some of the biggest names in the radio industry, as follows:

Acme Apparatus Co., American Radio & Research Corporation, L. S. Brach Supply Co., C. Brandes, Inc., Burgess Battery Co., Clapp-Eastham Co., Cutler-Hammer Co., DeForest Radio Telephone & Telegraph Co., Dictograph Products Corp., Edwards & Co., Electrical Products Mfg. Co., General Insulate Co., A. C. Gilbert Co., Holtzer-Cabot Electric Co., Manhattan Electrical Supply Co., W. J. Murdock Co., Pacent Electric Co., Radio Corporation of America, Signal Electrical Co., Stromberg-Carlson Telephone Mfg. Co., Telenduron Co., Western Electric Co., Westinghouse Electric & Mfg. Co.

Officers of the Radio Apparatus Section prominent in the industry are: M. C. Rypinski, who is now Vice-President and Sales Manager of C. Brandes, Inc., is chairman of the Radio Apparatus Section. The Eastern Vice-Chairman is L. G. Pacent, President of the Pacent Electric Co., Inc. The Western Vice-Chairman is C. E. Hammond, Secy.-Treas., of the Signal Electric Co. Charles Gilbert, President of the DeForest Company, is Treasurer of the Association. The Secretary is Elmer E. Bucher, sales manager of the Radio Corporation of America.

Woodrow Wilson May Speak

DEMOCRATIC politicians are believed to be making plans for the Fall campaign which will include broadcast speeches by ex-President Woodrow Wilson. No definite announcement has been made as yet concerning this, but the wise ones in Washington are asserting in the most positive way that the words of Woodrow Wilson will be heard on the air this fall.

Radio Aids in Capture

WHEN three prisoners escaped from the jail at Freehold, New Jersey, a complete description of each man was broadcast from WJZ. There had been times before in which descriptions of escaped men had been broadcast, but this is the first instance in which it attracted national attention. As a result of the broadcast description, persons within a radius of 300 miles were on the lookout for the men and it was not long before the persons were back in the jail once more.

Gino A. Baldini

"RADIO will be a valuable adjunct to the various musical forces which have long been in existence. It is a most wonderful medium through which to popularize anything"

An Interview with

Gino A. Baldini

By St. John Martens

AN UNUSUAL number of prominent opera, concert and phonograph singers have broadcast from WJZ. Probably a larger number of artists of the first rank have "appeared" at the Newark station than at any other broadcasting station in the country. Internationally prominent stars of the Metropolitan Opera Company, great concert artists and high-priced exclusive phonograph singers have made the trip from the island of Manhattan to the city of Newark, New Jersey, just to sing a song or two to the radio audience.

The public can always rest assured that when anything of the unusual occurs, there is always at least one individual behind the scenes who is largely responsible for the success of the undertaking. It is frequently the case, however, that the public never hears of the moving spirit whose influence is absolutely vital. He remains unknown and draws his satisfaction from the success of his efforts.

Obtained Talent

And so in the case of WJZ and its unusually fine programs, few of the public thus far have heard the name of Gino A. Baldini. But it was Mr. Baldini who was in a large measure instrumental in obtaining the services of this host of talent. He has been, almost since the beginning of broadcasting, in very close cooperation with officials of WJZ. He has personally conducted to the studio innumerable artists.

It is of interest to note that in round figures Mr. Baldini has been responsible for the appearance at WJZ, since September, 1921, of artists whose fees in regular concert work would have aggregated, for the time that they gave, about forty-eight thousand dollars. These are Mr. Baldini's own figures, which he totaled at the request of his interviewer, and he added that they were quite conservative.

Mr. Baldini, at the time that he gave this service to WJZ, and in fact at the time of the interview, was manager of the Artists' Department and Concert Hall of the Aeolian Company.

He announced recently that he was leaving this organization to assume the associate managership of the New York Symphony Orchestra under the direction of Walter Damrosch.

"I feel that the time will come," said Mr. Baldini, "and I feel that it should have come before this—when the officials in charge of radio broadcasting must adopt a regular schedule much after the fashion along which concerts now are conducted.

"I am firmly of the opinion that radio will never displace concert work or anything else in the musical world now in existence, but do believe that it will be a very valuable adjunct to the various musical forces which have been in existence so long. It is a wonderful medium through which to popularize anything, but in order to hold the attention of the radio audience it is extremely necessary to provide them continually with entertainment of the very best type."

And then he explained how it would be possible to enlist the services of some of the nation's best artists for scheduled programs at regular intervals each month, one, two, three or as many times as desired.

"It will be possible" he said, "to sign up twelve of the country's instrumentalists, sopranos, etc., using these stars as the hub of the wheel of the program as it were, while the spokes would be supplied by other talent of a lighter variety. One musical star of the first magnitude could be provided each night.

"And in this way," he continued, "the radio audience would be assured of programs throughout the year that would offer the very best entertainment possible. Such a program would be valuable not only to the manufacturers of radio equipment, not only to the promoters of concerts and operas, but also to the music world itself, and it would be impossible for popular interest to die down for even a single night if such a twelve-month program were mapped out, and followed carefully."

Mr. Baldini was born in Florence, Italy, and received his education in that country. He has a fine appreciation of better music and all his efforts have been and, he says, always will be, directed toward implanting more securely in the minds of the public the desire for true art in music.

His interest in radio was awakened quite by accident. A friend came into his office one day and said:

"Come along, I want you to hear some music tonight."

His First Radio Concert

But young Mr. Baldini, who spends most of his working hours surrounded by music and musicians, desired that particular night to hear anything but music and he refused the invitation at first, but, the air of mystery which his friend assumed finally overpowered his reluctance. He heard that night his first radio telephone concert over a small receiving set.

As he listened, there came to him the realization that here was a brand new agency, something that must sooner or later catch and hold the attention of the entire public. His acquaintance with officials at WJZ soon followed, and his offer to assist in obtaining talent was eagerly accepted. Among the many well known artists who have gone to WJZ through Mr. Baldini's efforts are May Peterson, Carolyn Beebe, the Kouns Sisters, Grace Kerns, Marie Sundelius, Percy Grainger, Cecil Arden, Sasha Culbarston, the Shannon Four and many others.

Radio Prescription Saves Life

HOW a sailor on a British vessel in the Mediterranean was taken critically ill and how he was subsequently saved by the receipt of a prescription by radio is discussed in a dispatch from Marseilles, as published in the New York "Evening World."

No one on the vessel knew what was the matter with the sailor and so the captain broadcast a report of his condition and asked for medical advice. A French vessel was one of the first to pick up the call for help, but there was no one on board who could read English, and so the operator relayed it to another French vessel. The doctor on this boat understood the language, but could not prescribe a remedy for the sailor's illness in the English language.

Then, says the report, he wirelessed a prescription in French to a third French ship where it was translated into English and forwarded to the French vessel carrying the sick sailor. The sailor recovered.

Uncertainty of British Plans

THERE is still much uncertainty regarding conditions under which wireless broadcasting will be carried out in England. Differences have arisen between manufacturers and the Postmaster General and conferences are now being held. These conferences are being attended by representatives of between forty and fifty firms including many of those which have applied for licenses to broadcast. These firms apparently have separated into two factions, one group wishing to have the operation of all broadcasting stations handled by one organization and the other group, which is composed of the small manufacturers, opposing this and characterizing it as monopolistic. It is hoped to have at least eight big stations for England, each of which is expected to cost $100,000.

Propaganda Feared in Europe

TRAVELERS returning from Europe express doubts as to whether the radio telephone will ever be popular for international broadcasting. This, they say, is because many of the countries fear that propaganda from a neighbor would be difficult to eliminate and be a possible source of friction. These opinions are entirely unofficial and are those of civilian travelers returning to America.

Argentina Thinks It Over

ARGENTINA is just beginning to take notice of radio telephony, according to American Commercial Attaché Feely, a bill having been drafted for the next Congress regulating the use of transmitters. Receiving sets are being manufactured in the Argentine in small numbers, and sell at high prices, from 200 to 700 pesos. However, such excellent programs have been broadcast from the Coliseo Theater and Opera House that many receiving sets have been purchased.

Russia Tries Broadcasting

RUSSIA, which since the original red revolution has been using the wireless telegraph for the dissemination of propaganda, has begun to use the radio telephone.

A broadcasting station has been erected on the Kursk Railway Station in Moscow, and is operated by the People's Commissariat of Posts and Telegraphs.

It was built at the Nizhni-Novgorod laboratory of the government, and will transmit by voice much of the press matter that has been sent by MSK, the big Moscow radio telegraph station.

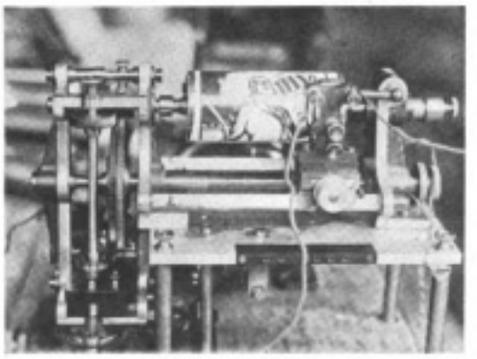
Cure for Baldness

THE Hounslow (England) Wireless Society earned international fame recently by declaring that baldness would be abolished when everybody has a radio receiving set and uses headsets. The bad news for the manufacturers of loud speakers is to the effect that the electrical waves in the headsets stimulate the growth of the hair. The Society proves its point by stating that all radio operators have luxuriant growths of hair, forgetting that no barber will tackle a man who wears a headset.

Cuba to Have Broadcasting Station

CUBA is soon to have a large broadcasting station, local interests having decided to erect one after hearing some of the United States broadcasters and observing the enthusiasm displayed by American visitors to the island.

Already there are numbers of receiving sets in daily use in Cuba, picking up American broadcasters.



Apparatus used to receive photographs by wireless. Marcel Touly and Gaston Tohanneau, French engineers, are experimenting with it at Malmaison, France

Broadcasting Aids Stenographers

BROADCASTING now appears as as aid to stenographers, furnishing them with speeches for transcription in practicing to increase their speed. Several business schools are taking up radio receiving for their speed classes, and recommending that their students use radio for practice whenever possible, securing both pleasure and profit at the same time. Heretofore, "home work" in stenography has had to be done by having some member of the family dictate.

National Radio Chamber Meets

THE first annual meeting of the National Radio Chamber of Commerce was held July 26 to 28 at Washington, D. C., where a number of prominent officials addressed the members. The speakers included Secretary of Commerce Hoover; Secretary of War Weeks, Major General Geo. O. Squier, Chief Signal Officer, U. S. A.; Dr. S. W. Stratton, director of the Bureau of Standards; M. C. Rypinski, vice-president C. Brandes, Inc., who spoke on Broadcasting; Commander S. C. Hooper, head of the Radio Division, U. S. N.; W. Kaempffert; Howard Lewis; Arthur Wiesenberger, research division of the National Retail Dry Goods Association; William H. Davis, patent attorney; and Dr. Louis du Plessis Clement.

In Bank, But Out of Luck

A RADIO dealer in South Orange, New Jersey, opened a store in a building formerly used as a bank. He went to considerable expense in remodeling the store, to attract the attention of the public, and he succeeded. But sad to relate, after he was all ready he discovered that even with the most super-sensitive receiving apparatus, not a sound could be heard within the building. The heavy steel reenforcement of the walls completely shielded the apparatus from the high-frequency waves. Not one of the three high-power broadcasting stations within fifteen miles of the building could be heard. And to come to the climax he had bought the whole building!

Radio Starts a Train

STARTING a train by radio was accomplished recently from KDKA, the pioneer broadcasting station of the Westinghouse Eectric & Mfg. Co. in Pittsburgh, Pa. A powerful radio signal sent out from the station was received by a set installed on a locomotive, where it operated a relay that closed a switch and started the big engine.

RADIO telephone broadcasting can be made to serve both public and private wants—the whole audience can be entertained and a message sent to a single individual in it, at the same time. This was done by

Adele Rowland

Whose Broadcast Program Was Heard By Her Husband, Listening 3,000 Miles Away

By Sam Loomis

Adele Rowland

THERE are two types of magazine or newspaper articles, one is a faithful reproduction of an unusual or interesting incident, and the other is a "story" inspired by a press agent of the person about whom the article is written.

Often it is difficult to distinguish between these two types of stories, and for that reason I have written these few lines to tell the readers of THE WIRELESS AGE that while the following little story about Adele Rowland, the Broadway star, smacks a little of the press agent, still the fact remains that such is not the case. I believe it necessary to explain this in order for the reader to fully appreciate how true a friend Miss Rowland is to the radio public.

I had understood that Miss Rowland had sung at WJZ and that the radio audience was to again have the pleasure of hearing her rich soprano voice. It so happened that the day on which our appointment was to be kept for the interview, fell on the same day she was to repeat her triumphs at Newark broadcasting station.

We met in the Times Square office of a theatrical firm and I no sooner had entered the door when I was made to realize that something of unusual interest was taking place.

Miss Rowland was excited.

"I wonder if he will hear," I heard her say.

It was not long before I discovered that "he" about whom she spoke was none other than her husband, Conway Tearle, the movie actor, who was in Los Angeles filming his latest picture. The actor knew on which hour her voice was to go through the air and he had promised to make elaborate preparations to hear her. WJZ concerts had been received on the Pacific coast before, and so he had considerable hope.

Four o'clock eastern daylight saving time arrived, and Adele Rowland sang. It seemed to those who listened in, that she was trying to surpass even herself, but no one except a few of her friends, and the writer, knew why.

She was singing to her husband. Three thousand miles away Conway Tearle paused between sets on the moving picture "lot" and listened.

He was hearing from a very high-powered station. At first the voice of his wife was rather faint, but gradually the tone was stepped up so that it came into the room in its full volume.

Across the continent!

Surely the radio audience will forgive the musical comedy star for sending a musical "goodbye" dear" across forty-eight states, to the one who hung on her every word at the opposite end of the continent.

And when she had finished singing, she turned to the writer and exclaiming with all the native enthusiasm the theatre-going public knows so well:

"Wasn't it wonderful! I wonder if he was listening."

In a short speech to the unseen audience before she sang, the charming star called attention to the fact that this was her second radio "appearance."

"I was a little nervous the first time," she admitted, laughingly, "but now I feel as though I know you. So many of you rewarded me richly with wonderful letters that I do feel as though we are friends."

She did not explain to them that her husband was listening in, too—at least was making an effort to do so—but every now and then she would put in a word, a phrase, that was intended for the ears of her husband alone, and so gracefully and easily did she do it, that she did not in any way displease her audience.

And when it was over she grew thoughtful, and said that we Americans are too prone to accept a miracle like that which had just happened—providing of course Mr. Tearle had heard, which subsequently proved true—that we are too prone to accept it as a matter of course.

"What it will resolve itself into in the future, the powers of heaven alone know," she said.

"And I wonder, oh! I wonder, how many more such marvelous secrets are as yet locked to us? It all makes us feel so small, doesn't it?"

To which we agreed.

But a few days after Miss Rowland's voice was heard from WJZ, newspapers throughout the country carried a story that "Adele Rolland," a Broadway actress, had run away from her part in "Partners Again," and had taken the fatal matrimonial step. Immediately radio fans, not examining the spelling of the names critically, wanted to know all about "their Adele." But, as related in the story above, "our Adele" is happily married to Mr. Tearle, and is not playing in "Partners Again," but in the Winter Garden production "Spice of 1922." There was considerable confusion due to the similarity of their names.

Proper Diction Necessary

Frank La Forge

The Man Who Has Accompanied the World's Most Famous Singers Contends Radio Artists Must Enunciate Properly if They Are to Hold Their Audiences

By Maurice Henle

OF Frank La Forge, the great pianist, the famous Ernestine Schumann-Heink has said:

". . . The greatest, most wonderful musician; the inspiration of all us singers."

With this recommendation to go by, the radio audience eagerly anticipated the time when the pianist would play from WJZ. That time came on an evening a few months ago, with the usual result, a veritable torrent of letters of congratulation and thanks.

His performances upon the piano had reached into thousands of homes and had won for him instant recognition even from those who had never before heard him. Unknown to most of the radio audience, however, Mr. La Forge's reputation among singers rests not only upon his exquisite skill in playing the piano, but also upon his ability as a coach. His keenly constructive criticisms during rehearsals have aided the artists fo. whom he has played, and Schumann-Heink's tribute, just quoted, really is based upon Mr. La Forge's coaching work.

It was not surprising, therefore, that when he was asked for his opinions on broadcasting, his reply should consider the subject from the singer's viewpoint, rather than as the pianist that the general public rightfully considers him to be. He has written some of the most successful of the modern concert songs, and has accompanied many of the greatest singers, and when he appeared at WJZ he naturally was a solo pianist.

Proper Diction Necessary

But his first words on broadcasting showed that his mind is occupied with the interests of the singers to whom he is such an important aid.

"Whether or not the radio telephone will be successful in the long run" he said, "depends in a large measure upon the study of language. Specifically I mean the attainment of proper diction by those who broadcast.

"When we have a concert or an opera or a musical comedy, or any entertainment where the one who entertains is visible to the audience, proper voice cultivation is not by any means the only point of importance. The audience can see the singer, it can see the action, but in a large measure the American audience has not placed a great amount of importance on the words of the song. In the case of the radio telephone, however, everything except the actual voice is eliminated and for that reason it is highly necessary, in order to give the audience the pleasure it expects, for the singer to have proper diction, in order that every syllable, and I might say every letter of every word may be made audible. Too many singers cannot do this.

Frank La Forge (above) is not only an accompanist, but a composer as well

"In fact, faulty diction is general not only among the entertainers, but is common throughout our country in every walk of life. The next time someone telephones, listen a little more sharply than usual and discover for yourself how clumsily the speaker on the other end slides over important consonants. Vowels invariably are easy to be understood, but when it comes to pronouncing consonants clearly, American people fail.

Must Hold Interest

"Unless the artists who sing over the radiotelephone are experts in the art of proper diction, radio audiences will soon tire of hearing them. And there is nothing that the audience can do about it."

The pianist's first studies were with his sister, Ruth La Forge Hall, also a pianist, who guided him until he was seventeen years of age. After this came four years of study in Chicago and four years in Vienna. Among the famous artists he has accompanied are: Mme. Gadsky, Mme. Sembrich, Mme. Alda, Mme. Matzenauer and Schumann-Heink. Some of his songs are: "Retreat," "To a Messenger," "Expectancy," "Song of the Open," and "By the Lake."

The pianist, as in the case of other artists, has studied and played many years in European cities. He thinks that Europeans will enjoy the radio telephone more thoroughly than Americans, when the new science finally is introduced over there in a big way.

"This," he said, "is because the European opera-goer insists upon knowing what it is all about. He will hungrily listen to every word of the action of the opera. He does not want to miss anything, and if he cannot understand the words of an aria he is peeved to a degree of which we have no conception.

European Singers Careful

"This has made the European singers careful. The singer over there realizes he will quickly fall into disfavor unless his diction is perfect, unless every syllable is understandable.

"Not so over here. How many attending an opera here understand the words? Not many. Nor do the people seem to care. They appear to be satisfied with reading the plot of the opera in libretto, in listening to the voice, admiring the gorgeous costumes and scenery, and watching the action.

"To the radio fans let me get on record as saying that I consider diction one of the most important factors that will contribute to the ultimate success of the radio telephone. Just you watch!"

We are going to.

A Sermon on Radio

Some Ideas and Ideals Contained Within the Poetry and Imagination Induced by Broadcasting and an Appreciation of Radio in Its Social and Moral Aspects

By Elias Margolis, Ph.D.


Elias Margolis

LESS than one hundred years ago, an Ohio town council refused a railroad a right of way, and the city fathers of a European municipality voted against the installation of gas street lamps. Both based their objections on religious grounds. The burden of their argument was, that had the Almighty contemplated railroads and gas, He would have mentioned them in His account of creation, in Genesis, chapter One.

Since Genesis is completely innocent of these innovations, railroads and gas were ascribed to Satan.

Even in this day of comparative enlightenment, there are those who look upon every invention and scientific discovery with suspicion. Every once in a while a reactionary religionist and an occasional repudiated politician seek the blazing light of front page publicity and take a fling at the world's greatest scientists and thinkers. They still live in a pre-Copernican and pre-Newtonian world.

However, they constitute a negligible minority. Even religion—as distinguished from theology—has caught up with man's progress and has learned the value of using instead of abusing the intellectual and scientific achievements of mankind. There are theologians and homileticians who are still given to the twisting and torturing of texts to extract a humdrum moral lesson, but the effective interpreters of the work of God, go to life direct for theme and inspiration. To them nothing which is human is alien. They find sermons not only in stones and running brooks, in mountains and fields, in storm clouds and rainbows, but in Man himself, in his nervous energy, and in his intellectual unrest, in his curiosity, in his harnessing of the forces of nature to perform his purpose, in his conquest of the air he breathes and of fathomless space, in his tunnelling of the earth, and in his rearing of gigantic structures.

Thus in taking wireless as a text, theme and inspiration of this homily, I do so because of my sincere conviction, that wireless is destined to play a great part in the social and moral development of mankind.

That it has its purely commercial side, goes without saying. That it is fast becoming a great and complex component of our industrial life is undeniable. I also suspect that there is money in it; that it is commercial. But these considerations do not worry me in the least. I know, for instance, that in the building of churches and synagogues, carpenters and masons, architects and dealers in realty profit thereby; I also know that in the process of teaching the Word of God, preachers are paid (though often underpaid), in short, that religion also, in common with the stage, the movies, baseball, matrimony and radio, has its commercial side; and yet because of that fact I am neither ready nor willing to counsel the scrapping of religion and churches.

I am also aware of the fact that wireless has suddenly become a fad, a sensation. So is religion given to sudden faddist sensations.

But radio is a fad with a difference. It's a healthy fad. If you doubt it, ask your youngsters. Perhaps you have been too busy with business, with golf, with the Washington conference, with the menace of Russia, with the latest divorce scandal, with the crime wave, to notice that your young hopeful has been acquiring a strange jargon abounding in such terms as, broadcasting, tuning up, sound waves, antenna, KDKA, WJZ, Man in the Moon, aerials, rheostats, etc., etc. And one of these fine days, with just as little thought, you will be buying him one of these radio toys and continue to regard it as a toy until a sudden access of vision and imagination will cause you to sit up and take notice of its real significance.

Unless you are suffering from the prevailing habit of taking everything for granted, you will find in that toy, romance as thrilling as Jules Verne ever dreamed and possibilities as amazing as ever came forth from the creative and prophetic mind of H. G. Wells.

If you have studied, not as a record of the world's greatest battles, not as dry-as-dust chronology, but as a record of human progress, from the time that man was inarticulate, to the time when he began to express himself and to record his impressions in one form or another, and up to this very day when he is expressing and recording in a manner which may best be described as radically revolutionary, you will recognize the historical, social and ethical significance of wireless.

If I were to attempt to write the story of mankind, I would do it somewhat in this manner: In the beginning man had vocal organs, but he knew not how to use them. One day he was badly frightened by a strange beast or by a thunderclap whereupon he emitted a strange hoarse cry, which scared him more than ever. He discovered he had a voice but could not control it as yet. Besides he had no use for that voice, as long as he could express his simple needs and ideas by means of gestures. When life became more complex, his needs multiplied and his ideas developed, and he found gesture language inadequate. Besides, he found it impossible to carry on conversations in the dark, or while his hands were otherwise engaged in the performance of his daily tasks. Necessity forced him to vocal speech. He began to form syllables and employed them as the names of common objects. The syllables were short and few in number. Thousands of years passed before these syllables were combined into words. The first words were nouns, names of things. Many more years passed before man was capable of adjectives, of verbs, namely of language as we know it today. For ten thousand years or more, man has used language, and aside from producing a great variety of tongues and dialects, tremendous vocabularies, complex grammars and linguistic subtleties, often hiding instead of clarifying man's thoughts, up to yesterday, as it were, he accomplished nothing beyond making speech effective and useful within easy hearing distance. The cupping of the hands was the first crude method man employed to overcome distance and to give volume to the sound of his voice. The next step was the old fashioned megaphone, familiar to all who attend

baseball and football games. And then, almost overnight, the telephone came upon us as the last word in distance speaking. Some of us still remember how gingerly we approached the first telephone, with what fear and trepidation. But soon, familiarity bred contempt, and if Central did not connect us with Chicago or New Orleans on the instant we learned to fume and to fret, to threaten and to bluster, to emit strange oaths, and to declare that our constitutional rights were being trampled on. Few of us stopped to consider the wonder of it all, or to be humbly grateful to the Supreme Intelligence of the universe for the wisdom and genius with which man was endowed.

Evolution of Writing

The evolution of the written word is equally indicative of the progress of historic man. As soon as man began to write, he began to make records; and with the making of records, history may be said to begin. To be sure, as in the case of speech, man's first attempts at writing were clumsy and crude. Had not man abandoned hieroglyphics or picture writing for a simpler and more economic method of recording his thoughts and experiences, the progress of the human race would have been painfully slow. In its influence on the development of pictorial art, the picture writing of Egypt is of supreme importance. It was given to the Semitic Babylonians and Assyrians, however, to make the first great advance in writing by simplifying picture writing in the form of outline signs or as we call it, Cuneiform. By means of the Cuneiform writing, Assyro-Babylonian civilization was enabled to hand down to posterity a vast clay tablet literature, historical, legal, religious, social, industrial and even scientific records of a great ancient culture. The Semites went even further. Soon there appeared the alphabet of the Phoenicians and early Hebrews, which after its adoption by the Greeks, became the basic alphabet both in names and forms of letters of almost every present day European people. At first writing was an art limited to the few. But with the invention of paper, of printing and bookmaking, the spread of education among the masses, the appearance of the typewriter, of shorthand, of linotyping, writing became universal and commonplace. The last stage in the development of writing was the invention of distance writing, or as we know it by its Greek name telegraphy.

When we acquired the telegraph and the telephone, we fondly imagined that we had reached the limit of man's ingenuity. Then came radio telegraphy closely followed by radiotelephony to teach us new wisdom and humility.

Historical man has not ceased to develop. Perhaps he has just begun to develop. Civilization is progressive, never static. The miracle of today is the commonplace of tomorrow. Yesterday I was sceptic, doubtful and unbelieving. Today, I sit at my Aeriola Grand, and listen in on WJZ, Newark; hear an opera by Mozart, a lecture by the editor of the Outlook, a sermon by a Passionist Father, a negro spiritual, a Jewish lullaby, a bit of lilting dance music, and I am transported to the Arabian realms of the thousand and one nights, and lest I stay there indefinitely I am suddenly awakened by the Arlington time signals or the price of cabbages and potatoes in the New York market, the score of the Yanks-Boston game or the weather forecast.

And like father Jacob of old, after the dream of the angels ascending and descending the celestial ladder, I am moved to say, "Verily God is in this place, and I knew it not."

And I sit and watch my youngsters as they listen with rapt attention to the Man in the Moon. Even the oldest of them, already the super-sophisticated product of our utilitarian educational system, is somewhat puzzled and almost ready to believe the fantastic stories woven about the moon and the stars. Poetry and imagination brought into the home, and the men of the future have need of both!

Good music, too, to counteract the trash which passes current, fine ideas and ideals, all the cultural influences! And should it become a trifle too jazzy, or too heavy, or too high-browish or technical, all I have to do is to press the button and I establish a most effective censorship.

When you go to church or synagogue you must sit through and listen to the sermon, be it banal or mediocre. You cannot politely escape. Not so with radio—press the button and you are relieved.

When you go to church or syna- coloratura shocks all your musical sensibilities, you must sit and suffer and groan inwardly, but withal you must be polite and sit it out. Radio offers you instant relief. Press the button or tune in for Pittsburgh or Schenectady, where the fare may be more to your liking.

Now in Infancy

Technically speaking, they tell us that they have but scratched the surface of radio possibilities. What we regard with amazement, our children will look upon with good natured scorn. In their day they will experience greater thrills. Moscow will radiophone to New York, Chicago to Tokio, Cape Town to London, Paris to Melbourne. Merchants crossing the ocean on great liners will keep in telephonic touch with their offices, their clubs and their homes. The technical possibilities are unlimited.

The social and cultural possibilities are greater. Great teachers and preachers will have a world audience. Prophets and spiritual leaders will broadcast their messages to the world. Statesmen will hear the voices of the people. Secret diplomacy will be a thing of the past. Languages may still differ, but ideas and ideals will become universal. Ignorance, the basis of intolerance, of national jealousies and race hatreds, will be dissipated. World peace which neither leagues of nations nor economic conferences can bring into being, will be realized. The Fatherhood of God and the Brotherhood of Man will cease to be mere phrases, but will be translated into fact.

A New Era

Historical Man will begin a new epoch in this development, the age of knowledge, of ethical living and social consciousness, of international understanding and good will. Radio is the promise of a better world, of a more splendid race of men.

This is Station HOPE (E. M. announcing), I am signing off, Good-by.

Prof. Elihu Thomson and His Early Work

EXPERIMENTS conducted with induction coils in 1871 have been cited lately to show that Prof. Elihu Thomson far antedated Hertz in wireless research. Thomson, who now is director of the Thomson Research Laboratory of the General Electric Co., in Lynn, Mass., years ago conducted experiments during the course of which sparks were drawn from knife blades held near grounded pipes, there being no connection other than the air between the blades and the induction coil that served as a source of the electrical energy. He made no practical application of his discoveries. It was twelve years later, in 1887, that Heinrich Hertz of the University of Bonn, informed scientists that electro-magnetic waves emitted by induction coils could be received by other appartus without the use of wires, after which Marconi did his famous development work. Prof. Thomson has been responsible for many important electrical inventions, the first commercially important one being the three-coil arc dynamo, which formed the basis of the Thomson Huston electric lighting system of 1880. He has received many prizes, medals and decorations, and is internationally famous in the electrical world.

Radio Aid for Muddled Minds

Musical Treatments Benefit Insane Persons—Concerts Given Daily in Institutions—Need for Receiving Sets

By Ward Seeley

An airplane view of Ward's Island, New York, entirely devoted to the care of the insane, with a capacity of 7,100 patients in the numerous buildings. Music is an essential in the treatment here, and 40 per cent. of the inmates leave each year, completely or partially cured

IF the radio telephone is doing such a great humanitarian work in hospitals, as I told in my article in THE WIRELESS AGE for August, what may it not do in insane asylums? Radio benefits the sick by changing their mental attitude from disease to health, and it seemed logical that if such radio mental treatment could cure those suffering from physical ills, or expedite their recovery, the same treatment should have even more marvelous effects on illnesses that are entirely mental.

Insanity is nothing more than mind-sickness.

The largest institution for the insane in the world is the Manhattan State Hospital, occupying Ward's Island in the East River, only a few hundred feet from the docks of New York. It has over 7,000 inmates. On the day I spent there the roster contained 7,076 names of insane patients. Some of them were dangerously violent and were held under close confinement in a group of isolated buildings, some were incurably ill both physically and mentally, but the majority had every appearance of health but were confined in open wards within barred windows and bolted doors.

To Dr. M. B. Heyman, medical superintendent, who for 35 years has been studying insanity and has achieved an important place in the profession, I posed a question: "How does radio help the insane?"

"So far," he admitted, "it doesn't help them at all. Quite the contrary. Patients with delusions that are subject to change have all shifted over to radio, and every one of them is receiving the most bizarre messages 'out of the air.' The radio craze certainly has struck these crazy people, you might say.

"If they weren't 'crazy' about radio, they'd be off on another subject, of course. Sometimes it's spirits, or thought transference, or the plain ordinary every-day telephone. In general, anything that attracts popular attention is sure to be taken up in an abnormal way by the insane. Turning the normal into the abnormal is what makes a person insane.

"I really think, however, that if I could present the radio telephone to my patients in the form of a loud speaker, thus placing it on a par with the phonograph, to which they all are accustomed, it would do a great deal toward removing it from their brains as a hallucination and making it for them an important source of diversion.

"I have been studying for years the effect of music on the mentally deranged. I don't know a thing about music, I don't play or sing, I am a physician, and my interest in music is purely professional. By experimental means I found long ago that music has a quieting effect on the insane, and we now have an orchestra that comes here every day to play for the patients. Practically every insane asylum in the country now has some means of providing music, so well recognized is its beneficial effect. Music has an important place in the budget of every institution.

"It is really astonishing, the effect that music has on the patients. The orchestra can go to a ward that is in an uproar, the patients violent, disturbed, distressed, destructive to themselves and to such property as is within reach, but a few minutes after the orchestra starts to play all is quiet. Even the most perturbed patients settle down quietly and listen attentively to music, when a few moments before they would not hear a word that was spoken even by themselves.

"The change is astounding, and you must see it occur before your eyes to understand what a vital hold music must have upon the mind. Mentalities that are open to no other outside influence can be reached by music of the right kind."

Here I interrupted Dr. Heyman to ask if improvement could not be effected in such cases by use of music that would suggest the mental re-forming ideas that sometimes are of benefit in treating mental derangements.

"That was my hope," explained the doctor, "when I first discovered that even the worst cases are susceptible to music in some degree and can be reached by it when all other mediums fail. However, apparently musicians have not developed a musical language sufficiently. They seem when they are composing to try to produce just pleasing sounds, instead of actually saying something. So all we know at present is that music will soothe the insane.

"There are certain kinds of music that are better than others, that we do know. Loud, blaring, strident music is ineffective, and sometimes it may stimulate violence instead of allaying it. I don't know what musicians would call the tones I mean, but in general, any sounds that are harsh and violent in their character have an adverse effect on mental cases.

"That is why you will not find any cornets or trombones in our orchestra that comes over from the city every day to play for us. We found that the tones from those instruments were disturbing. The best tones are those of stringed instruments, and, in general, those that are deep and sonorous and calm. Tones that might suggest, if you use a lot of imagination, the deep calm waters, or vast peaceful open spaces. Organ music is the best of all for many cases.

"We have here on the island two organs, one in the Catholic church and the other in the Protestant church, but neither of them are of the calibre that I would like to have. In spite of their comparatively small size, however, patients who are allowed to go to church will sit happily through the restful, consoling musical services. I have for

years made it a practice to give musical treatment to those patients who seem especially sensitive to it, taking them over to the city to hear the wonderful organs there. They always sit perfectly quiet while the organ plays. It never seems too long for them; they will listen for as long as three hours at a time in complete absorption with hardly a movement."

"You will be interested to know," I informed him, "that a new radio station is being planned for New York City that will be able, among other things, to broadcast organ concerts as given in Aeolian Hall."

"That's the stuff!" the doctor exclaimed, dropping his professional manner in a moment of forgetfulness brought about by his surprised delight over the news. "Now if you could give me organ concerts over here by radio you'd be doing a mighty big thing.

"You know," he continued, "insanity is a most baffling proposition. I don't know any more about what causes it than you do. Nobody does. We just have to feel our way around, and use the methods that experience shows do the most good. Music, so far, has been found to be about the greatest of the calming, rationalizing agencies, and as music has formed the greater part of the programs that I have heard over my son's receiving set, I expect to utilize radio here in the near future."

Hoping to get some clue as to just why music is so efficacious I asked if he knew just what part of the brain was affected by it, and what the relation of that part was to the rest.

"That's a natural question," he conceded, "and we doctors have asked it before, but the answer doesn't lead anywhere. It is a strange thing, the strangest thing about insanity, that you can tell nothing from inspecting the brain, that is in the vast majority of cases.

"Insanity is classified into two different types whose medical names I won't bother you with. One kind of insanity results from injury to the brain tissues from disease or accident, and the other results from—who knows what? The first kind, for which an actual physical cause can be perceived, usually by a simple diagnosis of the patient's body, is incurable, and is not as frequent as most people suppose. Only about 30 per cent. of the insane owe their mental condition to a lesion or other physical defect in the brain tissue.

"The rest of the insane have brains that are perfectly normal to every appearance, even under the microscope, and under chemical analysis. They just don't work right, that is all.

"We can find no causes in the brain itself, and so we are looking to the blood and to the glands. There must be a cause somewhere, and in time we will find it. In the meantime, while we search, we do the best we can for these poor people, these irresponsibles who are as great a burden and often danger to themselves as to others. As I have said, music is a prime agent of relief, and I hope that by Fall I will be able to use the radio telephone to give music to our patients."

The Hospital consists of a large number of buildings, widely scattered over the big island, and provided with its own power plant, two churches, a baseball field and a recreation hall, the latter a new structure now in course of construction to replace the one recently destroyed by fire. In the new hall there is ample space for a big organ, though no funds have been provided for one by the state. Dr. Heyman hopes to interest private individuals in providing an organ, and also in securing radio sets.

"They will have to be loud speakers," Dr. Heyman explained. "Gracious, what a lot of ideas headsets would put into these people's heads! They'd think they were being electrocuted or something equally terrible. Headsets would start a riot. But loud speakers would be just like the phonograph, only better. I hope that by the Fall, at least, I will be able to use the radio concerts in calming and entertaining my patients."

State of New York—Manhattan State Hospital
Ward's Island, New York City

To the Editor of "THE WIRELESS AGE."

May I not call to your attention the fact that music is a valuable therapeutic measure in the treatment of mentally sick people? Our experience has demonstrated that musical entertainments for the depressed types and mildly deteriorated cases are of a very considerable therapeutic value. For this reason our hospital is well equipped with phonographs and to the same end employs a first class orchestra.

It is believed that the installation of a radio receiving station at the hospital would be of undoubted benefit to our patients. One of the outstanding features of mental disease is loss of interest with a tendency to get out of contact with normal persons and affairs. It is believed that for such patients musical entertainments by radio would be a stimulation looking to the upkeep of interest in persons and events outside of the hospital, and would thereby tend to restore many of the mentally sick to a normal state of mind.

It is difficult to think that in any type of insanity such patients would not be benefited in some way by an opportunity of hearing such entertainments, and I am quite sure that radio musical concerts would meet with the gratitude on the part of the more than 7,000 mentally sick persons under treatment in this hospital.

Owing to the lack of funds we have thus far been unable to install a first class radio outfit in our hospital, and I write to inquire if you will not give us your assistance in securing an outfit for the hospital.

Sincerely yours,

(Signed) M. B. HEYMAN, M.D.,
Superintendent.

ANOTHER CHANCE FOR YOU TO HELP!

Cities Demand Licenses

CITIES in many parts of the country are planning to require that all radio stations, whether for sending or transmitting, be licensed, and subject to inspection by city inspectors. In Cleveland, O., an ordinance has been passed requiring a license costing 50 cents; Newark, N. J., is considering a similar ordinance with a fee of $1; Paterson, N. J., likewise is considering the same fee, as are other cities. In no city is the idea looked upon with favor, as the Government regulations and licenses take care of the amateur transmitter, while the requirements of the National Board of Fire Underwriters govern all installations, both transmitting and receiving. Municipal licenses are regarded as impositions by the amateurs generally and are being strongly fought in each city as they are proposed.

Want Radio in Canada Woods

USE of radio telephones in the Forest Service of Canada is being considered by the Canadian Forest Commissioners. As in the United States, the Canadian forests are guarded against fire by rangers who occupy lookout posts on mountain summits. So far the difficulties of transporting batteries in the woods, and of keeping them charged, have proved a severe handicap.

"WITHIN a short time radio receiving sets will be part of the necessary equipment for all hospitals." Such is the opinion of the executive head of New York City's charitable institutions,

Bird S. Coler

Commissioner, Department of Public Welfare, Who Broadcast an Appeal to the Radio Audience


Bird S. Coler

MY friends—I wish to speak to you briefly to-night on the necessity of providing radio equipment for hospitals, the use of radio in hospitals, and the possibility of development of the radio as a part of what will be conceded in a short time to be necessary equipment for all hospitals.

Many patients in our great public institutions to-day are not only homeless, but friendless. Many during long weeks or even months never have a visitor, a friendly handshake or a word of cheer except from their new-formed friends, the members of the hospital organization. Many in their hours of suffering have only their own introspective and retrospective thoughts as constant Job's comforters; thoughts of what might have been; thoughts of a mis-spent life; thoughts of where to turn and what to do when they shall be in condition to leave the hospital; thoughts of the homeless who are destined to lives of invalidism.

"As a man thinketh in his heart, so is he," is as true a maxim to-day as when first uttered.

Music has ever been, is now, and will ever be inspiring. Inspiration brings hope, and hope brings cooperation. It is a well-known fact that a patient's cooperation must be gained to obtain the maximum results from medical and surgical treatment.

During the short period of time which has elapsed since the inception of the broadcasting radio stations, great strides have been made through radio in eliminating much of the mental distress of those unfortunate victims of disease and injury who are now confined in our great charitable institutions. This new scientific achievement of radio, even in its present-day development, may be regarded as one of the greatest boons to suffering humanity.

The radio broadcasting stations have brought the mountain to Mohammed; the bedridden may now enjoy the opera, the drama, the lecture, the classic in music, and the ragtime. By means of radio, the artist, the actor, and the lecturer are now presented at the very bedside of the helpless. The little sufferer is now lulled to dreamland and relief from pain by the calming influence of lullabies and bedtime stories. In convalescent wards where no patients are critically ill, loud speakers may be used on receiving sets. In wards where a patient is in serious condition and where the slightest sound would serve to militate against the welfare of the patient, head sets bring all the enjoyment of the radio program to the other patients of the ward.

As Commissioner of the Department of Public Welfare, I have under my jurisdiction nine great public hospitals with an aggregate bed capacity presenting accommodation for over ten thousand patients. In these institutions thirty beds would be an average ward capacity, which would represent about three hundred and thirty-three wards in the departmental institutions. It is my desire to equip each and every one of these wards with a complete radio receiving set, loud speakers, and at least twelve head sets. This equipment will cost thousands of dollars. This money cannot be procured from city funds, and must, therefore, be obtained by private subscription. I am satisfied that this money will be forthcoming. I know that among my listeners at this very moment are many who have spent long, tedious hours while patients in hospitals, or when confined to a sick bed at home, who would have given anything for the pleasant diversion, the forgetfulness of self and malady which is now made possible by radio.

I know that there are others of you who have had near and dear ones in institutions, whose anxious expression and lighting up of the eyes at each visit showed more clearly than words how slowly had dragged the hours between your visits.

I know that you, my listeners, realize what radio means to you and what it would have meant to you and those dear ones while languishing in an institution or confined to bed at home. I know that in memory of your own experiences and the experiences of your relatives and friends, some of you are going to assist me in making it possible to give radio programs to all our patients.

In one of our institutions, the Cumberland Hospital of Brooklyn, Dr. W. F. Jacobs, the Medical Superintendent, has out of his own salary purchased five sets and is now giving the patients of that institution radio concerts. He tells me that he will not be satisfied until he can install fourteen more sets, and that he thinks it is about time that somebody began to help those who are trying to help themselves. In other words, he believes radio to be not only a diversion, an entertainment, but of material assistance in the treatment and restoration to normal condition of those who are cared for in his institution. And he wants money at once to do this work properly.

In conclusion, ladies and gentlemen, let me say that some of you may have regarded the radio only as a pleasant pastime, an evening's entertainment. I grant that this is true, but let me say to those of you who are enjoying the greatest of all God's blessings to man —health—to those of you who are able to be active and enjoy the agreeable association of a normal life, to those of you who are "listening in" surrounded by the environments of a happy home —all this is denied to the homeless, the friendless, the bedridden, the hopelessly incurable, the crippled child, the orphan, the blind, all of whom are represented in our class of public charges, the patients of the great charity hospitals of the City of New York.

If any of you feel that you would like to assist in bringing some of the bounties of the radio to our patients, I can assure you that your contribution, however large or small, will be most gratefully appreciated.

Curious Calls of the Ether

By CARL H. BUTMAN

ASSIGNING Radio calls is something of a trick and, with the constant increase of stations, it is in the way of becoming an art. In this country we have but three initial letter calls for about 5,000 official and commercial stations, which makes the designation of appropriate calls almost impossible.

Having only the letters N, K and W to start a word with, even champion word makers who spell thousands of words out of trade names, would be stumped in the position of Chief Radio Inspector of the Department of Commerce.

In some instances he has done pretty well. All calls starting with N are Naval, which is very appropriate, and the Army calls commence with W, which is somewhat significant as referring to the War Department. The rest of the W calls he heedlessly assigned to the Eastern part of the United States, leaving K for the west coast. The definite geographical call WVA (W.VA.) went to a city in Alaska; while to a Naval station at Savannah, Ga., he gave the letters NEV (NEV.), which would have suited a station in Carson City far better.

When the inspector got down to specific stations, however, he did far better; what could be more suitable than the call assigned to the Detroit Police Department, KOP—unmistakable.

In view of the recent revelations by Adolphus Busch, some of the Shipping Board's calls are quite appropriate. The craft known as the West Gotomska carries the significant call WET, while the Rio Grande answers to the call of KEG; the Chamblee has the same signal, but spells it KEGG, while the West Hartland makes it plural, KEGS. Speaking liquor-ishly, Great Britain has a gem of a call in the anti-prohibition signal, GIN; and also, since she has V with several other letters, uses the call VOP—significant of a very fine brand in the old days. Russia, with the letter R, of course, has RUM and RYE ships. Another vessel of the Shipping Board has a startling title when it comes to radio prefixes—KORK, which some experts insist belongs to Ireland—but that one has already been pulled.

The chief call assigner of Great Britain, with the letters B and G and Y, had a lot more chance to display his versatility in issuing signals. Among unusual British calls are BVD, GOP and YAP; more suitable for America, it would seem.

The station made famous by Radio Ralf has been identified as the U. S. Destroyer Parker, bearing the call NIX. The Navy got a few negative calls, including NIT, NOT and NAY. YES falls to Great Britain, but OUI happens to be Danish instead of French, showing that other radio inspectors go wrong.

One Southern Pacific passenger ship bears the title of a famous southern fraternity, KKK, and an Italian contemporary goes it one better with the well-known call, IWW. Japan has one appropriate signal, that of the station JAP. A French radio station carries the designation FUN and a British sub, the Polly Anna, the title GLAD. Another English sub bears the name of GABY, formerly of France. FAN aptly denotes one French operator, and an unfortnuate Madagascan station got FLU.

Some American naval vessels have calls which spell the names of their sweethearts, NAN and NEL, while another ship has the sentimental call KISS. Radio broadcasters have a perfect right to kick when assigned such calls as WEAK and WEEP, yet two suffer under those titles despite good service, showing the failings of the Radio Inspector who made another mistake when he gave the significant call WEAR to a newspaper instead of to John Wanamaker, Gimbel Brothers or Strawbridge & Clothier, whose calls fail to identify their businesses.

Business Men Back Station

THE city of Minneapolis is to have a high-powered radio telephone transmitting station capable of reaching into the farthest stretches of the northwest. The cost of this station for the first year will be borne by business men of Minneapolis who feel that in the new science of radio telephony, they have a weapon, which, if properly used, can be a powerful influence for Minneapolis welfare.

It is hoped that the station will be able to transmit on a wavelength greater than 360 meters so as not to interfere with the stations now in the field.

T. C. Gale (above) is the man you hear broadcasting Post Office Department information. His messages reach many thousands and have come to be looked for each day

Radio Waves Rule the Water

RADIO control of the water supply in the Salt River (Arizona) Irrigation Project is to be used, the Salt River Valley Water Users' Association having installed a radio telephone transmitter near the source of the Verde River. It is at this point that the water supply for the valley is tapped.

As heretofore no means of communication between Phoenix and the upper reaches of the river has existed, sudden storms causing the river to rise with great rapidity have done great damage. Now, use of the radio telephone will broadcast warnings as soon as the height of the water reaches the danger point. Gauges in the upper Verde and in Cave Creek are under constant watch.

The new radio station also furnishes information for controlling the big gates at Roosevelt Dam. When the Verde, which flows into the Salt River near Phoenix, is supplying plenty of water for irrigation, only a little water is needed from the big reservoir impounded by the Roosevelt Dam, while, when the water falls, the gates at the dam have to be opened.

Politics in the Air

POLITICAL circles in Washington are wondering whether the two big parties will carry out their threats and erect broadcasting stations for the dissemination of political propaganda.

Chairman John T. Adams, of the Republican National Committee, has had a proposal submitted to him to set up a station on the roof of the University Building, Washington, at a cost of $25,000. It is in this building that the Republican party has its headquarters. Until Congress places its stamp of approval on the project, however, nothing will be done.

Over in the Democratic camp, politicians are preparing, it is reported, to carry on a counter-offensive in the political war which will be staged this Fall by erecting a Democratic station. No one knows where it is all going to end.

56 Newspaper Broadcasters

THERE are at present 56 daily newspapers operating broadcasting stations in all parts of the country. The list contains some of the most famous names, such as the Detroit "News," San Francisco "Examiner," Los Angeles "Times," St. Louis "Post Dispatch," Atlanta "Journal," and "Constitution," Salt Lake City "Desert News," Kansas City "Star," Hartford "Courant," Baltimore "American," and Detroit "Free Press."

Third Triumph Assures Practicability of Radio in

Broadcasting Sport

Results of Leonard-Tendler Boxing Exhibition Evoke Landslide of Applause from Radio Fans

Among the listeners were many of the fair sex. Olga Steck, prima donna of the Broadway musical comedy, "Sue, Dear," had an Aeriola Senior, set up in her dressing room especially for the returns and entertained theatrical celebrities and newspaper men

NEW evidence of the place that radio telephone broadcasting has taken in the hearts of the public developed on July 27, when the third boxing match to be broadcast was "put on the air"—that of the Leonard-Tendler bout.

As hundreds of thousands of boxing and radio fans will testify, the air that night was filled with sounds of the gong that began and ended each round, of the warning whistle, of the yells of the crowds, and through and over it all, the voice of J. Andrew White, Editor of THE WIRELESS AGE, describing the bout from the ringside.

As has been told in these pages previously, the first match, that between Dempsey and Carpentier, was relayed by telephone to the broadcasting station, where it was repeated through the transmitter by an operator. The second event, between Leonard and Britton, was the first in which the voice of the ringside observer, J. Andrew White, was placed directly in the transmitter. This latest one was handled the same way.

In reporting the results of the second match, it was observed in these pages last month that it was evident that the crowds take radio as a matter of course, and are more interested in what they receive through it, than in the mere receiving itself. In other words, radio has ceased to be a stunt, a curiosity, and has become a public utility, on a par with the other and older facilities for spreading information.

What happened the night of July 27 was this: static interfered somewhat with receiving, but thousands of the loud speakers were trained, as before, upon the crowds in all parts of New York City and many other places throughout the eastern half of the country.

Along Broadway the masses in front of the horns listened eagerly and carefully.

For while the static sometimes interfered with the voice, listeners always were able to hear Mr. White's tones, calm and deliberate over the crackle. It was like listening to a speech in a crowded hall full of peanut-shelling, popcorn-chewing men.

Very few comments were heard complaining about radio as imperfect. It used to be that the instruments themselves were "panned" when static was bad, but that is all changed now. The public realizes that static is something that as yet baffles the radio engineer's best talents, and that while some progress has been made, it has yet to be mastered. Understanding the situation, the public is philosophical, tolerant, resigned, and appreciative, each one according to his temperament.

"Well, it can't be helped, so let's make the best of it," seemed to be the general attitude. And the consensus of opinion was that the best—also the worst—was mighty good.

That was the big thing that July 27 brought to the radio world's notice in a forceful way.

Broadcasting of the Leonard-Britton bout some few weeks earlier forced upon the public a realization that radio had extremely practical possibilities. It caught the people by surprise and the voice of approval and appreciation that arose was magnificent, and fully compensated those who labored to make it possible.

If that was what happened on that occasion, imagine the attitude of the radio public, as it awaited the gong from Boyle's Thirty Acres, in Jersey City, N. J. where the contest was staged.

Crowd at 125th Street and Seventh Avenue, New York City, in the heart of the congested Harlem district, listening to the returns of the Leonard-Tendler bout

The greatest reaction from the audience came from places other than in the vicinity of the Jersey City and Newark area. Hundreds of radio fans scattered in neighboring cities and towns as far west as Ohio and even Indiana were "in on the fun."

Letters had been received from them following the previous bout, complaining they had not known of the effort which was to be made. Many of them missed the results entirely, or just happened to tune in while the bout was in progress.

They made their voice heard, and their pleas for a wider advance notice fell on fertile ground. This time the work of "propaganda" was well done and there was no territory included in WJZ's range which was uninformed in advance of the event.

Scores of letters to Mr. White testify to the countless little gatherings called to hear the results. One by one they added to the picture—a picture of thousands of small family groups, smiling, applauding, **happy.**

This bout clinched radio as a successful means of transmitting sporting results. In the future no sport event of major importance will be complete without it.

The grand ballroom of the Hotel McAlpin, New York City, was thronged with an audience of guests and their friends who listened eagerly to the description of the Leonard-Tendler bout

SOME LETTERS FROM LISTENERS

Recently my brother-in-law, J. D. F., installed a very beautiful radiophone in my home. I protested more than mildly, for many reasons, but after listening for several evenings to the interesting and entertaining work of WJZ, I decided I was very fortunate in possessing the instrument. I have just heard the broadcasting of the L. and T. fight. That work I consider perfect in every detail. Mr. White is an ideal announcer, and I hope we may hear him again.—DR. D. H. KELLER, *East Orange, N. J.*

We, in conjunction with about 1,500 others in this vicinity, who were listening to the returns of the Leonard-Tendler boxing bout, as given out by the WJZ broadcasting station, and sent out to the said 1,500 through Westinghouse R. C. set and the Western Electric Loud Speaker, wish to compliment those in charge upon the clearness of the returns. We got everything except the gate receipts.—RADIO PARLOR, *New York City.*

I enjoyed the broadcasting of the boxing bout very much. It came in loud and clear, both the sounds at the ringside and the bout itself. Mr. Andrew White is a very good announcer.—MRS. KATHERINE BEKKER, *Wallington, N. J.*

The returns of the Leonard-Tendler fight received from you O. K. through heavy static.—R. M. SANFORD, *Atlanta, Ga.*

I wish to state that I received the returns of the Leonard-Tendler fight and enjoyed it very much. There were three persons listening in, and I hope you will broadcast the returns of more fights. The returns were heard very plainly.—CHAS. BARNES, *Bayonne, N. J.*

I am having a little Radio Party this evening to hear the fight broadcast by J. Andrew White and we sure did enjoy it, and wish to thank you for same, as do my twelve guests.—ARNOLD DAREY, *Irvington, N. J.*

With the greatest of pleasure I am writing you this letter in regards to the Lew Tendler and Ben Leonard fight that I received tonight and I hope you will keep the good work up, because it is great sport for those who cannot go to the ringside. To receive everything at your home is great. Give my best regards to the person who did the announcing from the ringside; it was great. . . . Good luck to the man that was at the ringside—ALFRED CRAGLE, *Glen Lyon, Luz Co., Pa.*

I wish to thank you very much in regard to the Leonard-Tendler scrap which I heard yesterday. I had heard the announcement for five days and I just couldn't wait for the date. My brothers-in-law and I had our ears on the receivers as if they were glued on. We would like to hear another boxing match like that.—FRANK ERLA, *Harrison, N. J.*

Words cannot express our appreciation for the efforts of Mr. White at Boyle's Thirty Acres, who presented the Leonard-Tendler boxing match to the thousands of listeners. The boxing returns were received by about 40 anxious and quiet "fanesses" and fans. Everything would have been perfect if it hadn't been for two reasons which were beyond your control, static and another station, where someone was trying to learn to count higher than five and insisted upon reciting portions of bedtime verses. The annoying station, however, was tuned out and only caused trouble during the early rounds. Rest assured your reporting of boxing matches is appreciated and we campers can always guarantee a large audience.—C. BOEKEMANN, *Hoffman's Camp Grounds, Mountain View, N. J.*

Am writing you a few lines as one of your radio audience in appreciation of the fine times you have given us. Your fight returns were fine and have to thank Mr. White.—CHAS. MERSINES, *Carlstadt, N. J.*

I received the broadcasting of the Leonard-Tendler bout on my crystal set. The tone was very clear and shouts of the crowd and sounding of the gong could be heard. I suggest that all similar championship bouts be broadcast via WJZ. My thanks to Mr. Andrew White for his services. Two people listened in on my set.—R. J. HOOPER, *East Orange, N. J.*

Through your goodness in broadcasting the Leonard-Tendler fight I enjoyed a ringside seat in my home. It was better than being at the fight, as I had a big, comfortable easy chair, a box of cigars, a cold glass (no, not of what we used to have) and all the comforts of home, and yet I "saw" the bout. The description was very good indeed, and whenever there was a cheering, we knew there was something interesting to follow over the radio regarding the particular advantage of one or other of the contestants. with every good wish for the future of radio broadcasting, and hoping you will continue the good work.—GEORGE L. MICHEL, *Jersey City, N. J.*

I wish to say that I heard the returns of the Leonard-Tendler fight and I enjoyed it very much. There were four people listening in, and we were all very much excited expecting any minute to hear Mr. White say that the telling blow had been struck. Also wish to say that the gong, the referee's whistle, the yelling of the announcer and also the cheering of the crowd were very distinctly received. Also heard the Leonard-Britton fight over the radio and take this opportunity of thanking WJZ for this and many other nights of amusement. Hope you broadcast the next big fight.—J. BANGEMAN, *Belleville, N. J.*

NO single thing has made an auxiliary, universal language more necessary, nor of more immediate practical benefit, than has the radio telephone

James Denson Sayers, Philology Expert, Who Recently Spoke from WJZ, Nominates Esperanto for the

Radio Language

J. D. Sayers

"ALL world progress rests upon interchange of intelligence." Thus Mr. Sarnoff began his article in the June issue of THE WIRELESS AGE.

It is as true a statement as can be made. If I had not read Mr. Sarnoff's article before writing this, I probably would have begun mine with some less pointed expression carrying the same thought. Therefore, I have borrowed the sentence because it tells so much in so few words.

By exchanging our ideas with others we achieve progress. All impediments to such exchange retard progress. The lack of a common means of communication between people speaking different languages is a great obstacle to orderliness in our world, which we are unable to recognize in its true proportions because we have never been accustomed to anything else.

When people shall have been using an auxiliary, universal language for a few generations, history will present to them in its true aspect the present regrettable chaos resulting from antagonizing language barriers.

Many phases of human progress through the ages have been calling loudly for an auxiliary language, but no one thing has made it so overwhelmingly necessary as the wireless telephone. Those who had been advocating an international language for years before the present widespread use of radio, have been delighted with the sudden awakening of the same thought in the minds of persons widely separated: "We must have a radio world-language!"

WANT WORLD RADIO TONGUE

Some months ago this thought was expressed here and there. Then it became heard more frequently until a short time ago the wireless authorjties of the five nations that lead in radio development met in Paris and decided, among other things, according to cabled news dispatches, that we must soon have "some common medium of communication such as Esperanto as a world radio language."

When far-sighted business men, such as those who sat in that conference, make such a statement, the affair is at once lifted from the dream-realm of the idealist into the great field of practical human needs.

Now, what is the situation as we find it in the field of international language development? We have radio and even now are ready to talk to other nations, but when shall we be able to do this? We cannot, excepting a few who have spent years learning it, speak Spanish, therefore we cannot call up our business correspondents in Cuba or other Spanish-speaking southern neighbors and talk to them directly. In Europe where twenty-five or thirty languages prevail in a smaller territory than North America, the situation is much worse. They have already realized their need over there and are far ahead of America in adopting and using the auxiliary language.

NATIONAL LANGUAGES UNSUITABLE

But what shall this auxiliary language be? We natives to English are prone to think of our mother tongue as good enough for all the world. The French think the same of their "language of diplomacy." And so the Spaniards, Germans, Russians and all the rest. The Jap hasn't had time to say much, but he would undoubtedly be heard from in a show-down. The Chinaman might even insist that since about one-fourth of the earth's population already use modified forms of his speech why should not Chinese be the world language?

These are very pertinent thoughts and questions. The world has refused many times to countenance the adoption of any nation's tongue as the world language. It would give a place of dominance to such a favored nation. This is one objection, but there is another and more important one as to why a national language cannot be the international language, especially of radio.

All who have studied a foreign language know how difficult it is to learn its myriad difficulties of grammar and pronounciation. Its declensions and irregular verbs cause endless trouble. After studying for a number of years and spending some time among people speaking a language, we think we know it; but when we call up some one on the telephone in that language, we find, after all our tedious study and practice, that we converse with difficulty. We then know that a language built logically, scientifically, without a thousand and one exceptions and with peculiarities of national pronounciation eliminated, would be a great blessing.

We could not in the limits of this article recount the long list of experiments which finally resulted in the one great outstanding achievement, Esperanto. Previous to its appearance, great thinkers such as Leibnitz experimented and achieved only indifferent results.

In 1859 Ludwig L. Zamenhof, creator of Esperanto, was born in Bielystok, Russian Poland. Four different language groups lived in his native city, hating and fighting one another. In very early childhood he conceived the idea of a common language that men might understand one another and cease fighting.

EXPERIMENTED WHEN YOUNG

By the time he was ten he was experimenting. While in high school he had developed a crude language which he and some fellow students learned and used. He began to see the difficulties of irregular national languages. He studied and mastered seven of the most important languages. He experimented, pruned and developed his new medium. He noticed how

some languages, in a haphazard sort of way, made use of prefixes and suffixes, for example in English, "re" and "dis," etc. He found that in all the Occidental languages, and to a considerable degree, in the Oriental languages, there was a remarkable commonality of root words.

By selecting these root words that were common to the greatest number of people, and by an ingenuous development of the principle of affixes, he built a language with less than three thousand root words, which is capable of expanding to hundreds of thousands of words by the simple use of the thirty-six prefixes and suffixes. One only needs to know a few hundred root words to build varying shades of expression and form a vocabulary that even an Elbert Hubbard could not construct in a national language that "just grew."

ONLY A FEW RULES

Sixteen rules were found to be entirely sufficient for the grammar of Esperanto. The conjugation of the verb was found possible in twelve forms, always regular. The pronunciation is strictly phonetic, the accent always on the penultimate, the next to the last syllable. Being built on the basis of words in living languages, seventy-five per cent. of its root words being in recognizable English forms, every one finds it surprisingly easy to learn Esperanto. In fact, it is so easy one wonders if it is practicable. Then a foreigner is encountered with whom conversation is possible only in the auxiliary language, and the discovery is made that the foreigner speaks it just as we do.

EASY TO ACQUIRE

Members of my class at the Washington Irving High School this past winter conversed with a Portuguese Esperantist visiting New York after they had had only five lessons in the language. Where it takes two or three thousand hours to gain indifferent mastery of a national language, grown up like Topsy, it takes one hundred to two hundred hours to learn Esperanto well enough for easy conversation. A great surprise for everyone is the fact that one learns to understand the language very quickly, much sooner than speaking facility is acquired. This is the reverse of the general experience in national language.

The foregoing facts support the assertion of the right of Esperanto to be accepted as the world language of radio. The masses can quickly learn it. It can be understood over the radio telephone very easily because there are only five vowel sounds, always enunciated with distinction. A German speaking in Berlin, a Swede in Stockholm, an Italian in Rome, or even a Japanese in Tokio, would be understood very well by Esperantists in other countries in a broadcast discussion of some subject of world-wide interest.

It can be only a short time before we in America, and the lonely peoples of islands in the sea and in the tangles of Africa or South America, all will be listening to scientific or philosophic discussion from the points of greatest learning, when we know an auxiliary language. Individuals some day will be able to call their nearest powerful radio station and ask for a connection with a party in South America, Persia or Siberia, with whom they will speak directly, without the intermediary of an interpreter.

Esperanto is already of great practical value as a language of commerce and travel. At the annual world congress held in Prague last Summer nearly three thousand delegates representing more than forty nations, were in attendance. The congress this year is to be in Helsingfors during August and indications are that more than five thousand will be in attendance, so rapidly is the movement spreading.

About one hundred magazines and newspapers are published in the language. A rich literature both in translation and in original works, has grown up. It is very well for me to remark here for the benefit of the many who are now becoming interested in Esperanto in this country that because of lack of interest in the subject heretofore on this side of the ocean, very few books or other literature on the subject will be found in our bookstores. We must obtain most of such from England and the continent, but undoubtedly American publishers will soon find it profitable to turn their attention to Esperanto in America.

In closing, let me emphasize and sum up by two other quotations from Mr. Sarnoff's excellent article: "Think of radio telephony as a means of better understanding between man and man, creed and creed, and even nation and nation," and "consider also one application of broadcasting by radio; an international conference to make open covenants openly arrived at—and the whole world 'listening in'. Some day, and perhaps in the not very distant future the dream will be a reality. When it is possible for the peoples of the world to listen to the deliberations of statesmen, to have first-hand knowledge of the functioning of their Executives in power, then the voice of the people may literally be heard."

Need we add that Esperanto must spread in usage among the peoples along with radio to make those prophecies become facts?

U. S. Acts to Regulate Its Own Broadcasting

THE United States Government, recognizing the great value of broadcasting and desiring to profit by it to the utmost, has appointed representatives of each of the ten departments to sit on an Inter-departmental Advisory Committee on Governmental Broadcasting. The new committee has been formed at the request of the Secretary of Commerce. In addition to the departmental representatives, there also are spokesmen for the office of the Chief Co-ordinator (Bureau of the Budget) and of the U. S. Shipping Board.

The committee already is functioning, and as a result of its deliberations the various kinds of material originating in the different departments suitable for broadcasting have been classified. These classifications include market prices and data, weather and hydrographic news, wave length and time signals, executive announcements, statistics, and educational material. One of the functions of the committee is to advise regarding priority of the different classifications, and regarding operating schedules at the Government radio telegraph and telephone stations from which the matter is transmitted.

The committee is composed of the following departmental executives:

Agriculture—W. A. Wheeler, Radio Development Section; Commerce—Dr. S. W. Stratton, Director, Bureau of Standards; Interior—O. P. Hood, Chief Mechanical Engineer, Bureau of Mines; Justice—S. Ely, Chief Clerk; Labor—A. E. Cook, Office of the Secretary; Navy—Com. D. C. Bingham, Naval Communication Service; Post Office—J. C. Edgerton, Air Mail Division; State—W. S. Rogers, International Communications Conference; Treasury—L. J. Heath, Public Health Service; War—Maj. Gen. G. O. Squier, Chief Signal Officer; Chief Co-ordinator—Capt. H. P. Perrill, Asst. Co-ordinator, Bureau of the Budget; U. S. Shipping Board Emergency Fleet Corporation—F. P. Guthrie, Head of Radio Division, Operating Department.

The chairman of the committee is Dr. S. W. Stratton, and the secretary is Dr. J. H. Dellinger, Chief of the Radio Laboratory, Bureau of Standards, Department of Commerce.

The committee has recognized the principle that radio must be used primarily for types of service that cannot be satisfactorily given by other means of communication, and that therefore radio broadcasting should not be used in general where wire telegraphy or telephony or printed publication would be as satisfactory. It is possible that the scope of the committee's activities may be extended beyond the subject of broadcasting.

Radio in South America

Regina Vicarino

Opera Singer Who Toured South America Believes That Brazil and the Argentine Will Be the First of the Latin-American Countries to Accept Radio

By Claire Burquo

REGINA VICARINO, coloratura, of three continents!

That is the true designation for the singer who recently delighted radio telephone audiences from WJZ.

Knowing that the gifted singer had appeared in South America and European cities as often as in cities of the United States, I asked her, for the readers of THE WIRELESS AGE, if she believed the time would come when radio-telephone broadcasting as now conducted in this country will ever be popular in other parts of the world. She first considered the case of South America.

"In only two countries in South America, Brazil and the Argentine, will the radiophone ever reach the proportions that it has reached here," the singer told me.

"The people in those two countries are very much alive to the possibilities of anything new. But there is a question in my mind as to whether the people in the other South American countries will become excited over the new form of entertainment. They are splendid people, but take life very easy and never become excited over anything.

"But in Brazil and the Argentine, it is different. I know that success will surely come to the one who introduces the radio telephone in those two countries.

VISUALIZES WORLD SYSTEM

"As far as Europe is concerned, I know that people there will eagerly grasp it. This opens the question of a world broadcasting system. It is possible that experimenting will develop the radio telephone to the point where sufficient power can be had to broadcast entertainments between continents as easily as they now are being broadcast between cities in our own country."

"But will this mean that some universal common language will have to be adopted?" she was asked.

"No, because even though the development of the radio telephone will permit international broadcasting, I do not think that it will ever be much used in that way. The people of Europe are very clannish. Each country wants to keep its own tongue and is not willing to adopt any other language.

South Americans told Regina Vicarino (above) they had labored under the impression North Americans could not sing

"This means that as far as the international broadcasting of an address is concerned, possibilities are nil. Broadcasting of speeches, etc., will stay within the individual country or countries using the language of the speaker. But when it comes to music I see different possibilities.

"Most of the operas which are so eagerly attended in this country are sung in foreign languages, and I dare say not ten per cent. of those who hear them understand the words of the singers.

AMERICANS LIKE ACTION

"For that reason broadcasting of a song from Italy in Italian would be just as delightful to Americans as it now is from the stage of the Metropolitan Opera House in New York City. This is only because the listeners do not care what the words of the singer may mean."

Regina Vicarino may truly be called a pioneer of the operatic stage in South America. She was the very first American singer to visit many of the Latin-American countries, and among the earliest to sing in the others.

She likes to tell of the reception she received in many of the cities on the southern half of the American continent.

"You see, I resemble not a little an Italian. And then, too, my name would lead one to believe I was of that nationality," she said.

"The South Americans simply will not believe that North Americans can sing. They insist that all real artists are of European extraction, and it took quite a little argument to convince them they were wrong in my case, at least.

OPERA IN SOUTH AMERICA

"Friends predicted that we would have anything but a rosy path in presenting opera down there. But the opposite proved true. They fairly ate it up. They had thought ours was a land of nothing but poor voices and jazz. Quite a shock for them—but a pleasant one, I must say in all fairness."

But to call Regina Vicarino an American singer only, despite her American nationality, would be unfair to the rest of the world that loves her. The South Americans, whom she knows so well, continually ask her to return and present more operas, and this she wants to do. She is considering entering vaudeville, and possibly before these lines appear in print will have determined upon that course.

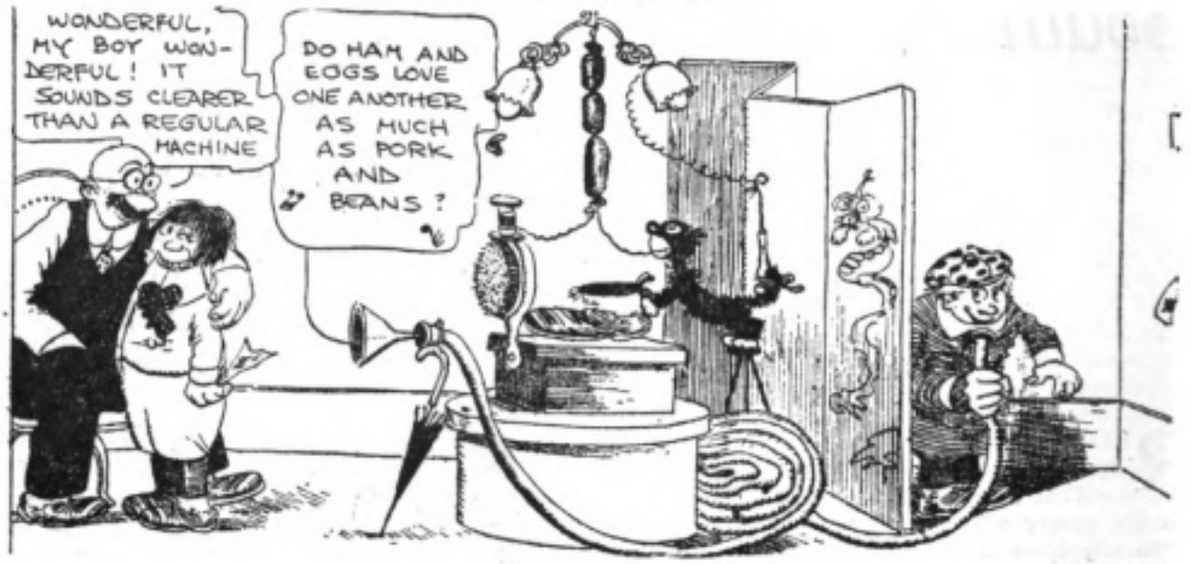
Her first instructor, Arthur Lawrason, known to the followers of the stage, is urging that she enter the variety stage.

But essentially she belongs to an operatic career, and should she finally go on the two-a-day, the opera will lose what vaudeville gains.

Radio's Popularity Proved by the Vigor With

OUR OWN WEEKLY RADIO RAVINGS

LITTLE WINFIELD'S OLD MAN PROMISES HIM $5 IF HE BUILDS HIS OWN RADIO OUTFIT AND, WITH THE HELP OF HIS PAL, JASPER, HE PUTS IT OVER SUCCESSFULLY ON THE PROUD PARENT.

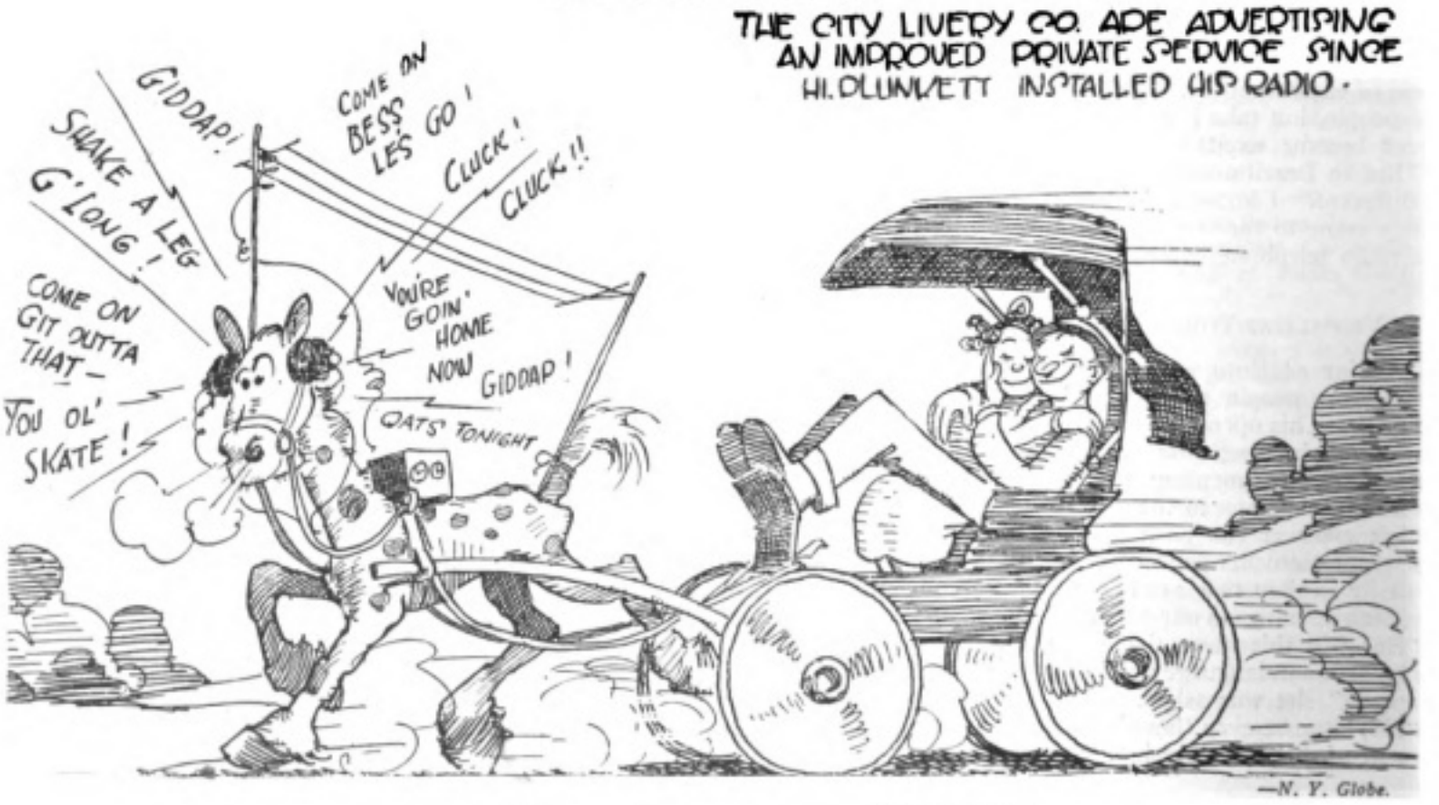


—N. Y. Mail

MUTT AND JEFF

—N. Y. World.

IMPROVED SERVICE



—N. Y. Globe.

Which Cartoonists Attack Its Humorous Sides

TERRIBLE TEMPERED MR. BANGS

—Cincinnati Post.

THE DAY OF REST

—Atlanta (Ga.) Journal.

SIMEON BATTS

—N. Y. Mail.

When Ether Waves Run Wild

Our Own Broadcasting Station

It is quite difficult to hear our station, but there is a way. The method we place most faith in is this: Go up into the attic. It matters not if you take your set along. Count off four paces from any wall and then stop. Place one hand on your forehead, the other hand on both of your hips. Then think deeply. Try this for fifteen minutes every hour on the hour for twelve hours and you will commence to hear things.

SUNDAY

7 P. M. "The Peculiarities of the Sock" an address by the Hon. Hoe Zurie, who will explain why one blue hose dreads to be worn with a red one.

8 P. M. Mr. Tincan Campbell will demonstrate the latest styles in eating soup. Loud speaker amplification will not be required.

9 P. M. A sermon. Any one.

10 P. M. Reveille.

MONDAY

7 P. M. Madam Whatta Voice, coloratura, will sing in Italian that pathetic ballad entitled: "No, Geraldine, Henry Cabot Lodge is not a summer camp."

8 P. M. John Sourface, the well-known undertaker, will discuss the "radio widow," a recent creation.

9 P. M. Due to the recent schedule now put into effect, this station will not be active during this hour. The announcer will state: "We are closing down to give Station AWOL a chance. Hear him if you can. If you can't, we will furnish asbestos paper and envelopes for letters to President Harding."

10 P. M. Marriage market quotations from Reno and Paris.

TUESDAY

7 P. M. Public Service Evening. The entire program will be devoted to subjects of deep municipal interest.

The artists, in the order of their appearance, are:—

(1) Jerry the Butcher will read off the names of his customers who have owed him for four weeks. Special mention will be made of Obediah Watkins who lives on the other side of the railroad tracks, who has had an unpaid balance of 39 cents for more than a year.

(2) Mortimer Pestle, the druggist, will read off a list of all who have cashed prescriptions during the past three days.

(3) Mr. Gab and his sister Gabby Gab will wind up the evening with bits of choice gossip they have picked up during the past week. Mr. Gab's talk will be of particular interest to women —and of course, vice versa.

Delirious Dave

(With apologies to Bide Dudley)

CHAPTER 1

Delirious Dave, the soda physicist, got an idea.

Wham!

It was not the idea that made the noise, but Proprietor Tracy slapping him in the face.

"Don't do that!"

Little Gertrude, who loved Dave and lived in the big house over the hill, was speaking. She had come in for a soda with chocolate ice cream.

Dave didn't mind being slapped.

But he objected to it in the presence of the girl he loved.

Four hours later Dave told Proprietor Tracy his idea. It was to get a radio set for the store.

Clang!

The fire engines were coming.

When the fire was over Proprietor Tracy congratulated Dave for his first idea. He wanted to give him a raise in pay, so he presented him with a ten-cent sponge to take home to his mother. It would be good for a cold sponge bath.

"I will get the radio set," said Proprietor Tracy, backing to the door with both arms raised high.

The robbers who forced him out of the store did their work quickly.

Dave had fainted.

(To be continued)

* * *

NOT A NOVELTY

The man who proposes to broadcast the whistlings of the million marmots from Montana evidently never has listened to a novice trying to tune a regenerative set. Unlike him is the gentleman who says there is no use trying to introduce radio into the Canary Islands because the natives there for centuries have communicated with each other over long distances by whistling and chirping.

Eddie's Friends

—Los Angeles Examiner.

Important if True

HONEST-TO-GOODNESS, here are a few of the things they say you can do by radio:

Hypnotize.
Help Ma find Dad in the poker game.
Help find bootleg booze.
Mental telepathic communication.
Summon ghosts.
See movies.
Change shape of head.
Moths, cockroaches and lightning bugs can communicate with each other.
Keep baby from crying.
Send kisses.
Rejuvenate your pocketbook when you go broke.
Get a divorce.

And Humor Fills the Ozone

By Roy K. Moulton

Wireless Wit of the N. Y. Eve. Mail Radio Review

THE fact that my radio broadcasting station is located on the bank of the Hudson River, out near the city limits, saved the situation one day this week for one of the large excursion steamers plying the waters of this stream during the tepid period of the year.

Everybody knows that the trap-drummer with his skillets, cow-bells, steam whistles, washboilers and glass-crashes, is the only feature of the modern dance orchestra that really counts. When he quits, there is no orchestra.

Well, on this day I was tinkering with my powerful $27 broadcasting machine when I received a telephone call from the manager of this steamboat to the effect that his trap-drummer had suddenly fallen ill from eating tinned salmon. I believe he had not been told to first remove the tins, or something like that, a trap-drummer being more or less uneducated in matters not pertaining to his own profession.

"I could get along without the captain of the boat," said the frantic manager. "I could even get along without the engineer or the firemen, but I can't get along without a trap-drummer. No boat can run without one. My passengers will not budge from the dock without a trap-drummer."

I immediately turned on one of my best jazz band records and pointed the nozzle of my broadcasting machine down the river. I tuned it to hit this particular steamboat and no other, which is in itself a good trick, if you do it. It is also a good trick even if you don't do it.

Apparently the experiment succeeded, for half hour afterward the stately excursion boat steamed by my broadcasting station. My radio music was being received aboard in good order and the couples were wrestling happily on the dance deck.

By slowly turning the nozzle of my machine, I kept it on the steamer, I thought, until she reached Poughkeepsie. The manager telephoned me from that point that my music died away just after the boat left Newburg. So I did not keep them dancing all the way. My broacasting machine was not quite strong enough. I think perhaps a $32 machine would have done it.

Correspondence

Dear Editor: Who is WET?

HOPSMAN.

There isn't room to print the list. Carrier waves are reported to have some damping effect on DRY. But, instinctively, this paper avoids all controversial subjects.

* * *

Dear Editor: Last night while listening in I heard WJZ explain that he was going to shut up for a while, after which the announcer said: "Our next number will be a fox trot entitled 'Who Will Take My Place When I'm Gone?'" Though I listened carefully for an hour I heard no one say he would do it. What's the answer?

WORRIED.

The Editor referred this query to Boreas, King of the Northwind, whose reply was unintelligible.

Life on the Radio Wave

—San Francisco Chronicle.

Wise Crack-les

A long wave gets a short welcome from a broadcasting fan.

* * *

Sam Wood takes exception to our statement that lightning bugs cause earthquakes instead of static. "For the elimination of static," Sam writes, "I suggest the extermination of lightning bugs. I have my kid brother on top of a stepladder with a long pole driving said bugs away from my aerial when receiving and you would be surprised at the results." Sam sent this to the Contest Editor, expecting a $10 prize to be one of the said results, but as he enclosed no step-up data, the C. E. turned the idea down.

* * *

FURNISH THE HOUSE WITH A RADIO SET AND WE'LL TAKE IT.

Real Estate for Radio

WANTED—High class radio receiving outfit, with range of at least 1000 to 1500 miles, complete with all necessary equipment, including aerials, batteries, Magnavox, etc. Also sending outfit, ordinary radius.

WILL EXCHANGE—Lot in a beautiful Florida resort, with or without furnished cottage, on equitable basis. Send full particulars in first letter.

T. V. ORR,
De Funiak Springs, Florida.

—An Un-Classified Ad.

* * *

RADIO FREQUENCY

S. H. R., a Philadelphia advertising man, uses the radio idea to collect overdue accounts. He sent this, for instance:

Radio is all the go,
I have one, by heck,
See if yours will reach me—
Broadcast me a check.

(My receiver is tuned to RHB 16 Bucks).

The RHB 16 Bucks is the catchline, the initials being those of the unfortunate debtor, and 16 Bucks being merely another way of saying "16 Checks" or "16 Iron Men" or "16 Simoleons" or "16 Spondulix" or "16 Bones" or "16 Cart Wheels," or "16 Sinkers."

WORLD WIDE WIRELESS

Want More Operators on British Ships

BECAUSE the SOS signals sent out by the S. S. *Egypt* before she sank recently off Ushant were unheard by ships in the vicinity, the Wireless Operators' Association, of England, is endeavoring to force a change in the rules affecting radio operation on British ships. At present, the Board of Trade allows ships to sail with but one operator, who is supposed in certain cases to be aided by a member of the crew capable of recognizing the SOS signal and who acts as a watcher while the operator is off duty. However, when the *Egypt* called for help seven ships were near by with such watchers on duty, but all failed to pick up the distress call, and 25 ships in the vicinity also failed to hear it because each had but a single operator who was not on duty at the time. A 24-hour watch by capable operators is demanded by the Operators' Association.

New Grecian Station

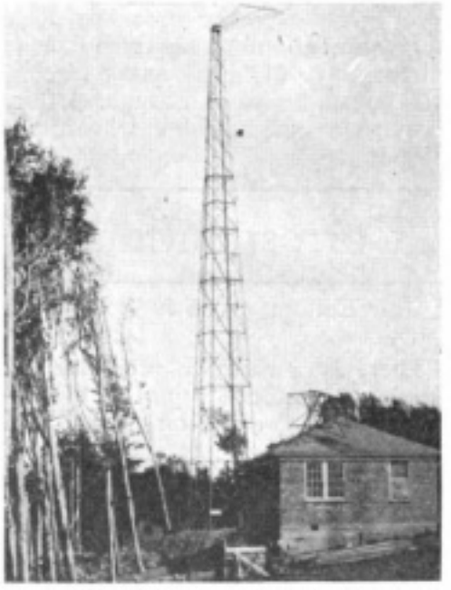
ATHENS, Greece, is to have a new official radio station, which is fast nearing completion. The station, whose call will be SXG, will handle the official messages previously going through SXB, the Athens Coast Station No. 2, which also is open for commercial use. Due to the state of war in Greece the number of official messages has been so great as to curtail greatly commercial work, which condition the new official station will obviate, allowing the use of SXB exclusively for commercial traffic.

Ongar Works With Spain

TRAFFIC between England and Spain, which for years has been sent through the famous Poldhu station in Wales, now goes through the new Marconi station at Ongar. This station is operated by distant control at London.

Irish Damage Clifden Station

PORTIONS of the big new Marconi wireless station at Clifden, Ireland, were destroyed recently by Irish rebels, who succeeded in routing the operating staff and putting the station out of commission. Marconi service across the Atlantic to Glace Bay, N. S., was interrupted for about 24 hours, after which the new station at Ongar, near London, which has been handling Continental traffic, took over messages for North America. The damage at Clifden was principally to the antenna system and the electric feed wires, the buildings and most of their equipment being unharmed. The experience is regarded as a new proof of the great flexibility of wireless telegraphy for long distance work, as had the break across the Atlantic been in a submarine cable weeks instead of hours would have been required for resuming service. This is the second time that the Irish have attacked radio stations, the British Admiralty Station at Bunbeg, Ireland, having been destroyed on May 10.



One of the new high-powered stations recently erected is that at the Presidio, San Francisco, Cal. Waves from its giant antenna are heard half way around the globe

Links West Indies Islands

TURK'S ISLAND and Caicos Island in the West Indies have just been linked by a wireless telephone circuit. The transmitters have no difficulty in covering the 12 miles between the two islands, and also handle traffic with ships in the vicinity.

Public Radio Telephone

A PUBLIC radio telephone service between Copenhagen and Bornholm has been opened, using arc transmitters. This is the first public radio telephone circuit to be opened in the Scandinavian countries.

South Africa Developing Radio Net

THE possibilities of the wireless telegraph are being studied by the Union of South Africa, which is considering the installation of a net of stations to cover the country. With stations having a range of 2,000 miles it would be possible to reach many sections now without modern communication of any kind. About £180,000 is the estimated cost, or about $880,000. In addition, radio telephone stations are being tried by the postal authorities in South Africa, two sets having been imported from England for testing purposes. Trials between Cape Town and Touws River, 160 miles away, produced perfect results, but lack of demand for such service is hampering its development. In spite of the fact that South African radio is entirely in code, except for the small amount of radio telephone testing, considerable popular interest has been aroused, and the Radio Society of South Africa, of Cape Town, has been adding many new enthusiasts to its membership.

Brazil to Have Fine System

THE most complete radio system in South America will be that of Brazil, according to American Charge d'Affaires Crosby at Rio de Janeiro, reporting to the U. S. Department of Commerce. American, British, French, German and Italian companies all will have a share in developing Brazil's radio system, with which cable lines are to be linked as well.

British Lay Radio Guiding Cable

APPARENTLY undeterred by reports from America that the "radio guiding cable" used for guiding U. S. Navy ships into New York Harbor is disturbed by dragging anchors, the British Admiralty have just laid a similar cable. The wire is laid in the English Channel off Southampton, where the fogs are frequent, and is expected to speed trans-Atlantic travel. Wireless waves are sent through it, and by means of antennas hung on each side of the ship, the helmsman is able to keep his ship directly over the cable, steering so that the signals come with equal intensity from both sides.

New Radio Compass Stations on Great Lakes

THREE new radio compass stations have just been completed in Michigan by the U. S. Navy Department. They are located at Grand Marais, Whitefish Point and Point Detour, where they will serve the ships sailing through Sault Ste. Marie between Lake Superior and Lake Huron. This is a dangerous passage because of the rocks and the frequent fogs. The new stations will make it possible for ships to navigate through the passage in safety even in the thickest fog, saving time and property. They bring the number of Navy radio stations on the Great Lakes to fifteen, stretching from Duluth, Minnesota, to Buffalo, N. Y. and making it impossible for a steamer on the Great Lakes to get lost in the fogs that often blot out all other guiding means but radio.

Honduran Station Is Nearly Finished

HONDURAS shortly will enjoy radio communication with both America and Europe, as a powerful wireless station at Teguicigalpa is approaching completion. The station is equipped with the most modern transmitting and receiving apparatus, all of American manufacture.

Radio Ship Sails for Alaska

THE *Gold Star*, the U. S. Navy Radio Repair Ship, is now in Alaskan waters, repairing and supplying the ten Navy radio stations in that part of the world. The ship, whose equipment is unique, is commanded by Captain John B. Earle. Her name was adopted as a tribute to the many mothers who lost their sons during the war. She carries a crew of expert radio engineers, capable of performing any radio task, from erecting a complete station to repairing a variable condenser. The ship also carries a large cargo of spare parts and supplies of all kinds, for it not only has to keep the radio equipment of the ten land stations in good order, but must provide the personnel with food and clothing.

Low Antenna at Lakehurst

A NEW type of transmitting antenna is being tried by the U. S. Navy at Lakehurst, N. J., the Navy airship base where the Navy's giant dirigibles are moored. In the effort to keep the big landing field clear for the airships, the height of the new antenna has been reduced to only 60 feet, while in order to give ample radiating surface it has been made in gridiron form, being 800 feet long and 120 feet wide. It thus forms a multiple-tuned antenna. It is erected at one side of the field, leaving the center unobstructed, while its low height does not interfere with ships leaving or approaching the field.

Recent transmitting tests have shown a 250-mile range in the daytime, using a 1 kw. tube transmitter, and it is expected that at night distances of 2,000 miles across the Atlantic will be covered. When the new German-built ZR-3 starts on her trip across the Atlantic for Lakehurst it is expected to keep in touch with her by radio. When she comes within 200 miles of the shore, a radio compass station will guide her to her landing field.

Navy Radio Exhibit for Brazil

AMERICAN radio progress will be demonstrated to the Brazilians this Fall, at the international exposition at Rio de Janeiro, where the Government is sending its special radio exhibit that has been seen at the more important radio shows in this country. In addition, other radio apparatus will be displayed. The exhibit will be carried by the U. S. S. *Nevada*, concerts from whose band will be broadcast from Rio de Janeiro harbor, to demonstrate radio telephone sending and receiving. A model of New York harbor, 5 x 6 feet, with all lighthouses, lightships, radio and radio compass stations located, will be exhibited, and a model vessel, propelled by an invisible electromagnet, will demonstrate the Navy's use of the radio guiding cable in Ambrose Channel.

Chicago is continuing its experiments with radio receiving equipment for its elevated trains, using an antenna strung above the cars

Radio Restricted in Turkey

THE sale of wireless apparatus in Constantinople and in the zone of Allied Occupation around the city has been prohibited by the Allied Police Commission. Apparatus may be sold in Turkey outside the Allied Zone only after permission has been secured from the Allied Police Commission, which investigates each buyer and the use to which he will put the instruments.

Installing Army Airship Sets

THE radio equipment of the semi-rigid dirigibles operated by the U. S. Army is being worked out with some new ideas, one of them being the connection of a generator direct to the airship's power plant, much as a magneto is driven. With this direct drive it is expected to achieve superior results in transmission, and it is felt that the engines are powerful enough to supply the necessary energy without cutting down the speed of the ship. Experiments are still being conducted to determine the best antenna design. Four alternatives are offered; inside the big gas bag; on the outside; fastened to it; and trailing, as in airplanes.

Supplants Wire Telephone in British Army

RADIO telephone and telegraph transmitters are to be used hereafter by the British Army instead of wire telephones, it has been announced by Lord Cavan, Chief of the General Staff. He stated that thousands of men had been killed during the war while laying and repairing telephone wires, while radio made it possible for operators to remain in bomb-proofs in comparative safety. New radio equipment is being secured for use in training the infantry.

Japan Wants Another Big Station

JAPANESE capitalists, headed by Baron Shibusawa, have asked for permission to establish a wireless company to work with American and European stations. The company would be capitalized at Yen 200,000,000, or about $98,000,000. Heretofore, Japan has frowned on privately owned wireless stations, considering it necessary to keep military control of radio, but it is understood that Premier Kato is in favor of the planned international system.

The present radio telegraph service between Japan and the United States is carried on regularly between stations of the Radio Corporation of America and stations operated by the Japanese Department of Communications.

Radio Controlled Tanks

WHILE little information on the subject has been allowed to reach the public, it is known that the U. S. War Department is considering the development of radio-controlled tanks. Since tests with the battleship *Iowa* showed the feasibility of controlling a vessel by radio, without a single person being on board of the ship, it is believed that similar applications are inevitable to military tanks.

Automatic Airplane Transmitter

ADAPTATION to radio of the familiar method of sending wire telegraph messages by operating a typewriter has been accomplished by the U. S. Navy Department. Typewriter sending and receiving apparatus has been in use by the telegraph companies for a number of years, but heretofore it has not been utilized in the radio world. The Navy's experiments have been conducted with an airplane, it being felt that here was the most important place to start with such a system. Transmission by the ordinary telegraph key in an airplane frequently is difficult, due to the maneuvers of the plane, and ground operators sometimes have trouble in reading the stuttering Morse when a plane strikes a series of air pockets. Use of the typewriter sender, with a similar automatic receiver on the ground, has proved practical in flying tests in Washington, D. C. Automatic typewriter recording on the plane while in flight is expected to follow shortly, making the system completely automatic and permitting positive operation under all flying conditions.

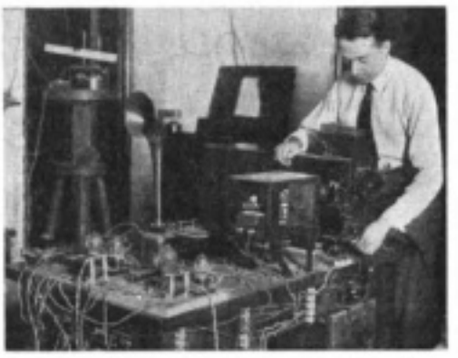
French Radio Central Opened at Sainte Assize

A NEW era in radio communication between New York and Paris was inaugurated on August 7th, when the new French radio central station at Sainte Assize was opened. The big station's first message sent to Radio Central of the Radio Corporation of America, on Long Island, was transcribed at the control room at 64 Broad street, New York City, and a reply sent back almost instantaneously. This exchange of messages was particularly fitting, as the new French plant is modeled after the original American Radio Central, and is the first one of the type in Europe.

It is located at Sainte Assize, 40 kilometers (24 miles) southeast of Paris. The transmitting apparatus includes two high-frequency alternators of 500 kw. capacity, capable of being operated singly or in series, permitting sending with from 250 to 1,000 kw. power, or of duplex transmission.

The receiving station is located at Villa Cresnes, half way between Sainte Assize and Paris. Wire telephones connect the two stations, and also the central office in the Boulevard Haussmann, Paris, which maintains remote control of both stations, and where the high-speed sending apparatus is located. The station operates on 14,300 meters, and is being heard in America about 25 per cent. more distinctly than any other transmitter in Europe.

The operating company is known as the Centre Radioelectrique de Paris, and was formed about two years ago, when it was realized by the French Government that the time had come to permit private companies to assume the burden of international radio development. The first stone for the new plant was laid January 9, 1921, by M. Deschamps, Minister of Posts, Telegraphs and Telephones. Management of the new station rests in the capable hands of Emile Girardeau, who was the French expert on communications at the Disarmament Conference at Washington, during which meeting he found time to inspect the Radio Corporation of America's plants at Riverhead and elsewhere. On his return to France he made some last-minute changes in order to avail himself of the latest American practice.



Radio experimental work is not complete without the use of the Oscillograph, which either records the radio waves in photographs, or presents them visually to the eye

Though Sainte Assize sent its first message to Riverhead, it is expected that it will put its regular traffic for America through the Radio Corporation's station at Marion, Mass.

Power by Wireless

THAT some day electric power may be transmitted by radio was the half-promise of Dr. Charles P. Steinmetz, of the General Electric Co., speaking before the International Radio Congress at Chicago recently. He pointed out that Marconi's invention of directional wireless was a step toward wireless power, permitting focusing of the radio waves in one direction. Dr. Steinmetz admitted that the possibilities still were hazy, and contented himself with outlining the general direction in which progress would have to be made, without stating when radio would displace all the present expensive electric wire systems.

New Signal Corps Stations

TWO new radio stations have been opened by the U. S. Signal Corps, one at Fort Totten, N. Y., and the other at Fort Bennings, Ga. This brings the total number of Signal Corps stations to 53. With the naval station at Boston, Mass., which co-operates with the Signal Corps, and the new station planned for Fort Sill, Okla., which latter will bring the Eighth Corps Area into the Army radio net, the Signal Corps will be able to cover the entire country with its radio service.

Radio for Japanese Islands

RADIO telephone communication across Chosen Strait has been opened by the Japanese stations at Fukuoka and Fusan, newly equipped with telephone transmitters. Shipping along the coasts of Kiushu and Chosen Islands takes advantage of the new radio facilities. Additional links are being forged in the radio telephone net being thrown about the Japanese Empire, and soon it will be possible to telephone by radio to the most distant of the islands, says American Vice Consul Corell, at Nagasaki.

Coming Radio Shows

BOSTON, Mass., is to have its second radio show in the Fall. October 30 to November 4 has been selected as the time, and arrangements are being made for a number of interesting features.

Cincinnati, Ohio, will have an Electrical and Radio Exposition October 7 to 14, inclusive, in Music Hall. The south wing of the building will be used for exhibits, while the big auditorium will be used for lectures, radio concerts and demonstrations. Various contests will be conducted, including one for receiving sets made by school children.

Houston, Texas, is planning for a radio show during the Houston Fair, November 9 to 18. The event is under the auspices of the Houston Fair Association.

Runnels County, Texas, has its fair this year September 14, 15 and 16, at Ballinger, and will use radio as a feature. An Armstrong super-regenerative set is being tuned up for the event, and the farmers of the county who have been winning prizes with corn and cattle, sheep and hogs, will also compete with each other's home-made radio sets.

Chicago will have a radio show in the famous Coliseum from October 14 to 21, under the auspices of the Chicago Executive Radio Council. This organization states that it intends to promote but one show a year, making that single event as important as possible. It selects the Fall as the best time of the year, in view of the recrudescence of wide public interest following upon the close of the Summer static season.

World Wide Wireless

A Few Facts About Existing Radio Facilities That Make the Use of This Method of Communication of Consequence to Everyone

By Edward J. Nally

President, Radio Corporation of America.

THIS brief outline of some of the aspects of radio is written from a viewpoint not often presented to the public at large. My purpose is to show it as an auxiliary to commerce rather than to stress the more familiar keynote of the "wonders of wireless," which have been the subject of many articles in the daily press. True, it is very baffling, from a scientific "reason why" standpoint, but so is electricity, which no one has yet been able to define.

The single fact that radio communication is the one medium capable of placing isolated communities in instant touch with the centers of civilization has a boundless appeal to the imagination. That, too, it has forever ended the vast silences of the sea further adds to its romance. However, until it becomes a general household utility it will probably remain in the public mind as something very mysterious—a sort of witchcraft, interesting, but making little appeal for intimate acquaintance; and comparatively few people realize that this means of communication has already a fixed place in the world's affairs; that it is, in fact, an economic factor of major importance, and world wide in its applicability.

Great Utility

The underlying reason for the rapid strides it has made is not because of its romantic, intangible or mysterious nature. Its important position in the field of communication is due solely to its utility, in combination with the three essentials of accuracy, speed and economy.

In addition to providing mariners with weather reports, storm signals and warnings of possible dangers to navigation, it enables passengers at sea to keep in touch with world affairs and with the movements of commerce and industry. Daily news bulletins are published on practically all the ocean-going vessels and transactions of great magnitude and of momentous importance are being carried on constantly between ship and shore through the medium of radio communication.

In its international application, radio is today carrying overseas a very material percentage of the world's communications. Radiograms, commercial and social, aggregating millions of words annually, are being sent daily across the Atlantic and Pacific oceans. These are regular paid communications, filed just as cablegrams are, and delivered with the accuracy and speed so essential to the users of long distance communication. Direct wireless service is maintained, night and day, with Great Britain, France, Germany, Norway, Hawaii and Japan, at rates which are from four to twenty-four cents per word lower than the cable rates. Economy being the keynote of commerce, the enormous total saving effected by the use of radio in the conduct of international communications makes it a matter of vital interest to everyone, and this interest has manifested itself in the constantly growing number of countries which are adopting radio as a means of communication, and which are constructing wireless stations with which to carry on this communication direct with other countries already thus equipped.

Radio Central

Another great advantage possessed by radio is what might be termed its universality, with reference to communication with several distant points at the same time. This was illustrated on the occasion of the formal opening of Radio Central, a super-powered station of the Radio Corporation of America, located at a point on Long Island about sixty-five miles distant from New York City. On November 5th, 1921, President Harding threw a switch in the White House, and a message which he had prepared for broadcasting to the world ran through a mechanical transmitter and the words, carried by land wire to Radio Central, were flung into space without the intervening agency of a human hand.

The first answer came back instantly. Others followed close upon it. Acknowledgments were received from such widely scattered points as Norway, Germany, France, Italy, England, Belgium, Sweden, Canada, Cuba, Japan, New Zealand, Panama, Colombia, Costa Rica, Nicaragua, Honduras and Australia.

This fact of the universality of radio has a further application in the broadcasting of news, market, weather and crop reports, lectures, sermons, etc., through the medium of broadcasting stations which are in direct communication with thousands of wireless stations maintained by amateurs in all parts of the country, and in this respect it is of especial value to isolated communities, out of touch otherwise with current happenings and with the world's progress.

This branch of the radio service has awakened a wide interest in all parts of the world, and with the rapid development of the wireless telephone, persons in remote districts, as well as passengers at sea, are privileged to listen to concerts by famous artists in the large musical centers and to hear, not the dots and dashes of the telegraph code, but the exact words of spoken addresses, etc.

Not a day passes, but our daily papers carry stories of new accomplishments in this direction, and I venture the prediction that in the not-far-distant future radio sets, for both telephone and telegraph, will be a vital part of the equipment of every American home.

U. S. Census Shows Jump in Radio Manufacture

IN the five years from 1914 to 1919 the manufacture of wireless apparatus in the United States increased more than eleven times, according to figures just reported by the Bureau of the Census. The value of the apparatus made in 1919 was $7,834,698, while in 1914 the total was only $672,575. In 1909 it was a little less, being $448,262. The next census of manufacturers will be taken in 1924, and it is expected to show increases greatly in excess of that of 1919, inasmuch as broadcasting did not start until the Fall of that year.

Egypt Offers Commercial Radio

THE Egyptian government radio telegraph station at Abu Zabal has just been authorized to accept commercial messages for Great Britain and Ireland. The station was opened in 1914, and has been handling official messages only.

British Develop New Tube

A NEW vacuum tube, or "valve," as it is called in England, has been developed there for detection and amplification. It is known as the Mullard Ora, and operates with a plate voltage of 30, while only 3.6 to 4 volts are required on the filament. The design is such that the same tube is used either as a detector or as an amplifier.

BROADCASTING STATION DIRECTORY

KAQ Young Men's Christian Association, Denver, Colo.
KDN Leo J. Meyberg Co.....San Francisco, Calif.
KDZT Seattle Radio Ass'n.....Seattle, Wash.
KFAF Western Radio Corp.....Denver, Colo.
KFAN Electric Shop.....Moscow, Idaho
KFAP Standard Publishing Co.....Butte, Mont.
KFAQ City of San Jose.....San Jose, Calif.
KFAR O. K. Oisen.....Hollywood, Calif.
KFBA Ramey and Bryant.....Lewiston, Idaho
KFBG First Presbyterian Church.....Tacoma, Wash.
KFC Northern Radio & Electric Co.....Seattle, Wash.
KFI E. C. Anthony .....Los Angeles, Calif.
KFU The Precision Shop.....Gridley, Calif.
KFV Foster Bradbury Radio Store....Yakima, Wash.
KFZ Doerr Mitchell Elec. Co.....Spokane, Wash.
KGB Wm. A. Mullins Electric Co....Tacoma, Wash.
KGC Electric Lighting & Supply Co..Hollywood, Calif.
KGF Pomona Fixture & Wiring Co....Pomona, Calif.
KGG Hallock & Watson Radio Service....Portland, Ore.
KGN Northwestern Radio Mfg. Co.....Portland, Ore.
KGO Altadena Radio Laboratory.....Altadena, Calif.
KGU M. A. Mucrose .....Honolulu, Hawaii
KGW Oregonian Publishing Co.....Portland, Ore.
KGY St. Martins College.....Lacey, Wash.
KHD Aldrich Marble & Granite Co., Colo. Spgs., Colo.
KHJ C. R. Kieruff & Co.....Los Angeles, Calif.
KHQ Louis Wasmer .....Seattle, Wash.
KJC Standard Radio Co.....Los Angeles, Calif.
KJJ The Radio Shop.....Sunnyvale, Calif.
KJQ C. O. Gould .....Stockton, Calif.
KJR Vincent I. Kraft.....Seattle, Wash.
KJS Bible Institute of Los Angeles, Inc., Los Angeles, Calif.
KLB J. J. Dunn & Co.....Pasadena, Calif.
KLN Noggle Electric Works .....Monterey, Calif.
KLP Colin B. Kennedy Co.....Los Altos, Calif.
KLS Warner Brothers .....Oakland, Calif.
KLX Tribune Publishing Co.....Oakland, Calif.
KLZ Reynolds Radio Co.....Denver, Colo.
KMC Lindsay-Weatherill & Co.....Reedley, Calif.
KMJ San Joaquin Light & Power Co...Fresno, Calif.
KMO Love Electric Co.....Tacoma, Wash.
KNI T. W. Smith .....Eureka, Calif.
KNJ Roswell Public Service Co....Roswell, N. Mex.
KNN Bullock's .....Los Angeles, Calif.
KNR Beacon Light Co.....Los Angeles, Calif.
KNT North Coast Products Co.....Aberdeen, Wash.
KNV Radio Supply Co.....Los Angeles, Calif.
KNX Electric Lighting Supply Co.....Los Angeles, Calif.
KOA Y. M. C. A.....Denver, Colo.
KOB New Mexico College of Agriculture and Mechanical Arts .....State College, N. Mex.
KOE Spokane Chronicle.....Spokane, Wash.
KOG Western Radio Electric Co....Los Angeles, Calif.
KOJ University of Nevada.....Reno, Nev.
KON Balzwasser (Inc.) .....San Diego, Calif.
KOP Detroit Police Dept.....Detroit, Mich.
KOQ Modesto Evening News .....Modesto, Calif.
KPO Hale Brothers .....San Francisco, Calif.
KQI University of California.....Berkeley, Calif.
KQL Arno A. Kluge .....Los Angeles, Calif.
KQP Blue Diamond Electric Co.....Hood River, Ore.
KQT Electric Power & Appliance Co..Yakima, Wash.
KQV Doubleday-Hill Electric Co.....Pittsburgh, Pa.
KQW Charles D. Herrold .....San Jose, Calif.
KQY Stubbs Electric Co.....Portland, Ore.
KRE Maxwell Electric Co.....Berkeley, Calif.
KSC O. A. Hale & Co.....San Jose, Calif.
KSD Post Dispatch .....St. Louis, Mo.
KSL The Emporium .....San Francisco, Calif.
KSS Frost & Dean Radio Rech. Lab., Long Beach, Calif.
KTW First Presbyterian Church .....Seattle, Wash.
KUO The Examiner Printing Co..San Francisco, Calif.
KUS City Dye Works & Laundry Co..Los Angeles, Calif.
KUY Coast Radio Co.....Del Monte, Calif.
KVQ J. C. Bubrecht .....Sacramento, Calif.
KWG Portable Wireless Telephone Co., Stockton Calif.
KWH Los Angeles Examiner.....Los Angeles, Calif.
KXD Herald Publishing Co.....Modesto, Calif.
KXS Braun Corporation .....Los Angeles, Calif.
KYF Thearle Music Co.....San Diego, Calif.
KYG Willard P. Hawley, Jr.....Portland, Ore.
KYI Alfred Harrell .....Bakersfield, Calif.
KYJ Leo J. Meyberg Co.....Los Angeles, Calif.
KYW Westinghouse Electric & Mfg. Co., Chicago, Ill.
KYY The Radio Telephone Shop, San Francisco, Calif.
KZC Public Market & Mkt. Stores Co., Seattle, Wash.
KZI Irving S. Cooper.....Los Angeles, Calif.
KZM Preston D. Allen .....Oakland, Calif.
KZN The Desert News .....Salt Lake City, Utah.
KZV Wenatchee Battery & Motor Co., Wenatchee, Wash.
KZY Atlantic-Pacific Radio Supplies Co., Oakland, Calif.
KDKA Westinghouse Elec. & Mfg. Co., Pittsburgh, Pa.
KDPT Southern Electrical Co.....San Diego, Calif.
KDYL Telegram Publishing Co., Salt Lake City, Utah.
KDYM Savoy Theatre .....San Diego, Calif.
KDYN Great Western Radio Corp. ..Redwood City, Calif.
KDYQ Carlson & Simpson .....San Diego, Calif.
KDYQ Oregon Institute of Technology....Portland, Ore.
KDYR Pasadena Star News Pub. Co.....Pasadena, Calif.
KDYS The Tribune, Inc.....Great Falls, Mont.
KDYU Herald Publishing Co.....Klamath Falls, Ore.
KDYV Cope & Cornwell Co.....Salt Lake City, Utah.
KDYW Smith-Hughes & Co.....Phoenix, Ariz.
KDYX Star Bulletin Publishing Co....Honolulu, T. H.
KDYY Rocky Mountain Radio Corp. .....Denver, Colo.
KDZA Arizona Daily Star .....Tucson, Ariz.
KDZB Frank E. Siefert .....Bakersfield, Calif.
KDZD W. R. Mitchell .....Los Angeles, Calif.
KDZE The Rhodes Co.....Seattle, Wash.
KDZF Automobile Club of So. Calif...Los Angeles, Calif.
KDZG Cyrus Peirce & Co.....San Francisco, Calif.
KDZH Fresno Evening Herald .....Fresno, Calif.
KDZI Electric Supply Co.....Wenatchee, Wash.
KDZJ Excelsior Radio Co.....Eugene, Ore.
KDZK Nevada Machinery & Electric Co.....Reno, Nev.
KDZL Rocky Mountain Radio Corp.....Ogden, Utah.
KDZM E. A. Hollingworth .....Centralia, Wash.
KDZP Newberry Electric Corporation...Los Angeles, Calif.
KDZQ William D. Pyle .....Denver, Colo.

KDZR Bellingham Publishing Co.....Bellingham, Wash.
KDZU Western Radio Corporation.....Denver, Colo.
KDZV Cope & Cornwell Co.....Salt Lake City, Utah.
KDZW Claude W. Gerdes .....San Francisco, Calif.
KDZX Glad Tidings Tabernacle....San Francisco, Calif.
KDZZ Kinney Brothers & Sipprell .....Everett, Wash.
KFAB Pacific Radiofone Co.....Portland, Ore.
KFAC Glendale Daily Press.....Glendale, Calif.
KFAD McArthur Brothers Mercantile Co..Phoenix, Ariz.
KFAE State College of Washington....Pullman, Wash.
KFAJ University of Colorado.....Boulder, Colo.
KFAS Reno Motor Supply Co.....Reno, Nev.
KFAT Dr. S. T. Donohue .....Eugene, Ore.
KFAU Independent School District.....Boise City, Idaho.
KFAW Cooke & Chapman .....Venice, Calif.
KFAW The Radio Den, Ashford & White, Santa Ana, Cal.
KFBB F. A. Buttrey & Co.....Havre, Mont.
KFBC W. K. Ashill .....San Diego, Calif.
KFBD Clarence V. Welch .....Hanford, Calif.
KFBE Reuben H. Horn.....San Luis, Gbispo, Calif.
KFBF F. H. Smith.....Butte, Mont.
WAH Midland Refining Co.....El Dorado, Kans.
WBL T. & H. Radio Co.....Anthony, Kans.
WBS D. W. May (Inc.).....Newark, N. J.
WBT Southern Radio Corporation.....Charlotte, N. C.
WBU City of Chicago.....Chicago, Ill.
WBZ Westinghouse Elec. & Mfg. Co., Springfield, Mass.
WCK Findley Electric Co.....Minneapolis, Minn.
WCJ A. C. Gilbert Co.....New Haven, Conn.
WCK Stix-Baer-Fuller .....St. Louis, Mo.
WCM University of Texas .....Austin, Tex.
WCN Clark University .....Worcester, Mass.
WCT Detroit Free Press.....Detroit, Mich.
WDM Church of the Covenant.....Washington, D. C.
WDT Ship Owners Radio Service.....New York, N. Y.
WDV John O. Telser, Jr. .....Omaha, Nebr.
WDW Radio Const. & Elec. Co.....Washington, D. C.
WDZ James L. Bush .....Tuscola, Ill.
WEB Benwood Co.....St. Louis, Mo.
WEH Midland Refining Co.....Tulsa, Okla.
WEV Hurlburt-Still Electrical Co.....Houston, Texas.
WEW St. Louis University .....St. Louis, Mo.
WFY Comrado Co.....Wichita, Kans.
WFI Strawbridge & Clothier .....Philadelphia, Pa.
WFO The Rike Kumler Co.....Dayton, Ohio.
WGF The Register & Tribune.....Des Moines, Iowa.
WGH Montgomery L. & W. Power Co., Montgomery, Ala.
WGI American Radio Research Corporation, Medford Hillside, Mass.
WGL Thomas F. J. Howlett .....Philadelphia, Pa.
WGM Georgia Ry. & P. Co. (Atlanta Const.) Atlanta, Ga.
WGR Federal Tel. & Tel. Co.....Buffalo, N. Y.
WGU The Fair .....Chicago, Ill.
WGV Interstate Electric Co.....New Orleans, La.
WGY General Electric Company....Schenectady, N. Y.
WHA University of Wisconsin .....Madison, Wisc.
WHB Sweeney School Co.....Kansas City, Mo.
WHD West Virginia University ....Morgantown, W. Va.
WHK Warren R. Cox .....Cleveland, Ohio.
WHN Ridgewood Times Printing & Pub. Co., Ridgewood, N. Y.
WHQ Rochester Times Union .....Rochester, N. Y.
WHU William B. Duck Co.....Toledo, Ohio.
WHW Stuart W. Seeley .....East Lansing, Mich.
WHX Iowa Radio Corporation .....Des Moines, Iowa.
WIK K. & L. Electric Co.....McKeesport, Pa.
WIL Continental Electric Supply Co., Washington, D.C.
WIP Gimbel Brothers .....Philadelphia, Pa.
WIZ Cino Radio Mfg. Co.....Cincinnati, Ohio.
WJD Richard H. Howe .....Granville, Ohio.
WJH White & Boyer .....Washington, D. C.
WJK Service Radio Equipment Co.....Toledo, Ohio.
WJT Electric Equipment Co.....Erie, Pa.
WJX DeForest Radio Tel. & Tel. Co. New York, N. Y.
WJZ Westinghouse Electric & Mfg. Co., Newark, N. J.
WKC Joseph M. Zamboshki Co. .....Baltimore, Md.
WKN Bleehman-Crosby Co. .....Memphis, Tenn.
WKY Oklahoma Radio Shop.....Oklahoma City, Okla.
WLB University of Minnesota.....Minneapolis, Minn.
WLK Hamilton Mfg. Co.....Indianapolis, Ind.
WLW Crosley Mfg. Co.....Cincinnati, Ohio.
WMA Arrow Radio Laboratories .....Andreson, Ind.
WMB Auburn Electrical Co.....Auburn, Me.
WMC Columbia Radio Co. .....Yellowstone, Ohio.
WMH Precision Equipment Co.....Cincinnati, Ohio.
WMU Doubleday-Hill Electric Co.....Pittsburgh, Pa.
WNJ Shotsang Radio Mfg. Co.....Albany, N. Y.
WNO Wireless Telephone Co. of Hudson County, N. J., Jersey City, N. J.
WOC Palmer School of Chiropractic, Davenport, Iowa.
WOE Buckeye Radio Service Co.....Akron, Ohio
WOH Hatfield Electric Co.....Indianapolis, Ind.
WOI Iowa State College .....Ames, Iowa.
WOK Arkansas Light & Power Co.....Pine Bluff, Ark.
WOO John Wanamaker .....Philadelphia, Pa.
WOQ Western Radio Co.....Kansas City, Mo.
WOR L. Bamberger & Co.....Newark, N. J.
WOS Missouri State Mktg. Bureau, Jefferson City, Mo.
WOU Metropolitan Utilities District.....Omaha, Nebr.
WOZ Palladium Printing Co.....Richmond, Ind.
WPB Newspaper Printing Co.....Pittsburgh, Pa.
WPA Fort Worth Record .....Fort Worth, Texas
WPE Central Radio Co.....Kansas City, Mo.
WPG Nashawg Poultry Farm.....New Lebanon, Ohio
WPI Electric Supply Co.....Clearfield, Pa.
WPJ St. Joseph's College.....Philadelphia, Pa.
WPL Fergus Electric Co.....Zanesville, Ohio.
WPM Thomas J. Williams .....Washington, D. C.
WPO United Equipment Co.....Memphis, Tenn.
WRK Doron Brothers Electric Co.....Hamilton, Ohio.
WRL Union College .....Schenectady, N. Y.
WRM University of Illinois .....Urbana, Ill.
WRP Federal Institute of Radio Telegraphy, Camden, N. J.
WRR City of Dallas (Police and Fire Signal Department) .....Dallas, Texas.
WRW Tarrytown Radio Research Laboratory, Tarrytown, N. Y.
WSB Atlanta Journal .....Atlanta, Ga.
WSL J. & M. Electric Co.....Utica, N. Y.

WSN Ship Owners Radio Service.....Norfolk, Va.
WSV L. M. Hunter and G. L. Carrington, Little Rock, Ark.
WSX Erie Radio Co.....Erie, Pa.
WSY Alabama Power Co.....Birmingham, Ala.
WSZ Marshall-Gerken Co. .....Toledo, Ohio.
WTG Kansas State Agr. College.....Manhattan, Kans.
WTK Paris Radio Electric Co.....Paris, Texas
WTP George M. McBride.....Bay City, Mich.
WVP Signal Corps..Bedloe's Island, N. Y. Harbor, N.Y.
WWB Daily News Printing Co.....Canton, Ohio.
WWI Ford Motor Co.....Dearborn, Mich.
WWJ The Detroit News .....Detroit, Mich.
WWL Loyola University .....New Orleans, La.
WWT McCarthy Brothers & Ford.....Buffalo, N. Y.
WWZ John Wanamaker .....New York, N. Y.
WAAB Times Picayune .....New Orleans, La.
WAAC Tulane University .....New Orleans, La.
WAAD Ohio Mechanics Institute.....Cincinnati, Ohio.
WAAE St. Louis Chamber of Commerce.....St. Louis, Mo.
WAAF Union Stock Yards & Transit Co.....Chicago, Ill.
WAAG Elliott Electric Co.....Shreveport, La.
WAAH Commonwealth Electric Co.....St. Paul, Minn.
WAAJ Eastern Radio Institute.....Boston, Mass.
WAAK Gimbel Brothers .....Milwaukee, Wisc.
WAAL Minnesota Tribune Co. & Anderson Bemich Co., Minneapolis, Minn.
WAAM I. R. Nelson Co. .....Newark, N. J.
WAAN University of Missouri .....Columbia, Mo.
WAAO Radio Service Co.....Charleston, W. Va.
WAAP Otto W. Taylor .....Wichita, Kans.
WAAQ New England Motor Sales Co....Greenwich, Conn.
WAAR Groves-Thornton Hardware Co, Huntington, W. Va.
WAAS Georgia Radio Co.....Decatur, Ga.
WAAV Athens Radio Co.....Athens, Ohio.
WAAW Omaha Grain Exchange.....Omaha, Nebr.
WAAX Radio Service Corp. .....Crafton, Pa.
WAAY Yahrling-Raynor Piano Co.....Youngstown, Ohio.
WAAZ Hollister-Miller Motor Co.....Emporia, Kans.
WBAA Purdue University .....West Lafayette, Ind.
WBAB Andrew J. Potter.....Syracuse, N. Y.
WBAD Sterling Electric Co. and Journal Printing Co. .....Minneapolis, Minn.
WBAE Bradley Polytechnic Institute.....Peoria, Ill.
WBAF Fred M. Middleton .....Morristown, N. J.
WBAG Diamond State Fibre Co.....Bridgeport, Pa.
WBAH The Dayton Co. .....Minneapolis, Minn.
WBAJ Marshall-Gerken Co.....Toledo, Ohio
WBAM I. B. Remyzen .....New Orleans, La.
WBAN Wireless Phone Corp. .....Paterson, N. J
WBAQ James Millikin University .....Decatur, Ill.
WBAP Wortham-Carter Publishing Co..Fort Worth, Texas.
WBAQ Myron L. Harmon .....South Bend, Ind.
WBAU Republican Publishing Co.....Hamilton, Ohio.
WBAV Erner & Hopkins Co.....Columbus, Ohio.
WBAW Marietta College.....Marietta, Ohio.
WBAX John H. Stenger, Jr. .....Wilkes-Barre, Pa.
WBAY American Tel. & Tel. Co.....New York, N. Y.
WBAZ Times Dispatch Publishing Co.....Richmond, Va.
WCAB Newburgh News Printing & Publishing Co., Newburgh, N. Y.
WCAC John Fink Jewelry Co.....Fort Smith, Ark.
WCAD St. Lawrence University.....Canton, Ohio.
WCAE Kaufman & Baer Co.....Pittsburgh, Pa.
WCAG Daily States Publishing Co.....New Orleans, La.
WCAH Entrekin Electric Co.....Columbus, Ohio.
WCAJ Nebraska Wesleyan University, University Place, Nebr.
WCAK Alfred P. Daniel .....Houston, Texas.
WCAL St. Olaf College .....Northfield, Minn.
WCAM Villanova College .....Villanova, Pa.
WCAN Southeastern Radio Telephone Co., Jacksonville, Fla.
WCAO Sanders & Stayman Co.....Baltimore, Md.
WCAP Central Radio Service.....Decatur, Ill.
WCAQ Tri-State Radio Mfg. & Supply Co., Defiance, Ohio.
WCAR Alamo Radio Electric Co.....San Antonio, Texas.
WCAS William Hood Dunwoody Industrial Institute, Minneapolis, Minn.
WCAT South Dakota State School of Mines, Rapid City, S. Dak.
WCAU Philadelphia Radiophone Co. ....Philadelphia, Pa.
WCAV J. C. Dice Electric Co.....Little Rock, Ark.
WCAW Quincy Herald and Quincy Elec. & Supply, Co., Quincy, Ill.
WCAX University of Vermont .....Burlington, Vt.
WCAY Kesselmen O'Driscoll Co.....Milwaukee, Wisc.
WCAZ Robert E. Compton & Co., Quincy Whig Journal, Quincy, Ill.
WDAA Ward-Belmont School .....Nashville, Tenn.
WDAB M. C. Sumner & Son .....Portsmouth, Ohio.
WDAC Illinois Watch Co.....Springfield, Ill.
WDAD William Louis Harrison .....Lindsborn, Kans.
WDAE Tampa Daily Times .....Tampa, Fla.
WDAF Kansas City Star .....Kansas City, Mo.
WDAG J. Laurence Martin .....Amarillo, Texas.
WDAH Mine & Smelter Supply Co.....El Paso, Texas.
WDAI Hughes Electrical Corp.....Syracuse, N. Y.
WDAJ Atlanta & West Point R. R. Co..College Park, Ga.
WDAK The Courant .....Hartford, Conn.
WDAL Florida Times Union .....Jacksonville, Fla.
WDAM Weston Electric Co.....New York, N. Y.
WDAN Glenwood Radio Corp. .....Shreveport, La.
WDAO Automotive Electrics Co.....Dallas, Texas
WDAP Midwest Radio Central, Inc. ....Chicago, Ill.
WDAQ Hartman-Riker Elec. & Mach. Co., Brownsville, Pa.
WDAR Lit Brothers .....Philadelphia, Pa.
WDAS Samuel W. Waltz .....Worcester, Mass.
WDAT Delta Electric Co.....Worcester, Mass.
WDAU Slocum & Kilburn .....New Bedford, Mass.
WDAV Muskogee Daily Phoenix .....Muskogee, Okla.
WDAW Georgia Railway & Power Co.....Atlanta, Ga.
WDAX First National Bank.....Centerville, Iowa.
WDAY Kenneth M. Hance .....Fargo, N. D.
WEAA Fallain & Lathrop .....Flint, Mich.
WEAB Standard Radio Equipment Co...Fort Dodge, Iowa.
WEAC Haines Electric Service Co....Terre Haute, Ind.
WEAD Northwest Kansas Radio Sup. Co., Atwood, Kans.
WEAE Virginia Polytechnic Institute, Blacksburg, Va.
WEAF Western Electric Co.....New York, N. Y.
WEAG Nichols-Hineline-Bassett .....Edgewood, R. I.

WEAH	Wichita Board of Trade & Landers Radio Co.,	Wichita, Kans.
WEAI	Cornell University	Ithaca, N. Y.
WEAJ	University of South Dakota	Vermillion, S. Dak.
WEAK	Julius B. Abercrombie	St. Joseph, Mo.
WEAM	Borough of North Plainfield, North Plainfield, N.J.	
WEAN	Shepard Company	Providence, R. I.
WEAO	Ohio State University	Columbus, Ohio.
WEAP	Mobile Radio Co., Inc.	Mobile, Ala.
WEAQ	Y. M. C. A.	Berlin, N. H.
WEAR	Baltimore Am. & News Pub. Co.,	Baltimore, Md.
WEAS	Hecht Company	Washington, D. C.
WEAT	John J. Fogarty	Tampa, Fla.
WEAU	Davidson Brothers Co.	Sioux City, Iowa
WEAV	Sheridan Electric Service Co.	Rushville, Nebr.
WEAW	Arrow Radio Laboratories	Anderson, Ind.
WEAX	T. J. M. Daly	Little Rock, Ark.
WEAY	Will Horwitz, Jr.	Houston, Texas.
WEAZ	Donald Redmond	Waterloo, Iowa.
WFAA	A. H. Belo & Co.	Dallas, Texas.
WFAB	Carl F. Woese	Syracuse, N. Y.
WFAC	Superior Radio Co.	Superior, Mich.
WFAD	Watson, Weldon Motor Supply Co.	Salina, Kans.
WFAF	Henry C. Spratley	Poughkeepsie, N. Y.
WFAG	Radio Engineering Laboratory	Waterford, N. Y.
WFAH	Electric Supply Co.	Port Arthur, Texas.
WFAJ	Hi-Grade Wireless Instrument Co.	Asheville, N. C.
WFAK	Domestic Electric Co.	Brentwood, Mo.
WFAL	Houston Chronicle Pub. Co.	Houston, Texas
WFAM	Times Publishing Co.	St. Cloud, Minn.
WFAN	Hutchinson Elec. Service Co.,	Hutchinson, Minn.
WFAP	Brown's Business College	Peoria, Ill.
WFAQ	Missouri Wesleyan College and Cameron Radio Company	Cameron, Mo.
WFAR	Hall & Stubbs	Sanford, Me.
WFAS	United Radio Corporation	Fort Wayne, Ind.
WFAT	Daily Argus-Leader	Sioux Falls, S. D.
WFAU	Edwin C. Lewis, Inc.	Boston, Mass.
WFAV	University of Nebraska	Lincoln, Nebr.
WFAW	Miami Daily Metropolis	Miami, Fla.
WFAX	Arthur L. Ernst	Binghamton, N. Y.
WFAY	Daniels Radio Supply Co.	Independence, Kans.
WFAZ	South Carolina Radio Shop.	Charleston, S. C.
WGAB	QRV Radio Co.	Houston, Texas.
WGAC	Orpheum Radio Stores Co.	Brooklyn, N. Y.
WGAD	Spanish Am. Schl. of Telephy.	Ensenada, P. R.
WGAF	Gonier Radio Service	Tulsa, Okla.
WGAH	New Haven Elec. Co.	New Haven, Conn.
WGAJ	W. H. Gass	Shenandoah, Iowa.
WGAK	Macon Electric Co.	Macon, Ga.
WGAL	Lancaster Elec. Sply. & Const. Co.,	Lancaster, Pa.
WGAM	Orangeburg Radio Equipment Co.,	Orangeburg, S.C.
WGAN	Cecil E. Lloyd	Pensacola, Fla.
WGAQ	W. G. Patterson	Shreveport, La.
WGAR	Southern American	Fort Smith, Ga.
WGAS	Ray-di-eo Organization	Chicago, Ill.
WGAT	American Legion, Dept. of Nebr.	Lincoln, Nebr.
WGAU	Marcus G. Lumb	Wooster, Ohio.
WGAV	B. H. Radio Co.	Savannah, Ga.
WGAW	Ernest C. Albright	Altoona, Pa.
WGAY	North Western Radio Co.	Madison, Wis.
WGAZ	South Bend Tribune	South Bend, Ind.
WHAA	State University of Iowa	Iowa City, Iowa.
WHAB	Clark W. Thompson	Galveston, Texas.
WHAC	Coe Brothers Elec. Co.	Waterloo, Iowa.
WHAD	Marquette University	Milwaukee, Wisc.
WHAE	Automotive Electric Service Co.,	Sioux City, Iowa.
WHAF	Radio Electric Co.	Pittsburgh, Pa.
WHAG	University of Cincinnati	Cincinnati, Ohio
WHAH	J. T. Griffin	Joplin, Mo.
WHAI	Radio Equipment & Mfg. Co.	Davenport, Iowa
WHAJ	Bluefield Daily Telegraph	Bluefield, West Va.
WHAK	Roberts Hardware Co.	Clarksburg, West Va.
WHAL	Phillips, Jeffrey & Derby	Lansing, Mich.
WHAM	School of Music, Rochester Univ.	Rochester, N. Y.
WHAN	Southwestern Radio Co.	Wichita, Kans.
WHAO	F. A. Hill	Savannah, Ga.
WHAP	Dewey L. Otta	Decatur, Ill.
WHAQ	Semmes Motor Co.	Washington, D. C.
WHAR	Paramount Radio & Elec. Co.	Atlantic City, N. J.
WHAS	Courier Journal & Louisville Times,	Louisville, Ky.
WHAT	Yale Democrat & Yale Tel. Co.	Yale, Okla.
WHAU	Corinth Radio Supply Co.	Corinth, Miss.
WHAV	Wilmington Elec. & Sply. Co.,	Wilmington, Del.
WHAW	Pierre Electric Co.	Tampa, Fla.
WHAX	Huntington Press	Huntington, Ind.
WHAZ	Rensselaer Polytechnic Institute	Troy, N. Y.
WIAA	Waupaca Civic & Commerce Ass'n,	Waupaca, Wisc.
WIAB	Josyln Automobile Co.	Rockford, Ill.
WIAD	Ocean City Yacht Club	Ocean City, N. J.
WIAE	Mrs. Robert E. Zimmerman	Vernon, Iowa.
WIAF	Gustav A. DeCortin	New Orleans, La.
WIAG	Matthews Electric Supply Co.	Birmingham, Ala.
WIAH	Continental Radio Mfg. Co.	Nevada, Iowa.
WIAI	Beers Stores Co.	Springfield, Mo.
WIAJ	Fox River Valley Radio Supply Co.	Neenah, Wisc.
WIAK	The Stockman Journal	Omaha, Nebr.
WIAL	Standard Radio Service Co.	Norwood, Ohio.
WIAN	Chronicle & News Pub. Co.	Allentown, Pa.
WIAP	J. A. Rudy & Sons	Paducah, Ky.
WIAQ	Chronicle Publishing Co.	Marion, Ind.
WIAS	Burlington Hawkeye-Home Elec. Co.	Burlington, Ia.
WIAT	Leon T. Noel	Tarkio, Mo.
WIAU	American Sec. & Sav. Bank	Le Mars, Iowa.
WIAV	New York Radio Laboratories	Binghamton, N. Y.
WIAW	Saginaw Radio & Elec. Co.	Saginaw, Mich.
WIAX	Capital Radio Co.	Lincoln, Nebr.
WIAY	Woodward & Lothrop	Washington, D. C.
WIAZ	Electric Supply Sales Co.	Miami, Fla.
WJAB	American Radio Co.	Lincoln, Nebr.
WJAC	Rodell Co.	Joplin, Mo.
WJAD	Jackson's Radio Eng. Lab.	Waco, Tex.
WJAE	Texas Radio Syndicate	San Antonio, Tex.
WJAG	Huse Publishing Co.	Norfolk, Nebr.
WJAI	Y. M. C. A.	Dayton, Ohio.
WJAK	White Radio Laboratory	Steubdale, Ohio
WJAL	Victor Radio Corporation	Portland, Me.
WJAM	Central Park Amusement Co.	Rockford, Ill.
WJAN	Peoria Star & Peoria Radio Sales Co.,	Peoria, Ill.
WJAP	Kelly-Duluth Co.	Duluth, Minn.
WJAR	The Outlet Co.	Providence, R. I.
WJAX	D. M. Perham	Cedar Rapids, Iowa
WKAA	H. F. Paar & Republican Times.	Cedar Rapids, Ia.
WKAC	Star Publishing Co.	Lincoln, Nebr.
WKAD	Charles Loof	East Providence, R. I.
WKAF	W. S. Radio Supply Co. & Wm. Schack	Wichita Falls, Texas

Vicissitudes of a Radio Impresario

Handling Broadcasting Artists Is Far From an Easy Job—Tact, Diplomacy and Musicianship Needed

By Harvey B. Gaul

IF your nerves can stand it, being a radio impresario is one of the greatest little indoor sports of the day.

First, wireless was invented, and then improved into the radiophone, and no sooner were the glad tidings picked out of the air than every son and daughter of old Adam conceived the idea that a waiting world was clamoring for the sound of his or her voice. Therefore every person who could twang, pick or scrape a string, every person who could touch or pound a keyboard, and any one at all who was not tongue-tied became possessed of the idea that he must be heard over radio.

Little Wilfred, who recited "Casabianca" so dramatically last Friday morning during the assembly exercises writes, "My teacher says I have a big voice and I never skip a word. I would like to recite over the wireless for you."

Youthful Elmer, who is just learning to use the violin bow and is now studying the first position, but who, nevertheless, promises to be the future Fritz Kreisler, indites us a note to the effect that he "would like to play the 'Jolly Farmer's Return' over the radio."

Mme. Dufranne-Ducault who (many years ago) once sang an operatic aria, phones in that she "would consent to sing over the wireless" provided we would "give her an exclusive program." She will sing such art works as "Just a Song at Twilight," "At Dawning," and other seldom-heard canzoni.

Happy Hazel, the child wonder of

Harvey B. Gaul

Squirrel Hill, who could play "Chop Sticks" when she was three, and who has had all of one year's tuition at teasing the clavier, has her fond mother write us: "Our little girl is an infant prodigy. She plays the 'Dance of the Toad Stools' in a heavenly manner. We have just installed a radio and would like to hear her."

One woman is the mother of a child preacher, a lad who has stirred thousands to walk in the straight and narrowing path. This lad must be given a chance to convert the nation.

Politicians who have a "message" for their constituents want to make "stump speeches" in our studio.

Then, there is Maestro Rudolfo Kzbyck, the Hungarian who plays the Hawaiian guitar better than anyone else in his mining town. He wants to make himself heard.

Emil Dopper, who has played a mouth-organ ever since he was knee-high to a milk bottle, likewise is crazy to prove his prowess.

And so it goes. Everyone who has his little gift is not anxious to hide his talent under a basket, but is most generous in wanting to share it with the world at large—by radio.

Even the professional has his and her peculiarities—often the trouble has but begun when a famous artist is placed on a program, whether at her own request or at our suggestion.

Let me catalogue a few of the diversions of this phase of radio program making. Mme. Raznor-Hazlitt, the celebrated cancatrice, is going to sing. Her secretary (who is her husband) phones in that the diva's accompanist is sick and cannot accompany madame. You are regretful, but in order to save

(*Continued on page* 70)

Wireless in the South Seas

By Bert E. Sandham

THE South Seas, like other remote possessions, are not without their radio stations, and the scenic setting and primitive environment, characteristic of the Southern archipelago, make one's sojourn in the isles both pleasant and intensely interesting.

The climatic conditions for radio communication, I found, were excellent during my extended stay in the Samoan Islands. A radio station at a high point on one of these islands, with the blue ocean to be seen in every direction, and with an antenna of reasonable length and height, can tune in both arc and spark from almost every corner of the earth. Static, the common enemy, is apparent but of sharp and short duration.

On any evening that one sits in, he can hear the high and low frequency sparks of the stations in Australasia, the numerous Hawaiian sparks, and stations of 5-kw. and less along the Pacific coast. Coastwise vessels plying between San Francisco and local ports can often be heard asking for weather reports. On switching over to the arc receiver the large stations of Europe can be copied. Our nightly schedule with Honolulu, across a distance of 2,250 miles, was carried out the year around using from 2- to 5-kw. low frequency spark. The daily "bill of fare" called for a mid-afternoon clearing with the Fiji Islands, some 750 miles distant, which we carried out with little difficulty. Our greatest distance covered and undoubtedly a remarkable one, was the exchanging of signals with the station at St. Paul, Alaska, a distance of 4,500 miles, using our ever faithful 5-kw.

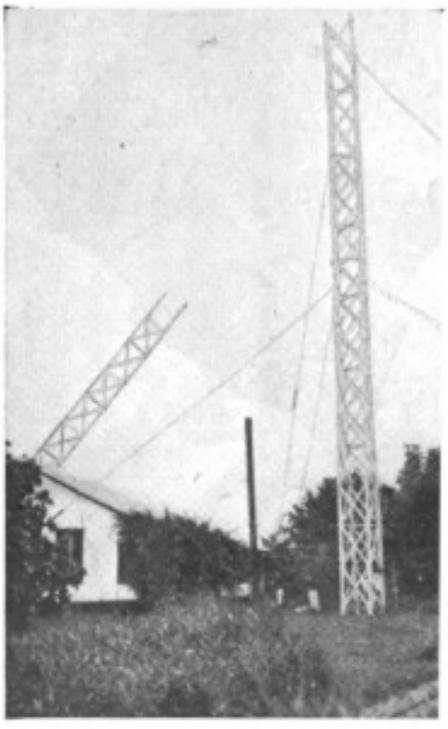
This section of the globe, notwithstanding its balmy tropical sunshine and calm seas, also has its adversities. Its numerous earthquakes not only give one a thrill, but make a mess of one's well kept battery-room. The acid becomes stirred up by the vibrations and occasionally thrown over the racks and floor. Another unwelcome visitant is the hurricane. This is less frequent, but the damage in its wake is more thorough and extensive. A five-day blow, together with its torrential downpour, is exceedingly unpleasant to say the least. During a recent blow the upper half of the radio mast blew down and came hurtling through the roof of our dwelling, spreading the antenna over the cocoanut palms for many yards around.

The natives accept the wireless as another wonder of the ingenious white man. On passing the station to and from their plantations, they will stop and view its paraphernalia and intricacies, and, with a shake of their heads and a shrug of their broad shoulders, they pick up their loads and proceed on their way.

Where the tower went through the roof

Surf riding absorbs many hours when the operator is not on watch

Hiking is one of the pastimes of the radio operator in the South Seas



The top of the tower dropped through the roof during a hard blow

A six-month stay on a smaller island of the Samoan group with a portable set, brought out many of the peculiarities of the natives. A doctor and myself were the only two white people on the island and were subsequently brought in closer touch with the natives. We rigged a single-wire antenna between cocoanut palms and installed the portable set together with the hand generator in our house. As I had a daily schedule with the main island, 60 miles distant, I called upon the native governor of the island to furnish me with two natives each day at 4 P. M. to turn the generator. This he agreed to do to the best of his ability.

The natives were greatly interested in the wireless, and for several weeks, scores of natives would stand about our house hoping for a chance to turn the handles. It was not long, however, before the natives discovered that it took considerable energy to turn the handles. This, together with their fast vanishing interest, soon resulted in a

(*Continued on page 76*)

America's Busiest Radio Station

Signals from England, France, Germany and Norway Received Simultaneously at Riverhead, L. I., on a Single Special Antenna Nine Miles Long—Static Practically Eliminated

ALTHOUGH Radio Central, the transmitting station near Port Jefferson, L. I., is the most powerful wireless station in the world, Riverhead, L. I., the receiving station, is the most versatile and also the busiest.

Radio Central can talk to Wales, France, Germany or Norway with ease, but Riverhead can listen simultaneously to Wales, France, Germany, Norway, and other powerful stations that may later be established. At the same time it can close its ears to the powerful impulses sent out only a few miles away by the giant Radio Central, New Brunswick, Marion and Tuckerton stations and to 90 per cent. of prevailing atmospheric disturbances.

It is more dramatic, more impressive, to hurl radio messages across three or four thousand miles of land or water than to pick them up at the other end. That is why almost every person interested in radio knows a good deal about Radio Central and its 200-kilowatt alternators and very little about Riverhead, which picks up and revives once powerful electromagnetic waves after their long leap across the Atlantic.

From an engineering standpoint, however, what has been accomplished at Riverhead in the receiving line is as remarkable as what has been done at Radio Central. Riverhead does its work quietly and without ostentation: Radio Central's tall towers and terrific currents advertise it to the world.

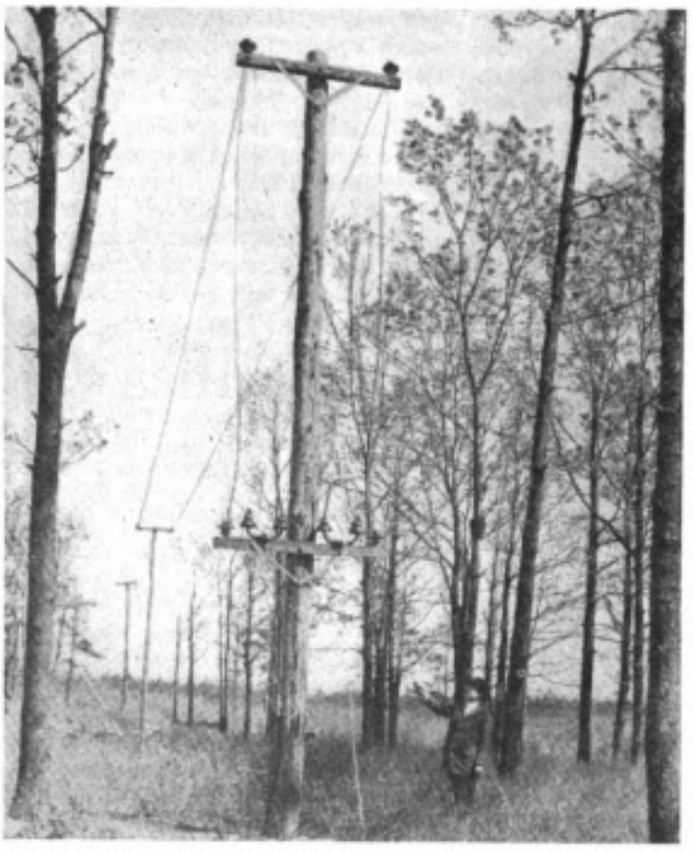
Why Riverhead Is Versatile

A few years ago in this country, and at the present time in all other countries, every sending station had its complement in a receiving station, located about fifty miles from it, and connected with it by telegraph lines. The one station talked; the other listened. Now Radio Central, New Brunswick, Marion and Tuckerton all talk; and Riverhead competently handles simultaneously incoming traffic of all the European centers with which they are connected. The explanation of Riverhead's efficiency is the long-wave directional antenna.

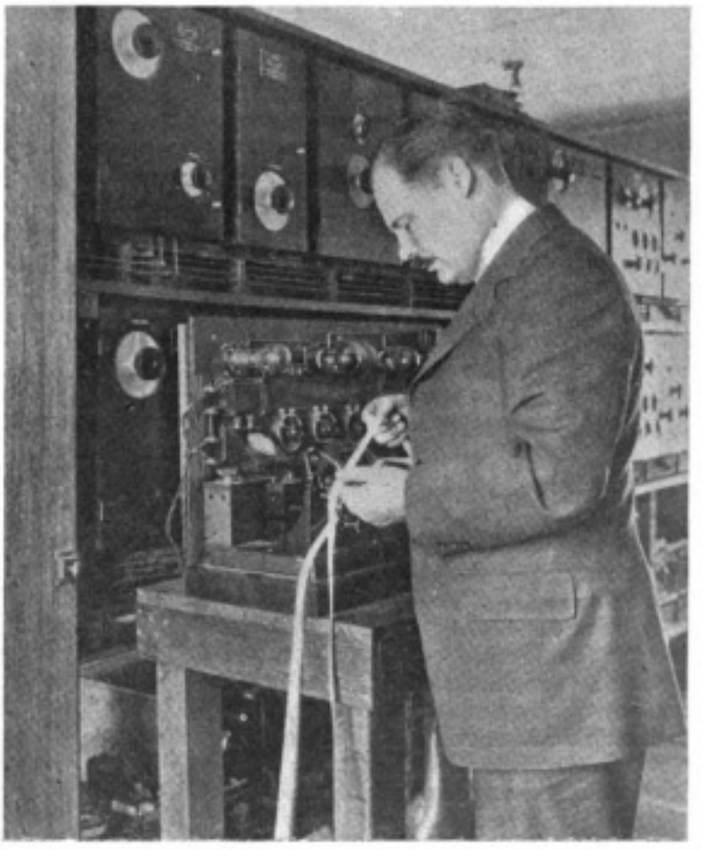
The station is not a network of antenna such as the mind would picture. It has simply one antenna consisting of two copper wires nine miles long, strung on ordinary telegraph poles. One station building contains the receiving apparatus which separates the conglomeration of signals received from Norway, England, France, Italy and Germany, and transfers them directly and automatically over trunk line wires into the Broad Street traffic office in New York City, where all incoming and outgoing messages are handled. The system of concentration, achieved after much experimentation, makes it possible to add new receiving circuits for communication with any new station in Europe simply by installing another set of receiving apparatus.

A description of certain phases of the Riverhead station, especially with regard to the manner in which it eliminates static, and of what may develop in the future, has been given by Ernest F. W. Alexanderson, chief engineer of the Radio Corporation of America and consulting engineer of the General Electric Company. He said:

"The antenna is of a new type which gives uni-directional reception so oriented as to receive signals from the over-ocean transmitter and signals from all other directions, including



Part of receiving antenna at Riverhead station of Radio Corporation of America, E. W. F. Alexanderson beside pole



Dr. Goldsmith's high speed ink recorder in operation at Riverhead with E. W. F. Alexanderson examining tape

the powerful home transmitter nearby.

"The antenna consists of two copper wires strung on ordinary poles, like a telephone line, and extending over a distance of nine miles. From this antenna a number of separate receiving circuits of different wavelengths are fed without the slightest mutual interference or weakening of the signals.

"Important as it is, from the point of view of centralization, to be able to receive an indefinite number of signals from the same antenna, the greatest importance in the use of this new receiving system is its remarkable properties of suppressing atmospheric disturbances, or the so-called "static" which hitherto has been the bane of radio communication. The attainment of these results is not an accident, it is the reward of development work covering a number of years.

THE WAVE ANTENNA

"The 'wave antenna' as now used in Riverhead is the practical answer to the receiving problem of today. It is a milestone in the development of the principle of directive reception. This is a principle which has almost unlimited possibilities.

"The practical form of receiving system which was described in one of my papers in 1919 was used by the United States Navy during the war, and became known as the 'barrage' receiver. It consisted of two antennas one-quarter wave-length long, balanced against each other. The wave antenna of today does not require any balancing. The receiver of the future will probably utilize an antenna several wave lengths long or several wave antennas balanced against each other.

The controlling idea in this development is a mental picture which we now have of the nature of the disturbance which we wish to suppress. We call it 'static' because it was assumed, in the past, that it was of the nature of static electricity. The hypothesis which is the basis of our modern work is, however, different.

"We imagine the ether as a disturbed ocean, with the waves of every length rolling in from all directions. These waves are of the same nature as the signal waves. Those disturbing waves, which are of different wave lengths from our signals, can be shut out by the same means as we use for shutting out other signals; that is, by tuning.

DISTURBING WAVES

"But the disturbing waves which have the same wave lengths as our signal and in all respects of the same nature pass through our tuning system like the signal. We must therefore find some other basis for discrimination than the wave length.

"If we can construct a receiver which is sensitive only to waves coming from one direction, then we can shut out waves from all other directions, even if they have the same wavelength. This idea started us on the work of directive reception. Theoretically there is no limit to the improvement attainable in this direction. We might build a receiving antenna focused on transmitting stations in Europe, but the antenna might be a system of telephone wiring covering the State of New York.

"It is an attractive subject for theoretical analysis, and it can be shown mathematically how extensive antenna systems can be made with unlimited directivity. The well-known 'loop vertical directive antenna' has a deaf ear in one direction, but receives signals and disturbances from three directions. The wave antenna turns its deaf ear to three directions and receives only from the fourth direction. For those who wish to understand the characteristics of our modern receiving system, in order to make use of it, a popular explanation may be of some guidance.

"Imagine the antenna to be a long, narrow lake, and the wind is the signal, and a cork, the detector, floating on the waves that beat against the shore. If the observer stands at one end of the lake he will observe waves beating against his shore only when the wind blows lengthwise of the lake, from the opposite shore. When on the other hand, the wind blows from his side of the lake the beating waves appear in the opposite end, while his shore is calm.

"This at least would be the case if the lake had smooth sand beaches on which the waves would spend their force. But, if it has steep, rocky shores, the waves will be reflected back and forth so that the whole lake will be rough. The waves, which indicate the signal wind would thus appear at both ends of the lake, regardless of the direction of the wind. This must be avoided.

"The wave antenna is therefore made with ends corresponding to the sandy beach. It terminates in a resistance which is carefully adjusted so that all wave energy is absorbed and none is lost.

"The practical advantages of the use of the wave antenna are: The elimination of something like 90 per cent. of the atmospheric disturbances and the possibility of concentrating all reception in one station. The developments which I have described show now that a practical solution has been found for the atmospheric disturbances in transoceanic communication. The same solution has been applied to ship to shore communication, with the result that the ocean liners are in touch with our Cape Cod station as soon as they leave the English Channel."

The station from which the signals are received at Riverhead are located at Bordeaux, France, transmitting on 23,000 meters; Carnarvon, Wales, 14,100 meters; Stavanger, Norway, 12,000 meters; Nauen and Eilveese, Germany, 12,600 and 14,700 meters.

French High Power Transmitting Tubes

(Translated from "Radioélectricité," Paris, June, 1922)

ALTHOUGH the great majority of tubes used in the various countries during the past few years cannot put more than 250 to 1,000 watts each in the antenna without immeasurably shortening their life, laboratory results indicate that in the near future tubes of high power will be available for commercial radio use. An important step in that direction has just been taken through the utilization of quartz glass, with which the engineers have achieved certain results, positive details of which have been withheld from the public up to now.

It was only during the last month that the Société Francaise Radioélectrique invited us, as well as representatives of the various interested French Ministries, to visit its factory at Levallois-Perret and inspect the new large transmitting tubes as they were placed in service.

We hope that the importance and newness of the subject will render the following description interesting to our readers.

The tubes in question are of two types: one places 1,200 watts in the antenna, and the other 5,000 watts. The first is made of glass, the second of quartz. It is interesting to compare them.

1,200-WATT TUBE

Figure 1 takes the form of a sphere of glass 20 centimeters in diameter (7.87 inches) with two tubular axial projections through which the connections pass.

The filament has the form of a V with the closed end supported by a coil spring; the two legs are mounted on two wires having a high melting point, to which are attached the external connections for the filament.

The grid, of woven wire, is connected with the outside through a highly-insulated lead that leaves the tube through the same end as the filament heating leads.

The plate is a cylinder concentric with the grid, and is held in place by a metallic mounting connected with a lead that leaves the tube at the side opposite to the filament and grid connections.

Current for heating the filament is supplied at the rate of 9 amperes at 12 volts. Potential on the plate is from 10,000 to 12,000 volts, at which the plate can dissipate 200 watts. The power that the tube can transmit to the antenna circuit is 1,200 watts, at which rate the plate remains without change in color. Raising the temperature of the plate to a dull red enables 1,500 watts to be put in the antenna.

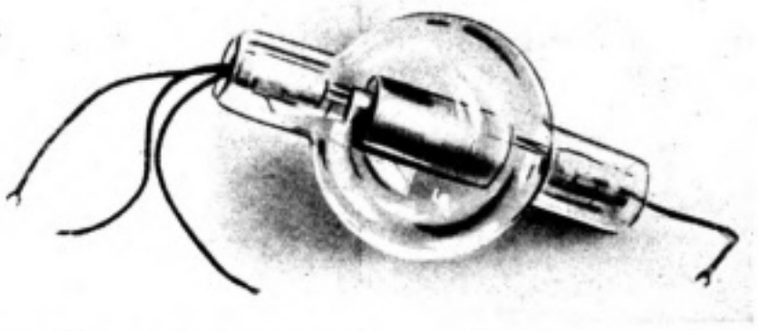


Fig. 1. French transmitter tube of glass, capable of placing 1,200 watts in the antenna circuit

Direct current is supplied to this tube from rectifying tubes absolutely identical in the details of construction, form and dimensions with those of the oscillator. Filament current also is the same: 9 amperes at 12 volts. A rectifying unit of two valves has an output of .5 ampere at 16,000 volts, or 4 kilowatts of useful power per lamp, without any visible heating effect on the plates.

However, in order to avoid all possibility of generating an obnoxious note, these valves are seldom operated at more than 1,500 to 2,000 watts.

These lamps are perfectly suited for connecting in parallel, and the different results obtained in tests are shown in the following table:

No. of Tubes	Plate			Filament			Total power absorbed in watts	Antenna 1 3 ohm		Efficiency %
	volts	amp.	watts	vts.	amp.	wts.		amp.	watts	
1	10,600	.16	1,600	21	9	189	1,790	32	1,330	74
2	11,000	.31	3,400	21	18	380	3,780	47	2,850	73
3	11,000	.47	5,100	21	27	565	5,665	57	4,200	74

5,000 WATT TUBE

During the past years the quartz industry has made important progress; one now works in quartz as easily, though not as economically, as in glass. As with glass, quartz is fused, welded, cut with a blowpipe, etc., provided a high enough temperature is used. The work becomes possible at temperatures of about 1,800 degrees Centigrade.

Quartz offers a particularly interesting advantage: its coefficient of expansion is so slight as to permit variations of temperature as great as they are sudden without risk of cracking the bulb. Particularly, the quartz bulbs can be cooled by ventilation without any fear of the fractures so frequent with glass tubes.

It is therefore natural that this material was thought of for the construction of high power tubes; its high melting point permitted heating of the plate to redness without danger, while its possibilities of cooling make possible considerable reductions in the size of the tube.

The 5,000 watt lamps that we have seen functioning consist of a quartz cylinder having a diameter of 90 millimeters (3.53 inches) with hemi-spherical ends from which the connections are led through long thin tubes. (Figure 2.)

The plate is rolled concentrically around the grid, which consists of a spiral wire encircling the filament. Both the plate and the grid are of molybdenum that has been given a special treatment. The filament is a V supported by a coil spring held in a small quartz tube in the center of the upper end of the lamp; the object of this construction is to protect the spring from the high temperatures generated between the plate and filament, in order to render the tension of the spring upon the filament constant at all temperatures.

The plate is connected with the exterior by a single connection, as is the grid, while the filament is provided with four connections, each leg of the V having two connectors, each of which passes through a lead-in tube. These connectors are in parallel, and the object of this arrangement is to reduce their diameter and facilitate the making of tight joints with the quartz.

While the small coefficient of expansion of quartz is an advantage from the point of view of the robustness of the tube, it is a serious obstacle to the hermetic closing of the tubes through which the connections pass. One cannot think of employing the same methods of sealing as are entirely successful with glass. A temperature of 1,800 degrees Centigrade is necessary to soften quartz, while at that temperature the connecting wires that are used have a sensibly greater diameter than they have at atmospheric temperatures, so that when the joint cools an annular space is left between the wire and the quartz, absolutely preventing a perfect seal. This annular space has to be closed by a special process.

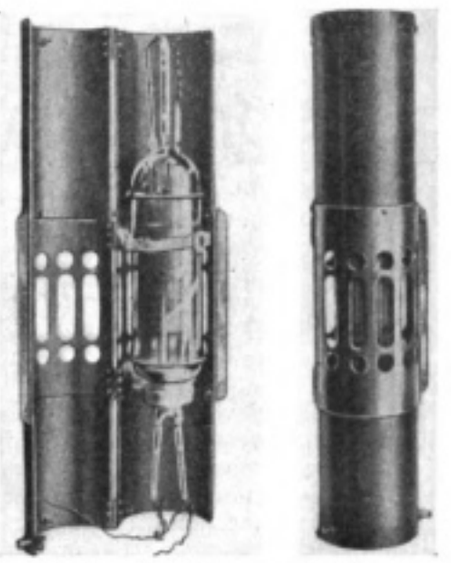


Fig. 2. French quartz power tube, 5 kw., in its special protective and ventilating casing

The tube is enclosed in a cylindrical case of composition material, open top and bottom, and furnished in the middle with a metallic screen containing a number of large perforations. The case is split vertically in two parts in order to facilitate mounting the tube within it by means of asbestos straps. Each end of the case is provided with the necessary binding posts, to which the lamp connections are led, for ease of connection with the outside circuits. At the same time that this case provides an efficacious protection, it serves as a conductor for a current of fresh air, supplied by a small 50 or 100-watt ventilator.

The filaments are heated by a current of 15 amperes at 16 volts, and a tension of 15,000 to 20,000 volts is placed on the plate, which can dissipate 2,500 watts when the tube is placing 5,000 watts in the antenna circuit. Here are the figures showing its operation:

Heating, 15 amperes at 16 volts, or 240 watts.

Plate, .45 ampere at 17,000 volts, or 7,650 watts.

One obtains 32 amperes in an antenna having 5 ohms resistance, or 5,100 watts.

The efficiency therefore is

$$\frac{5{,}100}{7{,}650 + 240} = .65$$

Under these conditions, the plate is at red heat, and the tube is consistently operated at that temperature, quartz having been utilized for the tube and molybdenum for the plate and grid precisely in order to permit operation under such a condition.

The tubes are provided with current from valves that are the same in form and construction as are the oscillators. Their filaments are given 20 amperes at 25 volts, and two of them supply a useful current of 1 ampere at 25,000 volts.

From the details given above, one can realize that it is a simple matter to construct a station putting 14 kw. in the antenna by using two valves and three oscillators.

These new lamps appear to give long service, although as yet it is impossible to secure accurate average figures due to the fact that there have not been employed enough tubes to enable an average to be drawn. However, it seems that the 1,200-watt glass lamps have a life of about 1,500 hours, while the life of the 5,000-watt quartz lamp is 2,000 hours. These figures, calculated in advance, were borne out by the first lamps to be tested.

It should be stated also that the service of these tubes can be extended by using larger filaments; however, the economy achieved in a slower rate of amortization of the first cost of the tube is made at the expense of its operating efficiency. Between the two necessities of long life and efficient operation a compromise has to be made, depending upon the relative importance attached to each.

A final consideration of the new tubes is that the use of quartz permits the replacement of burnt-out filaments. Such repairs can be made four or five times on the same tube, and at an expense of only about a fifth of the original cost. This is an important consideration which materially lowers the ultimate expense of these tubes, and will facilitate their commercial use.

The 20 K. W. Transmitting Radiotron

The Most Powerful Tube Ever Made for Use in Radio Communication. Banks of These Tubes Will Probably Supplant Alternators in Trans-Oceanic Work

By Dr. Irving Langmuir
Research Laboratory, General Electric Co.

THE three-electrode vacuum tube is now universally used not only for the receiving of radio messages, but is coming into more widespread use in connection with the transmission of such messages. The original vacuum tube did not have a particularly high vacuum, and, because of the ionization of the residual gas, could not be operated at more than 30 or 40 volts, or at more than a few milliamperes of current. This was because in the presence of a little gas such big currents were obtained as to lead to the formation of an arc, with resulting destruction of the lamp.

As the result of studies undertaken to discover the reason for this phenomenon it gradually became clear how it would be possible to construct vacuum tubes which would operate at high voltages and at high currents. One of the early applications of this new knowledge was made by Dr. W. D. Coolidge, who utilized this in the development of the Coolidge X-ray tube, an X-ray tube which has gradually displaced practically all of the older, so-called gas tubes.

Another application was found in the kenotron and pliotron. The kenotron is a vacuum tube rectifier, having two electrodes like the Fleming valve but capable of operating at pressures of several thousand volts and with currents comparable with an ampere or more. Tubes of this kind have found application for smoke precipitation, for various electrical testing devices, and in connection with the regulation of the

Dr. Langmuir with 20 kw. Radiotron and a "peanut" tube

electric generators used for the radio transmitting outfits on aeroplanes during the war. The development of the kenotron into a thoroughly practical device for these purposes is largely the result of the work of Dr. Saul Dushman.

The pliotron is a device which contains three electrodes, namely, a filament, grid, and plate, and it is capable of being operated at high voltages and currents, so that considerable amounts of power may be controlled. Tubes of this sort are now finding widespread application for transmitting radio messages, particularly for radio telephony. The ordinary radio telephone outfit, used for broadcasting, generates from ½ to 5 kilowatts of high frequency power, which is used to feed the antenna. The design and construction of tubes of this type has been carried out principally by W. C. White.

It has long been realized that, following out the principles made use of in the smaller tubes, it would ultimately be possible to construct tubes of large power. There have been many difficulties to overcome, however. After years of work by W. C. White and H. J. Nolte, they have succeeded in designing and perfecting pliotrons which are capable of generating about 20 kw. of high frequency current. In principle, these tubes resemble the smaller tubes which are now usually called radiotrons, in that they also have three electrodes. These large tubes are used in circuits much like those used by amateurs when they cause the tube to generate oscillations. In the construction, however, there are many differences.

The 20 kw. tube has a very large, rugged filament, many times the diameter and length of the ordinary radiotron. The grid is in cylindrical form and surrounds the filament, and the plate is a metallic cylinder about 1½ inches in diameter and 8 inches long, which is sealed directly to a glass tube through which pass the leads carrying current to the filament and grid.

Thus the plate, instead of being inside of the tube, as in ordinary radiotrons, forms a part of the outside wall of the tube. In order to dissipate the relatively large amount of energy liberated at the plate, the plate is water cooled, which is rendered particularly easy by the fact that part of its surface forms a part of the wall of the tube.

(*Continued on page 78*)

Broadcast Receiver Installed on Sightseeing Bus

WHAT is the first practical application of a radio telephone receiving set to a moving motor bus was seen on the streets of New York City and thereabouts early in August. Although many reports have been heard from time to time that receiving sets have been installed on automobiles of various kinds, running down of the actual facts has always revealed that interference from the ignition system was so great that the receiver could not be operated satisfactorily while the gasoline engine was running.

Now, however, a method of installation worked out by W. H. Howard, an engineer of the Radio Corporation of America, permits satisfactory operation while the bus is in operation. The system, while apparently simple enough, is in effect a contribution to the art of utilizing radio, and one that is expected to open the way for a new field of commercial exploitation.

The opportunity for trying out the idea of bus installations came when a New York City radio dealer discussed the possibilities with the Greeley Sightseeing Co., operating a line of motor busses between the metropolis and Coney Island. The bus company wanted radio sets for its machines, the dealer was dubious, and the Radio Corporation of America was called on for advice.

The installation of the present equipment was soon made. A couple of days later crowds blocked the street about the machine as it stood in Times Square, while pedestrians and motorists along the route to Coney Island stared after the big white bus as it sped past filled with radio music as well as interested passengers.

The installation consists essentially of a loop antenna with radio and audio amplification and a Western Electric loud speaker. The loop has four turns of bell wire and is 15 x 6 feet in size. It is wired to the inside of the top of the bus, above the heads of the passengers, and being horizontal, takes up no room, nor does it have directional effects. A vertical loop would have brought in the signals louder, but would have required considerable manipulation each time the machine changed its direction, and therefore was not considered. In the first tests it was found, as a matter of fact, that the superior signal power of a fully directional loop was not necessary, as the horizontal turns brought in the music sufficiently loud for it to be heard three blocks away when operating the tubes at the maximum.

No interference was experienced from the ignition system of the engine, both ends of the loop being brought into the tube circuit. This avoided use of the frame of the car as a ground, which has been the real source of most of the ignition interference experienced by other experimenters. Also, the loop is far enough away from the engine to prevent inductive effects. The only time automobile ignition sparks are heard is when a Ford races its engine close at the side of the loop.

Tuning is done by means of an R.C.A. No. 1820 variable condenser shunted across the loop. Amplification is accomplished by the usual intervalve transformers and No. 201 Radiotron tubes, using three steps of radio frequency and two of audio for the most pleasing results in volume and quality, feeding the usual Western Electric power amplifier and loud speaker.

During the trips to Coney Island and return comparatively little shielding is noticed from the buildings, bridges and elevated structures. Signals fade considerably when the loop is directly under the iron framework of the elevated roads, which of course is only for a second or two, and certain steel buildings in New York also throw perceptible "radio shadows," but in no cases is the fading of any considerable duration. The longest shielding effect noticed is when the bus crosses the Williamsburg bridge, a giant suspension structure. Between the two bridge piers, in other words when between the network of suspension cables over the river, considerable shielding is noticed, but peculiarly enough, when on the land sides of the piers it disappears, though the surrounding cables are as numerous there as they are over the water.

This new installation, being experimental, is at present in temporary form, being mounted in several wooden boxes, one on top of the other, at the left of the driver. There is now being developed a special set including spring suspensions for the tubes, in order to obviate the noise occasioned when running on a rough roadbed. Little effect of the jarring is observed on the life of the tubes, only one filament out of seven having broken down during the course of a week's severe operation.

Panama Amateurs Petition Government for Permission to Transmit

THE Radio Club of Panama has sent petitions to the naval authorities of the Canal Zone, and also to the government of the Republic of Panama for permission to transmit on 200 meters. The naval authorities who control radio in the Canal Zone have so far refused permission, and the matter was put before the Government of Panama, which, however, has advised the Radio Club that it had no jurisdiction in the matter as it had previously given full control of radio throughout the Republic of Panama to the naval authorities of the United States.

The following letter, which covers the whole situation, was recently sent to the Government of Panama, and was replied to as outlined in the preceding paragraph.

"The Chairman and specially appointed Committee of the Panama Radio Club, in the interest of the public at large and the Panama Radio Club in particular, hereby submit for consideration to the Government of the Republic of Panama a request for the enactment of laws which will permit the establishment and operation of amateur and experimental radio communication in the Republic.

"The Panama Radio Club, composed of a large and constantly increasing number of representative business and professional men, was formed on June 20, 1922, for the purpose of 'developing amateur and experimental radio communication in the Republic of Panama and establishing radio broadcasting station or stations for educational, recreational and experimental use.'

"The restrictions now imposed prohibit and deny the use of the air for radio communication to any citizen of or resident in the Republic of Panama. It is the sense of the Panama Radio Club that radio communication is a public utility, and as such should be controlled by the Government in the public interest; it is held, therefore, that the public good can best be served by the establishment of controlling rules and regulations by the Government of the Republic of Panama, which would be 'an act to regulate radio communication in the Republic of Panama.'

"It is not the intent or purpose of the Panama Radio Club to advise or propose to the Government the rules and regulations to be imposed, and only in the spirit of complete co-operation do we respectfully invite the Government's attention to the laws enacted in the United States for the regulation of radio communication, and further note that that country leads in radio communication and development, and therefore offers a progressive basis for such laws as may be established in this Republic.

"The art of radio communication has advanced rapidly, and has reached the stage never dreamed of eight years ago. One of the most fundamental operations of human life is the intercommunication between peo-

ple; and until the art of radio broadcasting arrived, man has never been able to reach by his spoken word thousands and thousands of people in many distant places at the same time. We respectfully call your attention to other countries, especially the United States of America, where a liberal view is taken of amateur radio communication (under Government supervision), and more especially to the broadcasting of daily concerts, market reports, lectures, sermons, and other entertainment, thereby making it possible for the many millions of listeners of radio sets already installed in residences of the United States to enjoy its benefits.

"Even conservative England has recently acceded to public demand, and has divided the Island Empire into eight broadcasting areas for the dissemination of news, entertainment and educational programs. In the case of the Republic of Panama, 450 miles long and 120 miles broad at its widest point, radio broadcasting would be a blessing to the outlying and isolated districts of the country, where the usual forms of communication are difficult."

In another communication the club further defines its desires and the general situation, as follows:

"The Panama Radio Club was formed with a view of establishing broadcasting stations for educational and recreational purposes, when the Government of the Panama Canal intervened, prohibiting the use of broadcasting stations on the ground that they would interfere with the naval radio stations within the Canal Zone.

"In order to avoid misunderstandings, we must state that the Government of the Republic of Panama in 1914 signed an agreement with the Government of the Canal Zone giving the latter full control of all radio communication within the Republic of Panama and the Canal Zone, and that the Government of the United States thereon placed the United States Navy in control of radio.

"As the navy authorities seem bent upon preventing radio broadcasting getting a firm footing on the Isthmus, we are now trying to enlist the help of all firms and corporations in the United States of America who are interested in the art of radio broadcasting, so that the residents of Panama may not be deprived of the benefits of this wonderful invention, but rather be allowed to help in its development.

"We do not demand the impossible. We are within five miles of a naval station using a 600-meter wave, and we are willing to abide by the rules and regulations enacted recently in the United States of America limiting amateur broadcasting sets to ½ K. W. input and using a 200-meter wave, which surely will not interfere with naval communications."

It is believed that the government will consider the general situation of the amateur.

English Amateurs Preparing for Westward Trans-Atlantic Tests

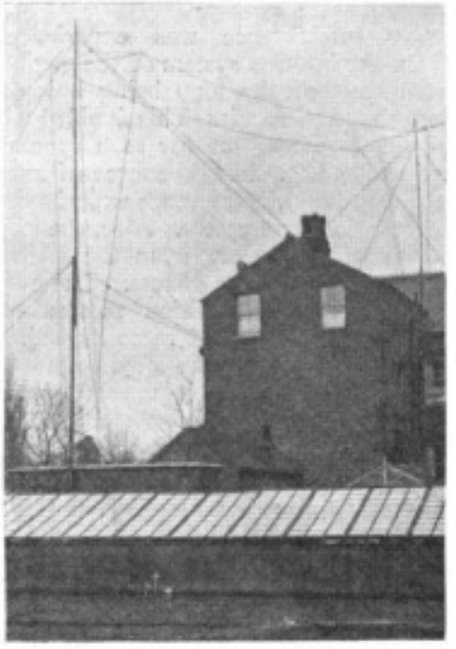
THE efforts of English amateur radio operators toward a British Radio Relay League are progressing nicely, according to recent advices from W. R. Burne, of Sale, Cheshire, England (English 2KW).

An organization of English amateurs, the nucleus of a future relay organization, recently succeeded in securing the permission of the General Post Office authorities to use a 1,000 watt C. W. transmitter for westward Trans-Atlantic tests with American stations next winter, using the call letters 2FZ.

A firm manufacturing wireless equipment has also secured a permit to use a C. W. transmitter of 250 watts for the same purpose, with the call 2WO. Preliminary tests of the latter station have been made and the early results have been very satisfactory, the antenna current of the station being 3 amperes on 250 meters, which, according to last winter's results, should get across the Atlantic without much difficulty when conditions are good.

When good radio weather comes along, in the Fall, both stations will transmit code words and their calls on regular schedules, which will be printed in later issues of THE WIRELESS AGE.

On this side, preparations are going forward for the erection of a special receiving station, employing a Beveredge antenna and special equipment for possible reception of English amateur signals. It has not been definitely decided, however, whether the English will transmit on 440 meters, the new wave-length just assigned English amateurs, or on a lower wave-length, perhaps in the neighborhood of 275 meters. There is, of course, considerable spark interference in the neighborhood of 450 meters, which is used extensively by ships when interference is heavy on 600 meters. This might make it advisable to use 275 meters.

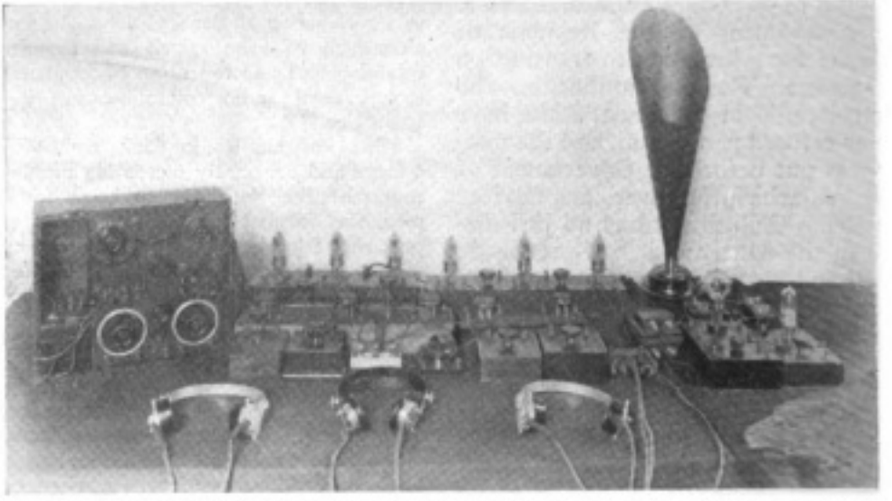


Antenna of English station 2KW which was used in the reception of American amateur stations in trans-Atlantic tests last December

The station of W. R. Burne, the prize winner of the English stations during last winter's amateur tests, when seven American amateur stations were logged, is located at Sale, Cheshire, England, 170 miles from London.

The antenna of the station, call letters 2KW, is an inverted L, supported by two masts, one 56 feet high and the other 45 feet high, the leads to the set being taken from the high end. The flat top is 45 feet long. The receiving set used during the tests consisted of a 6-tube with combined radio-audio frequency amplification. Most of the receiving set was constructed by Mr. Burne.

Some attention has been given by Mr. Burne and his associates to the formation of an international radio relay league, and Mr. Burne will be glad to hear from any one interested in the matter.



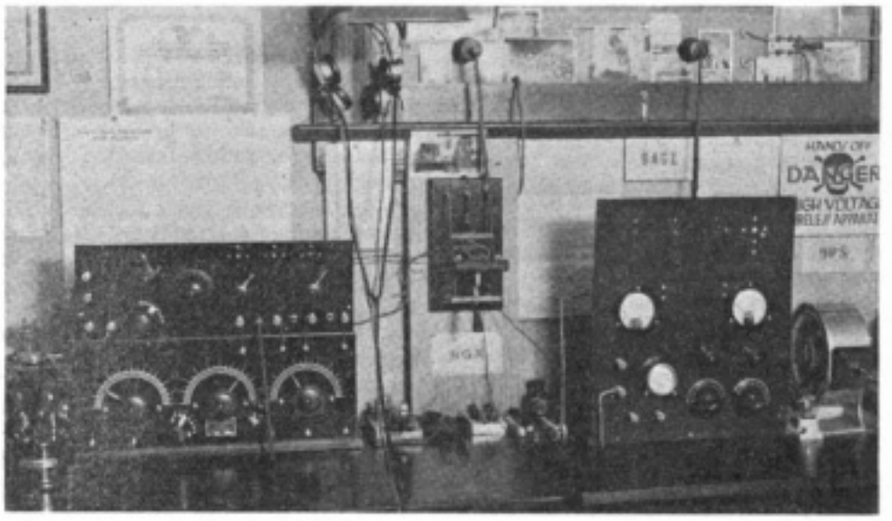
Receiving set used at 2KW (England) during trans-Atlantic tests. It has a combined radio-audio frequency amplification, as many as six steps of radio frequency being used at one time

Unusual Distance Work With 10-Watt Set

The Signals from 6AWP Reported from 21 States, Hawaii and Canada — Many Stations 1,500 Miles Distant Have Been Consistently Worked

RADIO Station 6AWP is owned and operated by Everett W. Thatcher, 407 West First Street, Santa Ana, California. Regular schedules are maintained between 11:00 P. M. and 1:30 A. M., and great distances have been covered with the ten-watt C. W. transmitter.

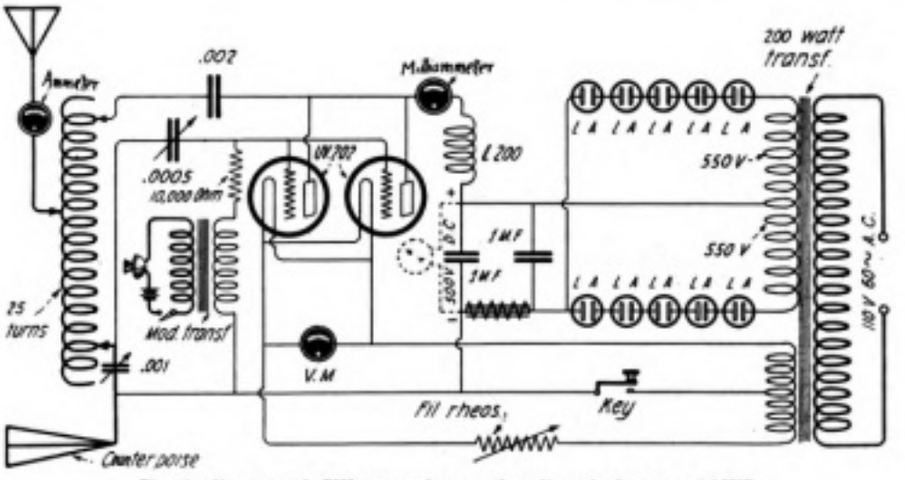
The antenna is supported by two masts, one 75 feet and the other 50 feet high. It consists of a four-wire flat-top type aerial, the wires being spaced 4 feet apart on the spreaders, and insulated by Electrose ball and ten-inch insulators. The lead-in is an eight-inch cage, also of four strands. A four-wire counterpoise of the same dimensions as the antenna and directly beneath it at a height of 12 feet is used in connection with the earth ground. The latter contains ten fifty-foot copper strips, buried six inches under the surface and diverging in a fan-shape. The pipes of the city water system are also used.



Transmitting and receiving equipment of station 6AWP. The 10-watt tube transmitter is shown at the right, and the Z-Nith regenerative receiver at the left

The C. W. transmitter is mounted on a bakelite panel 15 by 18 inches and ¼ inch thick. Two UV-202 five-watt tubes are used in the modified Colpitts circuit shown below. The inductance is 25 turns of edgewise-wound copper strip, 7 inches in diameter. A 10,000-ohm variable resistance is used as the grid leak and the secondary of the modulation transformer is placed in series with the leak and the ground.

The high voltage for the anodes of the tubes is obtained by "stepping-up" the 110-volt, 60-cycle A. C. supply through an Acme 200-watt transformer to 550 volts. A chemical rectifier, consisting of 6½-inch strips of lead and aluminum, immersed in a saturated solution of 20-Mule Team Borax, delivers 500 volts of pulsating direct current. Ten pint jars, five on each side of the circuit, are found to give very satisfactory results for this purpose. An Acme 1.5-henry choke coil of 150- to 500-M. A. capacity is placed in the negative lead, and on each side of this a 1-mfd. R. C. A. filter condenser is shunted across to the positive lead. A 300-turn honeycomb-wound coil is inserted as a high frequency choke in the positive lead. The variable condensers C1 and C2 are of .001 and .0005 mfd. capacity, respectively. When the tubes are oscillating at maximum efficiency, the plate current is 95 to 100 milliamperes, and the antenna current is 1.7 amperes on 200 meters.



Circuit diagram of CW transmitter and radio telephone at 6AWP

The receiving equipment consists of a Z-Nith regenerator and a home-made detector and two-step amplifier panel. Cunningham and W. E. tubes are used as amplifiers. The switch at the right of the panel controls the plate voltage on the receiving tubes. A series variable condenser of .001 mfd. capacity is used in the ground lead. Western Electric 'phones and the Murdock antenna switch, mounted on the wall, complete the equipment. The power supply for the transmitter is controlled at this switch, and a small contact has been installed which breaks the "A" battery circuit while the switch is in the transmitting position.

To date the C. W. transmitter has been reported from 21 States, Hawaii and Canada. 8AGZ (8YD), East Cleveland, Ohio, reports the sigs. very QRK. 8GY, Euclid, Ohio, copied signals in full on several occasions. 6ZAC, Wailuku, T. H., 5CN, Vancouver, B. C., 8BYH and 8CHV Scranton, Pa., SS. *David McKelvey*, off Key West, Fla., SS. *Admiral Watson*, off Yakutat, Alaska, and WSR 1000 miles west of NPE are amng the DX stations which have reported hearing 6AWP. Stations 9WU, 9ZAC, 9DVA, 9AMB, 7ZU, 7DP, 5ZA, and many others within a radius of 1500 miles have been consistently worked, sometimes during unfavorable atmospheric conditions.

EXPERIMENTERS' WORLD

Views of readers on subjects and specific problems they would like to have discussed in this department will be appreciated by the Editor

Reducing the Interference Caused by Static

By Robert H. Horning

President, Roselle Park Radio Club

FIRST PRIZE, $10.00

IT is intended that this article will enhearten those members of the radio fraternity who usually set aside their radio receiving sets during the warm months of the year on account of the severe static conditions prevalent during that period, to reopen their stations in an endeavor to best Nature, rather than accept defeat.

The reader must bear in mind, however, that the successful elimination of static is still a matter which is sought by the most eminent of scientists and engineers. Mr. Roy Weagant of the Radio Corporation has devised a system in which he claims the elimination of static from the received signal energy. The system, however, is generally understood among the laity to be too complicated for general application, and far too costly.

In order to more fully point out the simple change in the ordinary circuit, the full circuit is shown here with an inset to show the point in particular.

In figure 1, as will be noticed, the change in the circuit is encountered at the secondary terminals of the first audio-frequency transformer. The writer found that by carefully selecting various capacity grid condensers, a condenser with the capacity of .0005 microfarad and a grid leak of between 1 and 2 megohms shunted across the

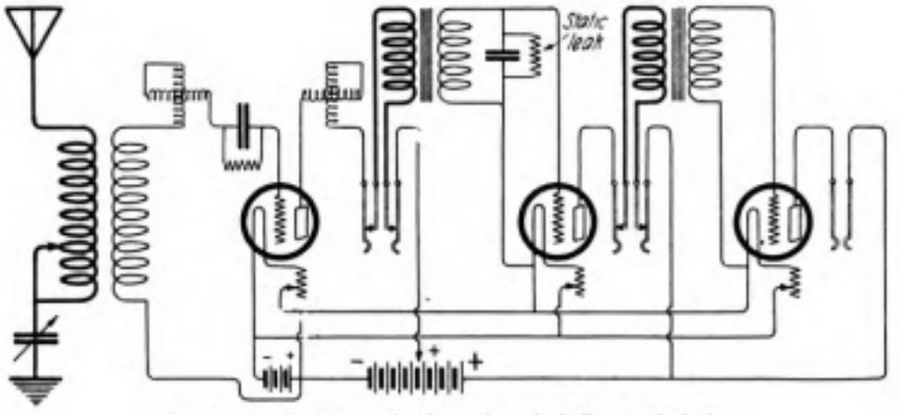


Fig. 1. Standard three circuit receiver, including static leak

The method to be described was successful in two results, i. e., the elimination to some extent of static, allowing the received energy to be more clearly picked up, and secondly, that tube noises, due to oscillations of the detector, and the amplifiers, "howling," was reduced to nil. Through the lack of time for experiment, the writer is unable to state whether or not the method to be described will reduce the 10,000-cycle squeal in the new 3-tube Armstrong super-regenerator.

The experiment was made on the usual amateur regenerative receiver having two stages of audio-frequency amplification, and using a standard feed-back circuit detector. The advantage of the method is that it may be employed on any tube set using audio-frequency amplification, regardless of the circuit used in the detector circuit, i. e., whether tickler feed-back, simple, two or three-circuit regenerative.

secondary terminals of the first audio-frequency transformer produced excellent results.

At first attempt a considerable decrease in signal or music intensity is noticed, but at the same time a very remarkable degree of clearness, which is absolutely free of any hissing tube noises, and reducing static to a minimum, is obtained. If the original signal intensity is desired, it is only necessary to increase the filament voltages on the tubes, thereby bringing the signals in stronger but still without a hissing or muffled intermingling of tones. During the summer months the above was in continuous operation at the station of the writer, the static never severe enough at any time to warrant the closing of the station even for a short while.

The same method may be tried across the terminals of the second or third stage of audio-frequency amplification, but the best results were obtained with the grid leak and condenser shunted across the secondary terminals of the first stage audio-frequency transformer.

The actual effect of the arrangement appears to be a leak for imposed oscillations which are concentrated in the first audio-frequency transformer by the oscillating detector circuit, rather than the succeeding audio-frequency transformers.

With the above static leak in operation, the operator of the radio set is led through a series of pleasant surprises. A large number of the music listeners are wont to believe that it is the fault of the transmitting station for poor modulation, or when several notes of different frequencies are struck simultaneously, they produce, at best, terrible effects in the ears of the listener. However, this may be the fault of the listeners own receiver, and in the opinion of the writer, many cases of poor modulation

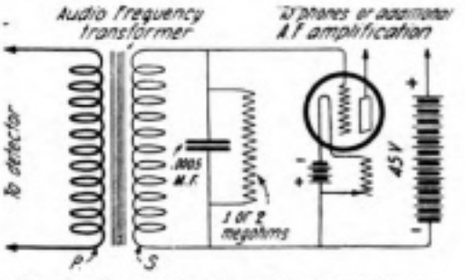


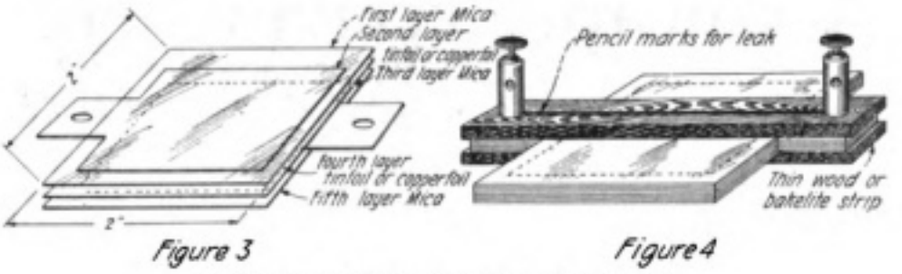
Fig. 2. The static leak on first of two stages audio-frequency amplification

may be quickly cleared by the simple addition of a static leak.

The writer has had the experience of being so-called "static bound," while, as radio operator, the ship was traversing tropical waters during the static seasons. Though within night range of United States coastal stations, the static was so severe that only the continual roar of static was audible. Occasionally near-by ships break the monotony with an exchange of QR's. Some ships are now fitted with arc transmitters, which enable them to remain in constant communication with land, regardless of static, which has less effect on the arc reception than spark. The writer can assure the radio listener of northern United States, that he has a gold mine of a location.

For the experimenter who must build his own, the following design will very nearly fill the bill for a static leak.

Three pieces of thin mica sheeting each two inches square, separating two pieces of either copper or tin foil cut slightly smaller than the mica, so as to prevent overlapping and short circuiting, the foil cut so that a leaf is left sticking out at opposite ends for connecting to binding posts. Two small pieces of thin wooden strips or bakelite, drilled to take two binding posts, one at each end connecting the foil leaves. Underneath the top wooden strip place a piece of clean white paper on which several soft lead pencil marks have been drawn, which will suffice for the static leak. The number of pencil marks drawn must be determined by the experimenter. Four or five heavy lines should suffice. Figure 3 shows the method of putting together, and figure 4 the finished static leak.



Figs. 3 and 4. Constructional details of static leak

What I Have Done to Eliminate Static

By Harry Metcalf

SECOND PRIZE, $5.00

THE problem of eliminating static has always been a puzzle and may never be solved. However, there are many ways of reducing same. I have done a great deal of experimenting along this line, and the results accomplished in this end are gratifying indeed.

The first step was to lower my aerial to 35 feet above the ground, as the static ratio rapidly increases as the height increases. Next I reduced the length to 100 feet. These two changes reduced static to a considerable extent, but when I took down all wires but one, it seemed to reduce static 50 per cent. This left me a single wire aerial 100 feet long by 35 feet high with lead-in brought from one end.

The next step which probably did more to reduce static to a minimum, was to use a two-circuit tuner instead of a single circuit tuner. In this tuner the primary is connected directly between aerial and ground and is in no way directly connected to the rest of the circuit. Two-inch coupling is used between primary and secondary, and no condenser is used in aerial circuit.

The next step was to employ a step down transformer between tuner and receivers, using a low-resistance head set. This reduced static and disturbances considerably, as it insulates receivers from tuner.

The next thing I did was to completely shield my receiving set. While originally I had a shield behind the panel which was grounded, this worked all right as far as capacity effect from one's body was concerned, I discovered that by disconnecting the aerial entirely, static disturbances could be quite plainly observed, so I continued my shield completely around my instruments, using sheet zinc. In fact, my set is in a zinc box with only small holes left for control knobs and binding posts. This is enclosed within a cabinet and grounded.

The above procedure also reduces induction from power lines, etc., to a considerable extent and during the month of July I received regularly the stations listed below, while in May and June before I made these changes I could only receive stations three to five hundred miles distance.

KDKA, Pittsburg, Pa.; WGY, Schenectady, N. Y (every Friday) WHAS, Louisville, Ky.; WSB, Atlanta, Ga.; WLW, Cincinnati, Ohio; also closer stations, as KSD, WCX, WWJ, WDAF, WHA, WOH, WBAE, WCAP, WOC, WHAI, etc., and only one tube has ever been used.

Gimbal Loop Cuts Down Static

By Geo. W. Gether

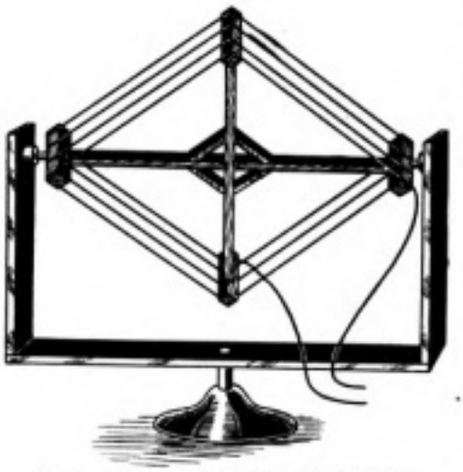
THIRD PRIZE, $3.00

DIRECTIONAL tests on static interference almost invariably indicate that the disturbance has a rather definite location, and much of the superior results experienced with loop antennas, it seems to me, are to be attributed to the highly directional quality of the loop.

However, there are times when, even with a loop antenna and radio frequency amplification, static spills into the earphones and loud speaker just about as loud as the incoming signals. Turning the loop, then, may eliminate the static, but it also cuts down and eliminates the signals as well. The cause evidently is that the source of the atmospheric disturbance, the transmitting station and the receiving station are all in a straight line. In summer, when thunder storms are apt to occur at many points of the compass at nearly the same time, this is a condition that is not at all unusual.

At first it may seem impossible to cure such a situation, but I have found that there is a cure, one that depends on the individual conditions in each case for its efficacy, which may be complete or partial.

The conventional loop swings about a vertical axis, and its poles, therefore swing around the horizon. However, it is well known that electric waves do not always travel horizontally, but may come in at odd angles. Static, particularly, often, if not usually, has its origin considerably above the horizon.



Simple gimbal loop for highly selective directional work

Therefore, I tried a loop rotatable about both vertical and horizontal axes, in other words, held in a gimbal. I found that this enabled me to differentiate between waves which, while coming from the same general direction, have considerably different angles with the horizontal at the receiving station.

The gimbal mounting is simple enough. The loop, instead of being pivoted on its lower corner, is held by its two side corners between two vertical arms, united by a cross piece at the base, the center of which bears a loose bolt or kingpin about which the support may be rotated. With that mounting, any position may be given the loop in any plane.

I found that in many cases this arrangement enabled part, if not all the static to be eliminated; at least, enough of it was hushed down to improve the readibility of code and the enjoyment of music. This is not perfect, by any means, but on the occasions when it works, the results are more than sufficient to make it worth making the slight change in the loop.

Of course, signal strength will weaken somewhat the nearer the loop is swung to a horizontal plane, but in these days of radio frequency in every shack there is no danger of losing readability through the small decrease; in fact, the slightly weaker signals will be much more readable through the lessened static than are the stronger ones in heavier static. As I said before, this doesn't work every time, but when it does you will rise up from a perfectly copied message and say "Bless you, my child," to the little gimbal.

A Cheap Receiving Set With Spider-Web Coils

By E. F. Lake

AFTER using various kinds of coils, it is my opinion that the spider-web or basket-woven coils give as good service as any and better than some for receiving from broadcasting stations, whether they be used with ordinary crystals or in the more expensive vacuum tube sets. It is an ideal kind of coil for a beginner or amateur to make, as with it he can build a crystal set at a very low cost. When he has perfected that, he can convert the set into a regenerative one by adding the batteries and putting a vacuum tube with its accessories, in another box just like the one holding his spider-web coils and crystal detector. Then he can disconnect the wires leading to the crystal and connect them to the tube set. After that it can be made into a two-step amplifying set by adding a third box with amplifying bulbs and their accessories.

At first glance the spider-web coil may appear difficult to make, but it really is easy for any intelligent boy. After the first coil has been made, according to the following instructions, anyone can weave these coils while holding radio bees, just as our grandmothers used to do with their quilting. It is also possible to drop a stitch like they did, but the result is not as disastrous.

I obtained such excellent results with the set which is illustrated in this article that I built another one just like it, to use with a two-step amplifying vacuum-tube set for long-distance reception.

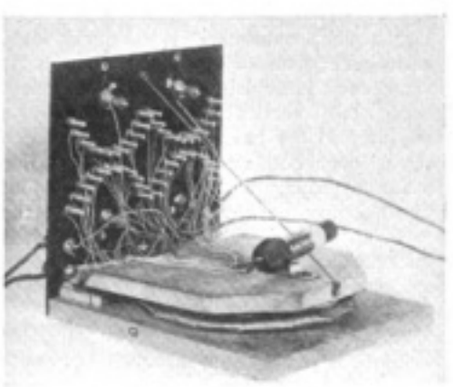


Fig. 2. Complete set with box removed and coil in lowest position

We keep this crysal set intact for local concerts here in Detroit and find that it gives musical notes clearer and more perfect than the bulb set. It gives everything just as loud and clear as though we were in the transmitting room and we did not add anything to the coils and crystal detector—not even a condenser. We now use the crystal set almost entirely for local concerts

Mabel Sue Lake listening to "moo-zic" through the finished set

and news on wave lengths of 360 and 485 meters and only resort to the bulb set when we want to get Schenectady, Newark, or other distant stations.

In figure 1 is shown the complete crystal set with our two-year old, Mabel Sue Lake listening to the "moo-zic." The panel is bakelite, but it can be made from any other material which insulates properly. The box was made of birch, but most any kind of wood is suitable and it can be stained and varnished to suit the idea of the builder.

In figure 2 is shown the back of the panel and the inside of the box with the movable coil in its lowest position. Figure 3 shows the movable coil raised to a higher position than will be found necessary. An opening of between one and two inches has given us the desired tone. This, with the adjustments obtained by the contact points and switches, enables us to tune out all interference and get the particular station we are after.

In making this kind of a set it is just as well to start with the coils. Each coil requires about 100 feet of wire and nearly another 100 feet is required for taps and other connections. As this wire is cheap it is best to have a few extra feet for any unforeseen use that might arise. Therefore you should buy about 400 feet, or four ounces of No. 27 enameled and single cotton covered copper wire. The double cotton covered will do as well as the enameled and single cotton, and No. 25 or 26 wire will do as well as No. 27. It would require six ounces of No. 25 wire to make approximately 400 feet and five ounces of No. 26. Then you will require two pieces of red fibre six inches square and 1/16 inch thick.

First, lay out each piece of fibre as shown in figure 4. Draw a circle 5¼ inches in diameter and divide it into 11 equal spaces. Then scribe a circle 1¾ inch in diameter and mark the 11 slots from the outside to this 1¾ inch circle. Ordinary scissors can then be used to cut the slots if you buy the common red fibre that is not over 1/16 inch thick. Plain cardboard may be used to wind the coils on, but it is not as strong as fibre and is apt to break while you are winding the coils. The tougher fibre also allows you to pack the wire tighter in the slots if you have not wound the coils close enough together to get 120 windings on it.

This disc must have an uneven number of slots and spokes, in order to produce the necessary basket weave. Eleven slots are sufficient, and more would only add to the work when winding without any special benefit being derived. The slots and spokes may also be reduced to nine, but eleven are more convenient when making taps. The slots could be made ⅛ inch wide if desired, or even more. No harm will be done if the slots are not cut perfectly straight as the wire covers the slots enough to hide any crookedness.

To wind the coils first drive a nail through the center hole in the fibre disc

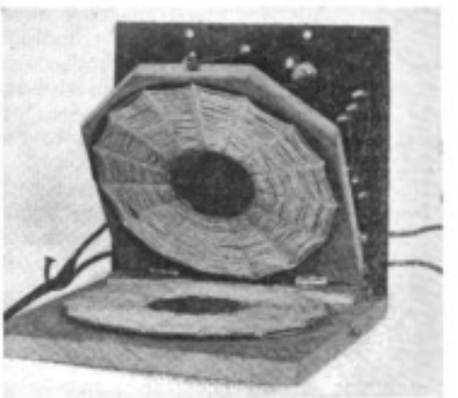


Fig. 3. Rear view showing hinged spider-web coil in highest position

and into something that is the correct height to allow one to either sit down or stand up while winding the wire. Drive another nail a few feet away that will fit in the center hole of the spool of wire. Winding the wire on the disc then will unwind it from the spool, preventing any snarling of the wire. The fibre can then be turned like a pinwheel as fast as the wire can be put

in one slot and out of the next one. Leave some ten inches of wire for a lead before starting and then weave the wire in one slot and out of the next one until there are 120 circles, or coils, of wire on the fibre disc. This means that only 60 coils will show on one side of any spoke as the other 60 coils are on the opposite side. If the wires in a slot are counted, however, it will be found that there are 120, because the top and bottom wires cross each other in the slots. Don't pull too hard on the wire when winding or the coil will become cup-shaped, but keep enough tension on the wire to make it lie straight from slot to slot. If the coil should become cupped lay a strip of wood along one slot at a time and hammer on it enough to flatten down the wire. This will flatten out quite a good sized cup. If you drop a stitch, as they say in knitting, or pass a slot when winding the coil it will cause two successive coils to lie on the same side of all the spokes. This will not make any difference except in the looks of the coil, but might make a difference in your count of the coils if you are not careful.

Locating the taps can be more accurately done while the winding is in progress than after it is finished. Some amateurs tap each of the first ten turns if a variable condenser is not used, and after that tap every tenth coil, whether a condenser is used or not. This is called units tapping and tens tapping. The units tapping serves in place of a condenser. The set shown in these pictures works perfectly without a condenser, so why go to the expense of a variable condenser? I have tried all kinds of condensers on this set but could not find that they made any improvement and therefore abandoned them all. Condensers are extremely important in their proper place, but we are located within five miles of such powerful sending stations as those of the "Daily News" of Detroit, and the Detroit "Free Press." Under such conditions the units tapping makes a variable condenser unnecessary.

Tapping every ten turns is all right for straight cylinder coils but it is far from accurate on spider-web coils. In our size of coil, if we tapped in tens there would be twice as much wire between the two outside taps as would be used between the two inside taps, as every turn of wire is longer than the previous one.

A better way of winding and marking these coils for taps is to measure off ten inches of wire and mark it with something black like ink. When you come to the ink mark, in winding the wire, slip a piece of paper under it, mark it No. 1 and fold it over so it will not fall out. If the black ink mark comes on the back of the coil, move the paper one spoke ahead or back so as to bring all taps on the side of the coil that faces you. Mark another paper No. 2, measure off a second ten inches of wire and repeat these operations. Continue repeating them until you have located the first ten taps. Do not allow two taps to come on the same spoke as it is better to gain or lose a few inches of wire between taps than to take a chance of short circuiting them. These will be the units taps.

For the tens taps, measure off 100 inches of wire each time and proceed with the winding and marking with papers in the same way as with the units taps. This will give a ratio of 10 to 1 between the units and tens taps.

sets I have made are so loud and clear I cannot see any reason for going to the expense of variable condensers. One would be required for each coil unless you were satisfied with half a job.

When the two coils are located in the box the windings of both must run in the same direction. The taps must all be on the same side of the coil and the sides without taps must lie face to face. This makes the coils right and left hand. You cannot go wrong if you will turn one fibre disc clockwise when doing the winding and turn the other in the opposite direction, and locate the taps on both coils on the side facing you. This makes the windings of both coils run in the same direction

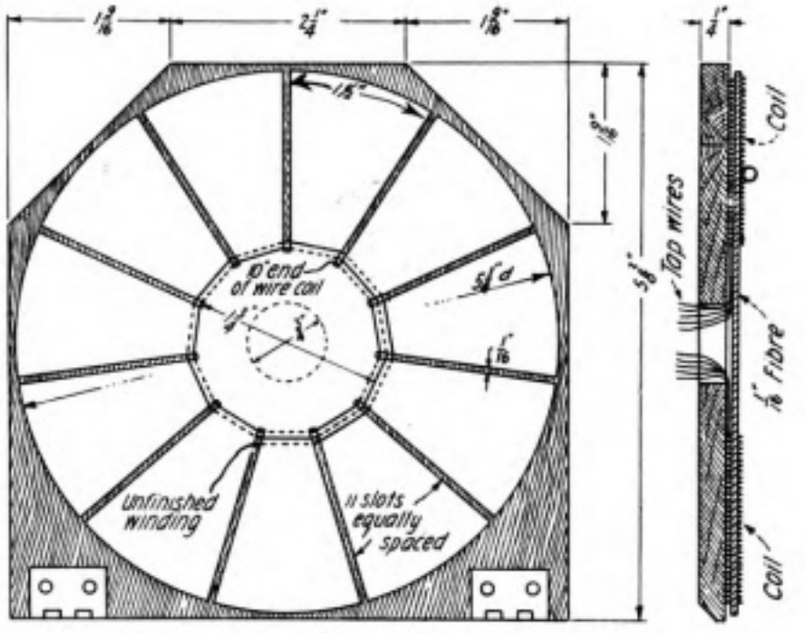


Fig. 4. How to cut fibre and hinged board, and how the winding is started

The units taps will take up some sixteen turns of wire and the tens taps can be started on the twentieth circle; ten being on each side of the different spokes. From there to the outside each succeeding hundred inches of wire will bring the taps on wire turns Nos. 34, 47, 59, 70, 80, 89, 97½, 105½, 113 and 120. If you wish, you can use these figures instead of measuring off every hundred inches of wire, or you can prove the figures by measuring the wire.

Each tap wire should be numbered so you will know to which contact point to connect it after the coils have been assembled. To identify the taps, cut thick letter paper into one-quarter inch squares, number them from 1 to 21, and string them on the tap wires. Each set of units and tens taps should be twisted together for ease in handling and connecting to the contact points.

The units series of taps can be omitted if you desire to use variable condensers in their place, but the three

when the smooth sides are face to face.

Tapping the coils is the most tedious part of the work as the wires are small and it is necessary to solder each tap. Those trained in this work do it easily and quickly, but beginners are clumsy, smear solder all over, get too much in the joints, and burn the insulation from adjoining wires with the soldering iron.

Therefore, it would be best to practice soldering a few similar wire joints before tackling the coils themselves. Probably the best way of making these tap joints is to solder the tap wire and coil wire to a small piece of thin sheet copper and then fold this over the joint. This is illustrated by the small sketch in the upper right hand corner of figure 5.

First cut forty-two tap wires each ten inches long from the same spool of wire from which you made the coils. Scrape the cotton and enamel insulation from one end of these for about one-half inch back. Then get some strip copper less than 0.005 inch thick and cut forty-two pieces 3/16 by 3/8

inch. Next cut some heavy paper into pieces as large as can be slipped under the wire that is to be tapped, to protect the adjoining wires so the soldering iron will not touch the cotton insulation and burn it. Then scrape the cotton and enamel from the wire that is to be tapped for a distance of about three-eighths of an inch. Put one of the copper strips under this bare part of the coil wire, bend the bare end of a tap wire over this bare coil wire and solder the tap wire, coil wire and copper strip together with a small drop of solder. Remember that the two wires and copper strip must be heated at the joint by the soldering iron before the solder will stick to them. Then fold the copper strip over the soldered joint or cut it away to make a small neat tap. After all the taps have been soldered and trimmed pull out the papers and the coil is ready to locate in the box.

With these two coils wound, tapped and connected you will be surprised to see how efficiently they will take the place of two honeycomb coils, or a vario-coupler, or a loose coupler in any kind of a hook-up. The results are so good that you start right in weaving other spider-web coils. At least that is what I did and what others have done that I have talked with.

Figure 4 illustrates how to lay out and cut the ¼-inch hinged board on which one of the pair of coils is fastened. The location of the hinges can plainly be seen. The taps are placed next to the board; the tap wires are drawn through the ¾-inch hole in the center of the board and the coil is then fastened to the board with four small brads or carpet tacks. These wires must be numbered before fastening the coil as described later. After this they are fastened to the contact point nuts as shown in figure 2.

Panel Lay-Out

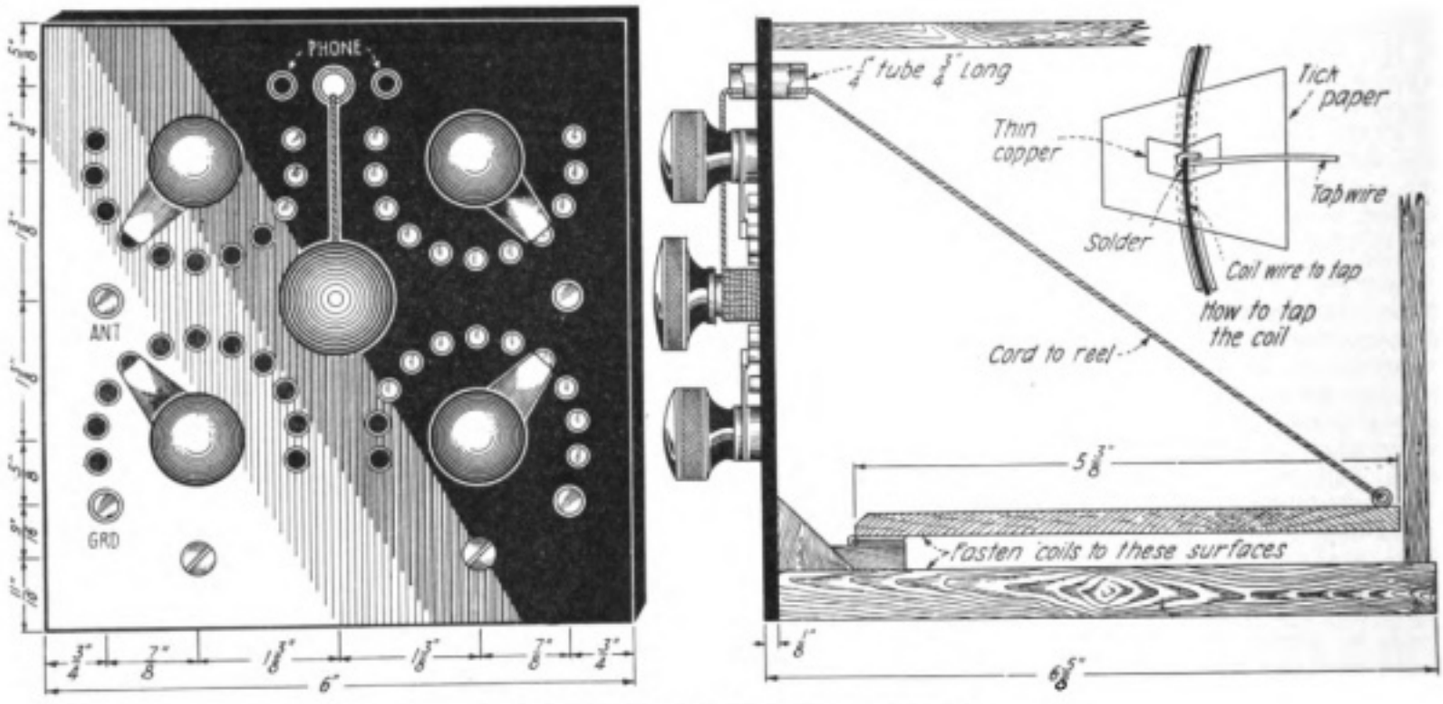
In figure 5 is shown the complete lay-out of the panel for drilling and how it can best be fastened to the bottom board of the box. A few minor changes have been made over the panel shown in figure 1 to give it a little more symmetrical appearance. The knob which raises and lowers the movable coil by reeling up the cord, has been raised to the center of the panel and the binding posts have been changed to different positions, two being added for connections to a vacuum tube cabinet.

The panel is a six-inch square of bakelite one-eighth of an inch thick. This can be drilled by hand with an ordinary carpenter's brace or with the "Yankee" spiral hand drill fitted with drills of the correct size. Be sure that your drills are just large enough for the different parts to make a tight fit.

The materials needed for this set are as follows:

List of Parts

1	Bakelite panel, 6 x 6 x ⅛ in. at 1½ cents per sq. in.	$0.55
4	Inductance switches, 1½ in. rubber knobs, 1 in. switch	1.00
1	Inductance switch, 1¼ in. rubber knobs, for reel	.25
44	Switch points, 3/16 in. x ½ in., head ¼ x ⅛ in., fitted with 2 nuts at 5 cents for 2	1.10
6	Binding posts at 5 cents	.30
4	Nickeled, round head wood screws ⅝ in. No. 6, at 12 for 5 cents	.02
1	Radium jewell detector	1.00
1	Bottom board, ½ x 6 x 6½ in.	.10
1	Box end, ¼ x 5¼ x 5½ in.	.10
1	Box top, ¼ x 5½ x 6½ in.	.10
2	Box sides, ¼ x 5½ x 6½ in.	.20
1	Coil board, ¼ x 5⅜ x 5⅜ in.	.10
1	Pair brass hinges, ¾ x ¾ in.	.05
2	Flat brass hooks, 1 in.	.05
4	Ounces, or 400 feet No. 27 Cotnamel wire for coils	.40
2	Sheets red fibre, 1/16 x 6 x 6 in.	.10
	Total	$5.41



Figs. 5 and 6. Front and side elevations of the panel

I used switch points with two nuts and connected the tap wires by clamping them between these nuts. In time such nuts might work loose and it would make a more permanent job to use only one nut to hold the switch point in the panel and then solder the tap wire to the threaded end. This would change the switch point item on the list of materials to read:

45 Switch points, 3/16x½ in., head ¼x⅛ in., 1 nut at 5 cents for 3—$0.75. This would reduce the total by 35 cents and make a better job but it would be more work.

A panel might be used that is cheaper than bakelite, and knobs, switches and other materials at a less cost may be used. If you should add vacuum tubes you need not make any excuses when you show this set to other radio fans.

Radio Relays by Re-Radiation

By Paul Mason

NEW uses are often found for old things, and troublesome by-products have become more valuable than the products originally sought. The phenomenon of re-radiation illustrated by the regenerative radio receiving apparatus may prove to have an application of considerable value.

A characteristic of regenerative receivers which has been troublesome at times and which inventors are seeking means of preventing is the re-radiation which seems to be inherent with this type of receiver. In order to provide the "feed back," or regeneration, an oscillation is produced in the receiving circuit which is modulated by the incoming current and "feeds back" into the tube. This is not all, however, for the oscillation escapes into the antenna circuit and the receiver becomes a miniature transmitter echoing the oscillations of the sending station back into space. This re-radiation of the regenerative receiver is not usually very strong, but it does unnecessarily congest the radio traffic and interferes with the reception of other messages in the near vicinity.

One frequently hears claims of wonderful records for distance reception made with simple crystal or vacuum tube sets. At first one may be inclined to discredit the claim completely, but on investigation it is usually found that there is a regenerative set in the neighborhood of the set for which the record is claimed; and then the explanation is easy. The regenerative set was in tune with the original sending station and it was the re-radiation and not the original that was heard in the less efficient set.

When, however, the regenerative receiver is in use and not in tune with the sending station but within the range of audibility of it (46 to 41,000 oscillations per second) heterodyning, or the clashing of the oscillations of the transmitting station with those of the regenerative receiver results, and a "howl" is produced.

Efforts are being made to find a means to prevent re-radiation and so take that much needless traffic from the ether. No doubt a valve, or device which would prevent the oscillations of the receiver being radiated out through the antenna would be a benefit to radio, for re-radiation is sometimes troublesome. This is especially important because of the rapid increase in the use of wireless and the already important problem of tuning out the undesired waves.

An experiment which showed a more pronounced amount of re-radiation was the recent radiophone tests between the ship "America" and the shore. In this experiment a special "hybrid" coil was used to enable one party to "break in" on the conversation of the other which is ordinarily impossible because the more powerful waves of the transmitter preclude the hearing of the weaker waves of the other station. The coil was called "hybrid" because it was a part of both the sending and receiving circuits. It is arranged so that an incoming signal will unbalance a delicately balanced magnetic field and thereby interrupt the sender. The coil also has the seemingly unavoidable attribute of giving a strong re-radiation. In fact it is almost identical with those used in Germany to modulate the current for long distance radiophone communication with the Poulsen arc.

Some of the amateurs in the vicinity of the receiving station in New Jersey claimed to have heard the "America" for a remarkable distance out at sea. But Jack Binns is authority for the statement that it was the re-radiation of the receiving station that was heard. And since the large re-radiation of the apparatus is known this seems the only logical explanation.

The very facts which make re-radiation objectionable suggest a use to which it might be applied with considerable benefit.

The greatest problem of broadcasting is to secure suitable programs. The cost of opera, band or orchestra are usually prohibitive, and the popular and effective speakers are difficult to secure. As a result broadcasters must be satisfied for the most part with strictly local talent or the reproduction of records, and are able to provide the greater attractions only upon favored occasions. While some stations are well supplied with special attractions, others may be entirely without, and the more interesting programs, when they are available, can be heard only by the strictly local audience and those having more efficient and expensive receiving sets farther away.

This is the suggestion. Broadcasters might develop and use circuits which would give the maximum re-radiation when they have no program above the average, to relay an especially good program from some other station which is beyond the range of the apparatus of the local fans. The broadcasting station with its more efficient apparatus could receive and relay the more interesting program to the local audience. With scarcely more than our present development, a station near the central part of the United States could relay to local radio auditors news from New York; selections of the Detroit Symphony Orchestra, from Detroit; opera, from Chicago, or San Francisco; the speeches of importance from Washington; programs of special interest from Los Angeles or other broadcasting stations, thus making the better programs of the United States available through the crystal and simple vacuum tube sets.

The present method of relaying or repeating of messages requires considerable time, is expensive, and is subject to error at each repetition. The receiving and repeating of messages obviously requires double the time of a single sending and thus keeps the message in the ether for twice the time which would be required by an automatic relay operating on the same principle as the regenerative receiver or the "hybrid" coil. Such a relay would be highly valuable in relaying broadcasting programs or commercial communications. By carrying such a development to its logical completion, the government stations used for giving out weather and market reports might be tuned together and act as a single system of relays, the only manual or oral sending being done at Washington.

Surely there is an important field for the use of such a relay. Modifications may be made or special circuits developed which will give a high relay efficiency, and at the same time perhaps, someone may discover means of preventing re-radiation when none is desired. Whatever may result from such a study may be uncertain, but this much is certain, there are large opportunities and bright prospects for research and experiment in this field.

New Submarine Tube Sets

THE U. S. Navy is now busily engaged installing new tube transmitting sets on its submarines, tests with the first set, on the S-50, having been entirely satisfactory. The sets make use of much equipment already in the hands of the Navy, with some additional material necessary to modernize it. Tests show daytime ranges of between 200 and 300 miles when the submarines are cruising on the surface, and it is reported that it also is possible to work under water, though secrecy is thrown around the details of this accomplishment.

Practical CW Telegraph and Telephone Transmission

By Edward Thomas Jones

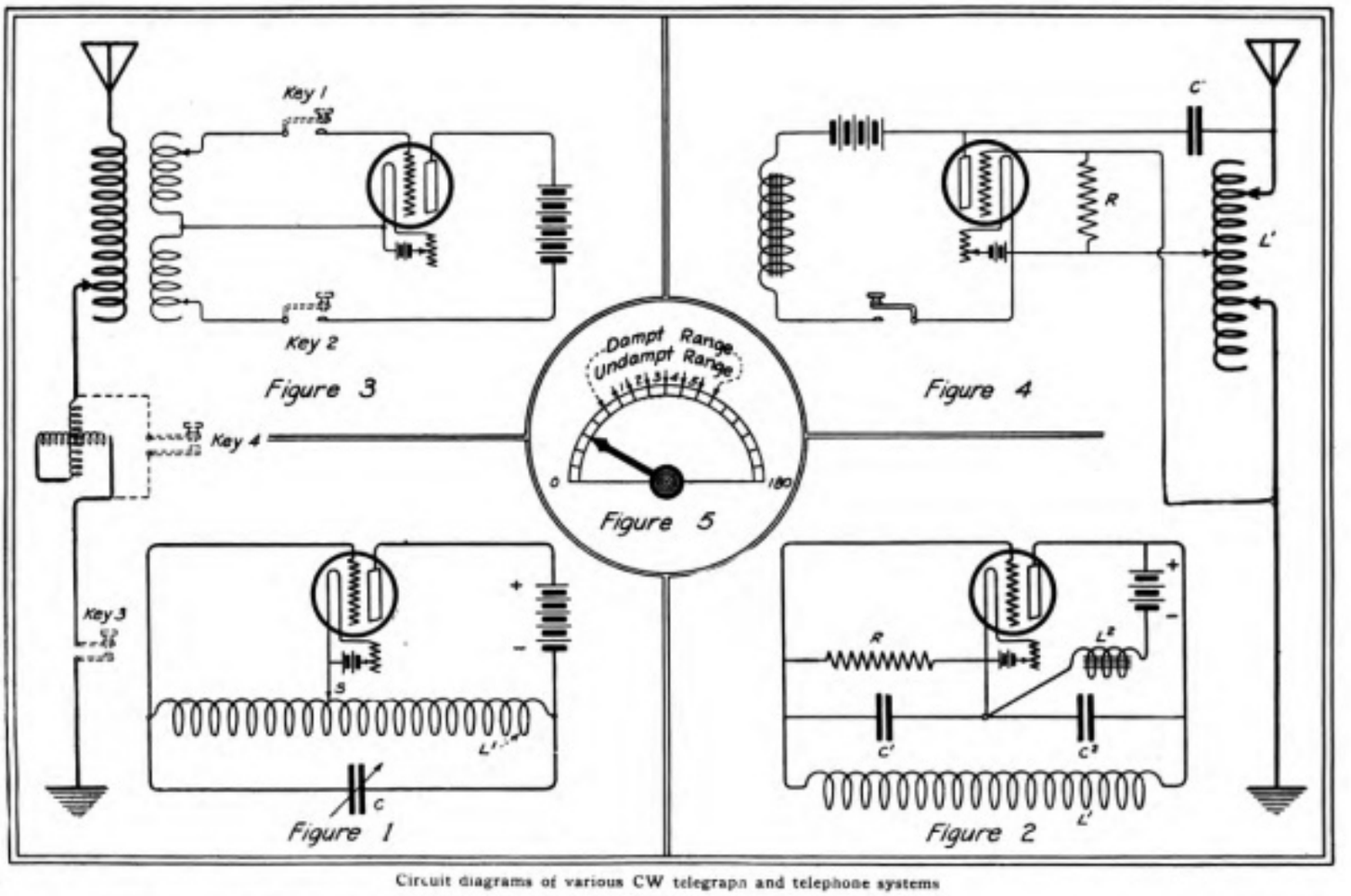
AMATEURS are rapidly discarding their bulky as well as inefficient spark apparatus and substituting the more modern, highly efficient, CW telegraph and telephone transmitter.

As an introduction, the general principles of oscillation generation will be discussed. Any amplifying device having a non-linear characteristic may be made to sustain an undamped oscillation if disturbed from its condition of equilibrium. This disturbance is brought about by coupling its input and output circuits or members. If the device had a linear characteristic the disturbance would not be transformed into a periodic oscillation, but would be indefinitely amplified.

Figure 1 shows a circuit in which the plate and grid circuits of the tube are coupled through an oscillatory circuit so that the resulting grid to plate coupling is negative. In this circuit auto-coupling is employed and maximum oscillation generation has resulted. The coupling between the grid and plate is adjusted by means of the sliding contact S. The frequency of the generated oscillations is varied by means of the variable condenser C. Electrostatic coupling may be employed to couple the circuits. The well-known Eaton oscillator is nothing more than this circuit with the proper values of capacity for each condenser.

One form of capacity coupling is shown in figure 2. The B Battery connection is not the same as was employed in figure 1. Here we have the batteries in series with a large impedance or choke coil L-2. This acts to prevent the batteries from shortening the condenser C-2. Since the grid is insulated from the filament by the condenser C-1 it is necessary to provide a high resistance grid-leak R to form a path for the negative charge which would otherwise accumulate on the grid and which would permit the grid to become so highly charged that no current whatsoever would flow in the plate circuit. The tube would become inoperative.

The circuits shown in figures 1 and 2 can be used for CW transmission. A very simple but efficient transmitting circuit is given in figure 3. Here we have an open radiating oscillatory circuit. The wave-length range is quite broad with a minimum adjustment or change of coupling. In other words, practically no coupling adjustment is necessary for a large range of wavelengths. The tuning is very simple. It is only necessary to shift the antenna clip or ground clip until maximum radiation is obtained or until both circuits are in resonance. The tuning qualities of this circuit with an antenna having low ohmic resistance is very selective, and the wave, while not only pure has practically zero decrement in comparison to undamped wave decrements. This permits very sharp tuning at the



Circuit diagrams of various CW telegraph and telephone systems

receiving station. In fact the sharpness of the tuning qualities of such a system have been found to be so great it was necessary in several cases to install a small variometer, placed in series with the ground at X (figure 3), with which to vary the wavelength slightly above and below the calling wave in order to attract the receiving operators' attention.

When the circuit is in operation the antenna oscillatory circuit loses energy by radiating into space. The greater amount of energy lost in this manner the better the transmitting antenna it is. If the antenna is a good radiator it requires a large power tube to continually furnish sufficient energy to the antenna to be radiated. This has been the experience of many experimenters who have endeavored to operate an ordinary receiving tube on a transmitting circuit. It fails to function because it cannot furnish enough energy to the antenna. Connecting several small tubes in parallel is never as efficient as employing one large tube. To operate several tubes in parallel connect their grids and plates together as well as their filaments. The latter can be operated from one source of current.

Many experiments have been made to find the best location for the telegraph key. If the key is connected in position 1 of the grid circuit, transmission is made possible but not practical, because, the electron flow from filament to plate is not stopped. The grid circuit is opened and the grid becomes highly charged negatively. This method is slow acting and the operator cannot transmit intelligently at a rapid rate, due to the fact that when the key is first closed the negative charge must leak off before the oscillations will start. It is clear then that there is a decided lag in the building up of the oscillations before they reach their maximum state. A high resistance may be placed in shunt to the key so that it forms a leakage path for the charged grid; however this does not work well and should not be employed. A second method of transmitting is to place the key in the "B" battery d.c. current supply (see key 2). When the circuit is opened the power supply is cut off and the tube discontinues generating oscillations. It is understood that when key 1 is being operated that key 2 is closed, and vice-versa. This method was described in the December issue of THE WIRELESS AGE and was employed by the writer when using the oscillation generator circuit as a transmitter.

A third method of transmitting is accomplished by inserting the key in series with the antenna ground-oscillating circuit. When the circuit is open no energy is radiated by the antenna system, but when the key is depressed energy is radiated. This method is not recommended on account of the high resistance which is bound to be present between the contact surfaces.

A fourth method of transmission is known as the de-tuning method and the arrangement is shown at 4 in figure 3. This is the method applied to arc transmitters of the Poulsen type. It is known as the compensation method and can be inductively or conductively coupled. A very unique scheme for the transmission of signals by the conductive compensation method is shown. A telegraph key (4) is connected so that when depressed it will short circuit the variometer inductance. If the receiving apparatus is tuned to receive from the transmitter when the key is depressed, it will not receive when the key is up, due to a difference in wavelength because first the antenna circuit is in series with the inductance only and next it is in series with the inductance and variometer. The difference in wavelength depends upon the degree at which the variometer is set. In this case the transmitted wave will be much shorter than the compensated or useless wave. Since we are dealing with undamped waves and the tuning at the receiving station will be very sharp the difference between the transmitting and compensation wave need be but a few meters.

Figure 4 shows that the antenna capacity has been substituted for the condenser C shown in figure 1. A condenser C-1 has been placed in the plate-antenna circuit so that the inductance L-1 will not prove a short to the d.c. current supply, due to its low resistance. Transmission is effected by opening and closing the direct current plate supply.

Undamped transmission for the amateur means that in the space of some few degrees on the condenser we can squeeze in some five or six amateurs, whereas, with the ordinary damped spark transmitters we are glad to be able to lose one transmitter of the latter type within the same degree of tuning, when endeavoring to tune one out. I have endeavored to make this clear to the reader in the sketch figure 5 where within one damped wave signal tuning qualities on the condenser scale (barely audible below and above maximum response) five sharply tuned undamped transmitters have been tuned in and out before the single damped signal has been eliminated. This is an exaggerated description; however, it will suffice to show what can be done along those lines. Even though we could only crowd three stations into that same space, then three times as many amateur stations could be operated with even

less interference. It allows for greater bands of wavelengths over which amateurs can successfully communicate without interfering with the commercial stations. Besides, the operation of CW transmitters is absolutely noiseless. This will permit many experimenters to transmit in the wee hours of the morning when conditions are most favorable for long distance record work. The whole transmitter, when employing one transmitting tube, can be enclosed in a container measuring about 8 inches by 8 inches and can be placed in the desk.

Connecting leads within the set whether it be transmission or reception apparatus should be as short as possible and of generous size. A small gauge of copper tubing is excellent for connections that are to be made between apparatus. Sleevings of cambric tubing may be used as insulation.

Last to be considered is resistance. As a rule it is more or less a neglible factor especially at low frequencies, but at high frequencies corresponding to the short waves used in C. W., it is an important factor. This is especially true of a series resistance. All connections should be soldered if possible and if they are changed frequently the points of contact should be sandpapered. Contacts on condensers and bearings on variometers if they are of that type should be examined for poor contact. As a rule it is well to select a variometer that has pig-tailed leads. Always bear in mind that a series resistance in a capacity circuit will, at high frequencies, introduce serious losses.

It is hoped that by putting into practice some of the foregoing suggestions, the reader will be enabled to bring about a more satisfactory and efficient operation of the station with which he is concerned.

Vicissitudes of a Radio Impresario

(*Continued from page* 53)

a program that has been advertised in 500 newspapers, from Massachusetts to Mexico, you send another accompanist to madame. Two hours later the phone rings and the secretary is sorry to inform you that the famous artiste cannot sing "because the accompanist you sent was not *en rapport* with madame." It makes no difference that the accompanist has played for almost everybody under the sun, she is not *"en rapport"* and as you very well know, if you are not that, life is *nothing!*

Miss Cooper, who holds quite an enviable position at the Third Presbyterian Church, gives you a ring as she says "Not to be catty, but why am I placed on the same program with that dreadful contralto from the Sixth United Presbyterian Church? I won't stand for it." This means that someone has to be juggled and someone else has to be placated.

The prime difficulty of the radio impresario's life, however, is in getting talent of the proper calibre. That artists are temperamental and sometimes peculiar seems to be inevitable. Dealing with these peculiarities is part of the job, often amusing, and never dull. Discovering the artist who has both temperament and talent is the big difficulty, for while the famous performers are well known, programs cannot be made up exclusively of international names. Local talent must be used, but only if it is really accomplished.

In order to determine the availability of unknown performers, we sent each applicant a questionnaire. It asks for name, address, phone number, nature of performance, whether vocal, instrumental or recitation, experience, musical connections, dates available, and space for suggested program.

While it is not always possible to tell from a suggested program just how meritorious the concert will be, yet one can tell something of the capability of the performer by glancing over his proposed list. A singer who offers Puccini, Handel or Gounod arias, or lieder by Strauss, Hugo Wolff, or Brahms, is almost certain to have had some technical experience.

To be sure, we are taking a chance on some of these unknown performers, and while we try to protect our vast audience as much as is possible by demanding references and recommendations, occasionally there is a slip. One night we had a woman who professed to have all possible experience. She had sent in a program of Schubert, Franz, and Grieg. It looked good and we booked her. When she arrived at the studio she shifted her program and sang "Old Black Joe," "Kathleen Mavourneen," and a number of other demi—semi-demi classics. She sang two numbers and the operators shut down the transmitter.

To canvass the territory and to make up a list for future reference, a new scheme is now being tried. Two nights a week, at the *Pittsburgh Post* studio, try-outs are being held for instrumentalists, singers, and reciters who are over 14 years of age, and who are not professionals. This scheme is being tried, not because the professional field has been exhausted—as a matter of fact, it has hardly been scratched—but because we feel that there are a great many talented youngsters, and not a few "oldsters" who can sing, play and recite in a pleasurable manner, and should be given a hearing, first, that the next generation of musicians may be stimulated, and second, to aid radio.

A critic passes judgment on the performer's ability, and if he comes up to 80 per cent. in tone, diction, phrasing and quality, he is given an opportunity to perform over wireless.

The percentage of musical talent in any commonwealth is astonishingly large. Almost everyone has some slight musical training, and when you combine this training with native ability, the result is often quite amazing. It is this same half-hidden, half-blossomed talent that makes choral organizations and amateur orchestras flourish. Say what you will, radio is stimulating and encouraging the young musical generation.

The one difficulty in preparing radio programs is the securing of sufficient instrumental material. Abraham Lincoln once said: "God must have loved the common people; he made so many of them," and by the same token there must have been a tremendous amount of affection spent upon singers as there are proportionately so few instrumentalists.

In making up KDKA'S programs, we try to obtain a capable instrumentalist for each concert. Violinists are numerous, but cellists, clarinetists, flutists, cornetists and the other instrumentalists that compose the orchestra are scarce, due to the fact that most of the players have theatrical or orchestral engagements.

If at times you feel that inner urge, the desire to obey that impulse, to sit down and send in a black-hand letter telling us how "rotten the program was last night," don't do it. We have professional listeners-in who tell us, and they don't sign their names "pro-bono-publico" nor yet "Well-wisher." A famous editor once said to me "People complain to me about how poor the stuff is that is in our journal. If they only knew how much worse the stuff is that we keep out, they would be grateful." Something like that is the experience of a radio impresario. We are the original, simon-pure "conscientious rejectors."

NEW APPLIANCES AND DEVICES

Mesco Brings Out a New Headset

THE Manhattan Electrical Supply Company has brought out a new radio headset. This headset will bear the numbers 2500 and 2501 and will replace a design which carried the number 480 which this company has been making for nearly ten years.

The new No. 2500 headset is vastly superior to the old type, not only in outward form, but in inward construction. It has the operating characteristics of the most expensive receivers, while it retails at a moderate price.

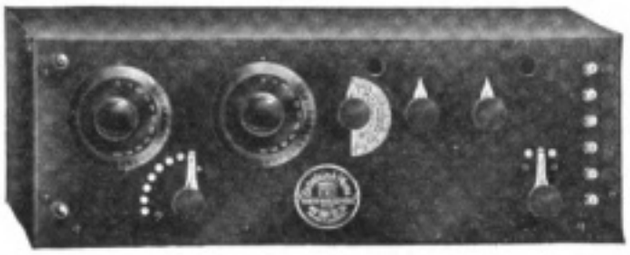
Mesco No. 2500 Headset

This headset is super-sensitive. It will produce loud signals, and because of the construction of its magnets, will produce sound without distortion. This is accomplished by designing the magnets to exert a center pull on the diaphragm, thus flexing it equally in every direction. The magnets are of tungsten steel. Another important feature is in the winding of the magnets. In the No. 2501 headset there are 6800 turns of wire as against 4400 turns on the No. 2500. As it is the number of turns which makes for greater efficiency and not the ohms resistance, the No. 2501 is an unusually effective receiver.

This headset is constructed with a sanitary headband. This is accomplished by covering the band proper with a rubber japanned finish which can be easily cleaned at any time. The case proper is flush on the back with no projections to scratch the furniture. In a similar way there are no projections on the headband to catch the hair. The cord tips are concealed within the case, making it impossible to unbalance the set by touching these with the hand. The polarity of the magnets are indicated in the case and a tracer telephone cord is used, so that the receivers may be correctly inserted in tube circuits. An eyelet is attached to the case and the tie-cords relieve all strain on connections.

The Entertain-A-Phone

ENTERTAIN-A-PHONE RECEIVING SET NO. 2 is manufactured by the New York Coil Company, 338 Pearl Street, N. Y. City, who, for the past 17 years, have been actually engaged in the manufacture of wireless and precision electrical devices. This set consists of a tuner, detector, and two stages of audio-frequency amplification, all contained in one hard-wood cabinet. The transformers, condenser and variocoupler are the standard New York Coil Company's products. This is a two circuit non-regenerative tuner which the makers guarantee to be free from distortion and objectionable noises. Its operation is as simple, so the makers claim, as that of an ordinary phonograph. All connections are made through the rear of the cabinet. The various parts are secured to the bakelite panel and an extra base so that by loosening several screws the panel is withdrawn which does not disturb the connections. An original feature is the provision for three separate sets of phones, either set of which is used by turning a switch on the panel. Of course a loud speaker may also be employed.



The Entertain-A-Phone Receiver

A New Vernier Condenser

THE O. C. White Co., of Worcester, Mass., has a new vernier condenser on the market, known as Type 1-V.C. The bearings are of special cone type, with spiral spring tension, self-centering and so effecting constant and positive contact. The dimensions are width, 3⅝ inches; height, 3 inches; depth, 2⅜ inches.

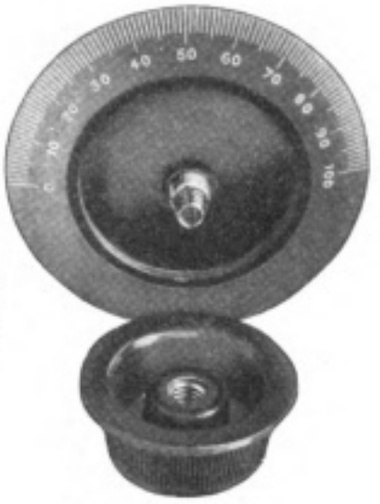
"Pot-Rheo," of Acme Apparatus Co.

A REFINEMENT in radio apparatus has been made by the Acme Apparatus Company in their Pot-Rheo, or combination unit containing a potentiometer and rheostat mounted concentrically in the same base. This piece of apparatus finds a ready use in tube sets of all kinds. The rheostat is for filament control, and the potentiometer for fine variation in either B battery potentials on a detector tube, grid potentials on audio amplifier tubes, or as a stabilizer, so essential for radio frequency. Both the potentiometer and rheostat are wire wound; the former 200 ohms, and the latter 4 ohms.

A New Invention in Radio Knobs and Dials

MR. ROBERT W. TAIT, of New York City, has recently been granted a patent on a knob and dial for radio uses, in which the use of a set-screw, for fastening it to a shaft is eliminated.

The manufacturer and radio experimenter is fully aware of the disadvantages of the usual set-screw, such as the splitting of the head of the set-screw, the stripping of threads, the tendency of the dial to wobble upon the shaft, aside from the extensive time for proper mounting. All these disagreeable and costly features have been eliminated through Mr. Tait's new invention.



Tait knob and dial

To mount this knob and dial, it is simply necessary to hold the dial with one hand, and screw on the knob with the other. No tools are necessary. When fastened it will not wobble on the shaft, at the same time being self-centering and self aligning. A change for the better is also noticeable in that the numerals are at the correct angle for best visibility. This knob is being manufactured by the Tait Knob and Dial Company of 11 East 42nd St., New York City.

Du Pont Brings Out Viscolac, a New Finish

A NEW finish for electrical apparatus, which also has the qualities of an excellent insulating material is announced by the chemical products division of the du Pont Company. The new material, which will answer the demand for better dielectric qualities, is known as "viscolac." Viscolac is made from a cotton base and is inherently tough and waterproof. Shellac is susceptible to moisture or dampness, deteriorates rapidly, does not stand rough usage, and is far from being a perfect insulation. It is claimed that viscolac has none of these defects. Viscolac can be applied by brush, dip or spray.

"B" Battery in Storage-Battery Form

THE Willard Storage Battery Company, of Cleveland, has put on the market a 24-volt "B" battery, in storage-battery form, which can be recharged as often as is desirable. It consists of twelve cells, of 2 volts each, a total of 24 volts. Willard threaded rubber insulation is used between the plates, and the case and cell containers are so designed that all elements are visible and the height of the solution can easily be determined. The cells are spaced an ample distance apart to prevent leakage of current, which frequently causes frying noises in a tube set. Adjustments of voltage can be made, as the connections between cells of the battery are exposed. Special care has been taken in designing the battery to prevent the solution from flowing over the sides of the cells. The vent chamber is so designed that the cover is self-draining.

New Dictograph Radio Loud Speaker

THE Dictograph Products Corporation, of 220 West 42nd Street, New York, has brought out a loud speaker which is meeting with favor on the part of the radio public.

The loud-speaking unit incorporated in the Dictograph Radio Loud Speaker, is a specially devised loud-speaking element. The design and construction is such as to permit of maximum amplification and the elimination of side tones, distortion, mechanical vibration and the metallic sound common in the phonograph and in other radio loud speakers.

The Dictograph Radio Loud Speaker is adapted for use in all types of radio receiving sets in which a detector unit and two stages of amplification are employed. It is not recommended for use with crystal receiving sets, unless these sets are located close to a broadcasting station and the volume of the sound received through a head set is quite strong. In general, it will be found that where a head set will bring good, clear and distinct volume, the Dictograph Radio Loud Speaker will give very satisfactory results. All that is necessary is to tune the receiving set to the maximum volume.

The Dictograph Radio Loud Speaker is a simple, compact, home-type instrument. Its finish and pleasing design make it a valuable addition to any receiving set. The eleven-inch burnished copper bell horn is attached to the die-cast black enamelled aluminum tone arm with nickel trimmings. The sound chamber is enclosed in a solid hardwood ebony finish cabinet mounted upon rubber pads to avoid marring highly polished surfaces.

C. Brandes, Inc., Establishes Canadian Factory

C. BRANDES, Ltd., has been incorporated at Ottawa, Canada, and a factory leased at Toronto, Ont., for the manufacture of the well-known Brandes head telephones. C. Perkins, Ltd., Montreal, has been appointed Canadian representative. The popular price of $8.00 for the superior headset will be maintained in Canada.

The Monthly Service Bulletin of the

NATIONAL AMATEUR WIRELESS ASSOCIATION

Guglielmo Marconi, *President* | J. Andrew White, *Acting President* | H. L. Welker, *Secretary*

Founded to promote the best interest of radio communication among wireless amateurs in America

HEADQUARTERS: 326 BROADWAY, NEW YORK

DURING the summer just passed some very interesting experiments in transmission on wave-lengths considerably below 200 meters have been carried on by a few stations in the Second, Third and Eighth districts. Not much definite information is available at present, but it is known that communication has been maintained over considerable distances during times when very bad conditions, because of static and interference, existed on 200 meters, without any appreciable difficulty having been experienced on the shorter waves. In fact, it is believed that these experiments have pretty definitely established that the transmission curve for a given power takes an upward bend after the 200 meter point has been passed. Contrary to what has been generally believed, the greatest difficulty in maintaining communication on 125 and 150 meters has not been at the transmitting end, but at the receiver, where a special type of receiver, well shielded, was required. At the transmitting end, there has been little, or no difficulty in getting a considerable amount of power into the antennas of the stations participating in this unusual work.

At 2ZL station, Valley Stream, L. I., the transmitting antenna consisted of four vertical wires, in a 5-foot square cage, the total height being 50 feet above ground. A counterpoise was used, consisting of 7 wires, 20 feet long, directly under the cage and about 7 feet above ground. It was possible to tune the transmitter, consisting of two 250-watt Radiotrons UV-204, in a full-wave A.C. rectification circuit, to 150 meters, without the use of a series condenser. The antenna current on this wave-length was 4 amperes. With the use of a series condenser of a value of .0003, the wave was reduced to 125 meters, and the antenna current on this wave-length was 3.5 amperes. By adding still more capacity in series, the wave-length was reduced to an even 100 meters, with 3 amperes in the antenna.

Comprehensive experiments, to determine the range, variation in strength and other matters of interest are now being carried on and the results will be published in a later issue.

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FORMATION of a radio club among students and graduates of the Elm Vocational school, Buffalo, N. Y., is planned for the early Fall. Arrangements are already under way for the formation of the club.

The club idea is the outgrowth of an exhibition of radio equipment manufactured by students of the school and which is now on display.

School students, aided by their instructors, have manufactured more than 25 complete receiving sets. A competition for the students resulted in prizes being awarded as follows:—

Alfred Pfuelb, 1485 Genesee street, a student in the automobile department of the school, was awarded first prize. His set rivals in almost every detail the higher grade commercial sets which retail at or near $100.

"It took me nearly a year to make the set," the prize winner said. "It works fine. I have heard the New York police sending out numbers of stolen cars, and have heard all of the big broadcasting stations in the East."

Second prize was won by William Hartmann, 123 Herman street. He produced a practical set at a cost of less than $4.

Third prize went to Chester Halladay, East Aurora.

Students who made their own sets were delayed by the scarcity of materials.

More than 25 receiving sets are on display in the school halls.

Recently the Elm school orchestra gave a concert in the broadcasting station of the Federal Telephone and Telegraph company. School students "listened in."

The club is to be formed as soon as school sessions are resumed. Its membership will include those who have already made receiving sets and others who contemplate similar work.

△ △

THE first fire recorded in New York City as caused by an amateur radio set occurred during a recent storm, when a bolt of lightning struck the apparatus belonging to Charles Down. The set was near the window of a room on the top floor of the apartment house at 410 West Forty-fourth Street.

Down, who is an electrician, blamed his lightning arrester for the blaze. While the small instrument worked successfully during the many electrical storms of last month, Down said the static on this occasion was too much for it. On the other hand, Dr. Alfred N. Goldsmith, Professor of Electrical Engineering at City College and director of its radio laboratory, did not think Down's theory plausible. He regarded the occurrence as "almost a phenomenon," and believed that a heavy bolt of lightning penetrated the porcelain-shelled arrester and struck the inside aerial. Another explanation offered by Dr. Goldsmith was that Down's ground wire, which connected with a water pipe, was not properly adjusted.

When Down arrived at his apartment after firemen had extinguished the small blaze, he made a careful examination of the apparatus and found the outside aerial and the roof antenna in perfect condition.

On the ledge outside the window was the arrester and ground wire. "Instead of jumping the gap to the ground wire," said Downs, "the electricity went through the indoor aerial. The lightning seemed to be of greater voltage than at any other time since I installed the set and the static in the air was apparently heavier than the arrester could bear."

△ △

THE San Francisco branch of the Radio Institute of America, located in the Call Building, has just installed one of the new General Electric radio telephone transmitters and receivers of the type used in ship to shore duplex telephony. Known as "The Ocean Telephone," the new set permits not only telephone conversations, but also CW and ICW telegraph. Its installation in the Radio Institute's school on the Pacific Coast brings that branch on a par with the headquarters at 326 Broadway, New York City, where one of these sets also is used in training students in the most modern tube work.

△ △

THE Portsmouth Radio Club, at a recent meeting, heard two interesting talks dealing with radio work. One of them was delivered by A. A. Kubiac on "Single Tune Receiver and Its Operation." Mr. Kubiac explained that many abuses are caused by improper operation, and that considerable interference is brought about by allowing a regenerative set to generate energy as an oscillator.

The second talk was delivered by Dr. S. J. Sechelman on "Chemical Electricity." Dr. Sechelman gave an comprehensive talk of the action of cells and voltage.

Both talks were given in simple language, devoid of technical expressions, and were easily understandable by the layman.

THE Milwaukee Electrical Contractors' association held their final radio class of the season recently in the School of Engineering.

Robert Linx, radio operator at the school, spoke on broadcasting in general, demonstrating his talk on a transmitting set. He also explained receiving sets.

Prof. F. C. Raeth, of the engineering school, explained the various call letters and abbreviations used in the various countries.

This class, which has been meeting twice each week at the Public Service building, is composed of electrical contractors, who are desirous of knowing something of the latest fad, in order to help their patrons. Charles Krech is president and J. Nixon is secretary. About seventy-five members are enrolled.

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A NEW radio club has been formed at Omaha, Neb. The movement has been started by Ray Noreen and Clarence Eastman, both old time "spark gaps," and the object of the proposed organization is to get together the folks actively interested in radio for the purpose of solving mutual problems and promoting mutual interests.

△ △

SOME one, evidently with malice aforethought, recently sent a postcard to a certain well-known radio personage, who operates a station known as 2ZL. On the card was written:

"A village is where the police and fire departments are the same man."

The operator took this as a slur upon his home burg of Valley Stream, L. I., and while he admits that they do take in the sidewalks and lock up the town every night at 9, he points out the fact that the police and fire departments of his town are two men.

△ △

IN order to collect data necessary to enable it to determine upon a solution to the broadcasting interference problem, the Bureau of Standards of the Department of Commerce is asking well-known amateurs in all parts of the country to conduct special tests during the month of September. Advanced amateurs whose expertness and technical equipment are known to the various district radio inspectors have been asked to cooperate, and have been furnished with details of the information that is desired.

The principal data needed concerns the daylight range of the various stations broadcasting on 360 meters, in order to determine the limits of the zones in which interference occurs. It is felt in Washington that the radio characteristics of the different districts have great influence on the range of stations, and that power input gives comparatively little guide. The tests in September are expected to reveal what might be called the "natural broadcasting boundaries." No announcement has been made as to what will be the action taken when all the data is received, but it is expected that the Department of Commerce will use the information in alloting broadcasters wave-lengths of other than 360 meters. The investigation is a scientific study of just what interference exists on that wave-length, and is expected to be followed by remedial action as soon as the necessary information is received.

The action of the Bureau of Standards in asking the amateurs to undertake the work is rightly regarded as another striking tribute to the men—and women, too—who have done so much for the development of radio communication.

(*Continued on page 76*)

Crosley Radio-Frequency Tuned Amplifier

THE Crosley Manufacturing Company of Cincinnati, has brought out a radio frequency tuned amplifier. This instrument, known as the R. F. T. A., consists of a tuned radio frequency transformer, vacuum tube socket and vacuum tube control rheostat, the transformer consisting of a variable condenser, shunted by an inductance coil. The condenser is tuned so that its relation with the coil forms an infinite impedance to the frequency of the incoming signal that it is desired to tune. As a result, signals of other frequencies and a large percentage of static are filtered out, while the desired signal is impressed, multiplied by amplification constant of the first tube on to the grid of the detector tube. This increases the signal audibility and makes possible the hearing of signals which would normally not be heard.

New Radio Frequency Transformer of the Acme Apparatus Co.

THE Acme Apparatus Company has developed a radio frequency transformer, R-2. By using these radio frequency transformers, the weak incoming radio energy may be amplified before reaching the detector tube, after which audio frequency can be employed for loud speakers. It is stated that the problem of a satisfactory transformer for short waves was given long consideration by the Acme engineers, and that the result is a radio frequency transformer which upholds the reputation of the Acme line for efficient and dependable service.

The Baldwin Radio Company

THE Baldwin Radio Company of Salt Lake City, Utah, with a capital of $1,000,000 has been organized and completely financed. The officers are David A. Smith, President; Lester D. Freed, Vice-President, and J. F. Nibley, Secretary and Treasurer. This company has the license to manufacture the Nathaniel Baldwin radio telephone headset and loud speaker. The new factory of the company will have a daily capacity of 2,000 complete head sets. Through improved methods of manufacture these telephones will be superior in sensitiveness and correct tone reproduction to the very excellent instruments which have heretofore been placed upon the market.

THE Chester County (Pa.), Radio Association has just issued its Year Book for the period ending last June, and has been receiving the envious comments of all the other radio clubs ever since. The Year Book consists of 40 pages, printed on expensive coated paper, with a cover of heavy blue stock, and reports the excellent work done by the association during the past year. Numerous illustrations show the extensive equipment of some of the stations whose operators are members, notably 3ZO and 3XW. 3OI the mobile station contained in a radio shack mounted on a motor truck, which has taken prizes in many parades in various parts of the state, also is described.

△ △

WILLIAM F. B. McNEARY, radio editor of the Newark "Sunday Call," whose voice is known to amateurs and broadcasting fans alike, has been decorated with the Polish Commemorative Cross, which has just been bestowed by Marshal Pilsudski of Poland, for "exceptionally meritorious and distinguished service." McNeary served two years in Poland with the U. S. Military Attaché, Major E. E. Farman, who has also received the same decoration.

△ △

THE Four National Engineering Societies, the offices of which are at No. 29 West 39th Street, New York City, probably maintains the best free employment bureau connected with any industry or profession in the United States. Members of many affiliated societies and organizations are available through this service bureau, so that it is in fact a national clearing house for engineering talent of all kinds. The bureau has advised The National Amateur Wireless Association that its members are given a cordial invitation to make free use of the bureau by advising their local organizations of the existence and usefulness of the Engineering Societies' employment service. The administration of the bureau is in charge of Mr. W. V. Brown, Manager, Employment Service, Engineering Societies Building, No. 29 West 39th Street, New York City.

△ △

DR. A. E. KENNELLY, professor of electrical engineering at Harvard University and the Massachusetts Institute of Technology, who is one of the National Advisory Board of Vice-Presidents of the National Amateur Wireless Association, has been awarded the Cross of the Legion of Honor, for distinguished services as exchange professor in engineering to the French Republic.

Wireless in the South Seas

(*Continued from page* 54)

marked decrease in their daily attendance. At the end of another month no natives were to be found at 4 P. M. to assist me. My friend and I noticed them put to sea in their outriggers about 3:30 P. M. to go fishing until close onto 5 o'clock. This was a pretense on their part as their boats revealed few if any fish for their hour's efforts. I again took the matter up with the island governor, and he, very chagrined, ordered the village policeman, a native of gigantic proportions, to see to it that two men were on hand daily at the prescribed time. This together with our occasional gifts of tobacco and chewing gum, resulted in two natives being on hand each day.

The natives were very friendly to us, and with their assistance and guidance we were soon expert surf riders and fishermen, and took part in all their sports. The excellent opportunities offered for radio communication, together with a background of primitive beauty and customs, made my visit to these fascinating isles very memorable, and is a trip that is appreciated much more when one returns to the noisy cities and their daily routine.

US Isn't American

IF ANY amateur or commercial operator hears "US" being called he need not jump to the conclusion that somebody is trying to raise the whole United States. "US" is an outlaw call chosen by the United Fruit Co. in 1909 for its station on Swan Island, off the coast of Honduras. The island has never had its nationality settled, and is known as "the island without a country," though Americans have lived there for many years. Should the island become American territory, it would lose its US call, as all American stations are in the N, K and W series.

STATIONS WORKED AND HEARD

Stations worked should be enclosed in brackets. All monthly lists of distant stations worked and heard which are received by the 10th of each month will be published in the next month's issue. For example, lists received by November 10th will be published in the December issue. Spark and C. W. stations should be arranged in separate groups.

1IV—C. H. Campbell, 66 Vine St., Bridgeport, Conn., June and July.

CW—1aao, 1aby, (1acs), (1acu), 1adl, (1agi), 1aip, 1aiq, 1aju, 1anq, 1ant, 1ape, 1ar, 1ary,-1asf, 1aun, (1awb), (1axm fone), (1ayz), (1azd), 1azw, 1bas,-1bes, 1bet-1bfe, 1bgf, (1bgp), 1bka fone, 1bkq,-1bln, 1bnt, 1bqe, 1bqk, 1bqt, 1bve, 1cak, (1ccz), 1cfi, 1cgr, 1chj, (1cik), (1cjh), 1ck, 1clz, 1cm, 1cmk, 1cne, 1cnr, 1cpn, 1csl fone, 1cve, 1es, 1gv, 1hk, 1hx, (1jt fone), 1kc, 1pm, 1pr, 1pt, 1qn, (1qp), 1rd, 1sj, 1sw, (1uj), (1vq), 1xg, 1xm, (1xx), 1xz, 1yb, 1yk, 1ze, 2abd, 2abq, 2acy, 2adv, (2afc), 2afp, 2aif, 2aja, (2ajw), 2amq, 2amz, 2apa, 2auz, 2awf, 2awh, (2aws), 2ayf, 2ayv, 2azc, 2bdf, 2bdg, 2bdm, (2bdu), 2bea, 2beb, (2beh), 2bem, (2bff), 2bfx, 2bfz, 2bgj, 2bgm, 2bgw, 2bhq, 2bjo, (2blp fone), (2bml), 2bnc, 2bnf, 2bnz, 2bqd, (2bqh), 2bqu, 2brb, (2brc), 2btj, 2btw, 2bua, 2bum, 2byc fone, 2byv, 2cah, 2cbg, 2cbt, 2cbw, 2cc, 2ccd, 2cdk, (2cei), 2ces, 2cft, 2cgk, 2cim, 2ckk, 2clj, 2cnp, 2chq, 2cox, 2coz, 2cpd, (2cpk), 2cwe, 2da, 2fc, 2fp, 2fz, 2hj, 2jw, 2kl, 2mj, 2nz, 2oe, 2rj, 2ry, 2sq, 2ts, 2ud, 2vc, 2vh, 2xaj fone, 3aaz, (3adx), 3afb, 3ajd, 3aln, 3ano, 3atz, 3bfu, 3bg, 3bgt, 3bit, 3blf, 3bnu, 3bty, 3bvc, (3dt), 3fs, 3iw, 3lr, 3mo, 3od, 3qv, (3vw), 3xa, 3zo fone, 3zz, 4dc, 4gl, 8ago, 8aio, 8amm, 8aph, 8aqo, 8asv, 8avd, 8avl, 8avl, 8awm, (8beo), 8bhx, 8bil, 8blx, (8bnu), 8brf, 8bxh, 8bxt, 8cay, 8caz, 8cbj, (8ccx), (8cid), 8cjh, 8ckk, 8ckm, 8cko, 8ckw, 8cng, 8cpx, 8dr, 8hj, 8ju, 8ml, 8nb, 8sp, 8sz, 8ue, 8vq, 8wa, 8xe, 8xv, 8zz, 9aap, 9aix, 9io, 9uu, Can. 9al, 9aw.

Spark—1adc, 1aok, 1aw, 1boq, 1bpz, 1brq, 1bvb, (1cdm), 1dy, 1gm, 1lz, 1sn, 1wq, 2abm, 2acy, (2ad), (2adk), 2ale, 2apd, 2awf, 2bgr, 2bjo, 2bpf, (2bsc), (2bzf), 2ct, 2di, 2el, 2fp, 2mn, 2nf, 2om, 2pf, 2tf, 2tu, 8apb, 8azf, 8brl, 8tc, 8ew, Can. 3gx.

3-BEI, W. Walter Filson, Audubon, N. J., (July.)

Spark.—1boe, 1brv, (1dy), 1ho, (1lz), 2acp, 2aer, (2ary), 2 fp, (2om), (2sz), 4fd, 4it, 8aib, 8ajt, 8ajx, 8bda, 8bdv, 8bg, 8bgt, 8bl, 8bsy, 8bqa, 8bun, 8ceb, 8dd, 8ea, (8ew), 8hl, (8il), 8oi, 8rq, (8tc), 8uc, 8ve, 8zo, 9uh, Canada 3gn, 9bs.

C. W.—1ajl, 1anq, 1gv, 1pt, 1qn, (2awf), 2bkt, 2bml, 2fp, 2nz (day), 3bz, 3tj, 3zz, 4bx, 8afd, 8aoi, 8aqo, 8awp (fone), 8bpl, 8brf, 8cjh, 8ckm, 8cqn, 8ue, 9aps, 9cp.

6AWP—Everett W. Thatcher, 407 West First St., Santa Ana, Calif.

C.W.—2fp, 3fs, 3aln, 4bq, Can4cb, (5za), 6aif, 6aiy, (6ak), 6akw, (6ale), 6aot, (6asj), (6atp), (6aun), (6awt), 6bjd, (6bjy), (6bju), (6bkb), 6bpo, 6bqf, 6bsa, 6df, 6ek, (6fh), 6gh, 6ib, 6ku, (6lu), 6nn, 6nx, 6ov, 6pi, (6ti), (6tw), 6xa, (6xad), 6xas, 6xh, (6za), 6zaa, 6zac, 6zae, 6zaf, (6zb), 6zg, 6zi, (6zn), (6zt), 6zx, (6zz), (7dp), 7nf, (7na), 7ni, 7mf, (7oz), 7sc, 7xf, 7xg, (7zu), 8agz, 8brl, 8jl, 6xv, 9aav, 9aeg, 9alg, 9aog, 9ajs, (9amb), 9arj, (9ayu), Can. 9bd, (9bji), 9bsg, (9dth), (9dtm), (9dva), 9dxn, 9dzj, 9nx, (9ps), (9wd), (9wu), (9xaq), 9xm, 9yae, (9zac), (C18).

Spark—5if, 5hk, 5xd, 5xu, 5yq, (5za), (6aak), 6aau, (6abu), (6aeh), 6agt, (6afh), 6ajr, (6akl), 6amz, 6ar, 6as, (6atu), 6bqd, (6bju), (6bjy), 6bjv, 6cc, 6cs, 6gr, 6hc, (6ic), 6iu, (6kc), (6vk), 6vx, 6zam, (6zb), 6zq, 6zu, 6zx, 6zz, 7bs, 7cb, 7ck, 7gj, 7gt, 7hf, 7im, 7in, 7jd, 7kb, (7ly), (7mf), 7mp, 7nf, (7ot), 7tj, 7vd, 7wj, 7xv, (7ya), 7yj, 7ys, 7za, 7zm, 7zo, (7zu), 9aeg, 9aog, 9ayu.

The 20 K.W. Transmitting Radiotron

(*Continued from page* 58)

These 20 kw. tubes are ordinarily operated with about 20,000 volts d.c., which is obtained from ordinary 60-cycle alternating current by rectification, using two or more kenotrons, together with large condensers for smoothing out the rectified alternating current.

A bank of ten tubes of this kind operated in parallel is capable of generating 200 kw. of power, which is about all that is required for most trans-oceanic radio communication. It is probable that outfits of this kind will displace the larger and more expensive alternators, the most successful type of which has been the Alexanderson alternator.

The 20 kw. tube merely marks one stage in the development of still larger tubes. It will undoubtedly be possible, when the need arises and when the necessary development work has been completed, to construct tubes of many hundreds, or even thousands, of kilowatts.

Explains Super-Regeneration

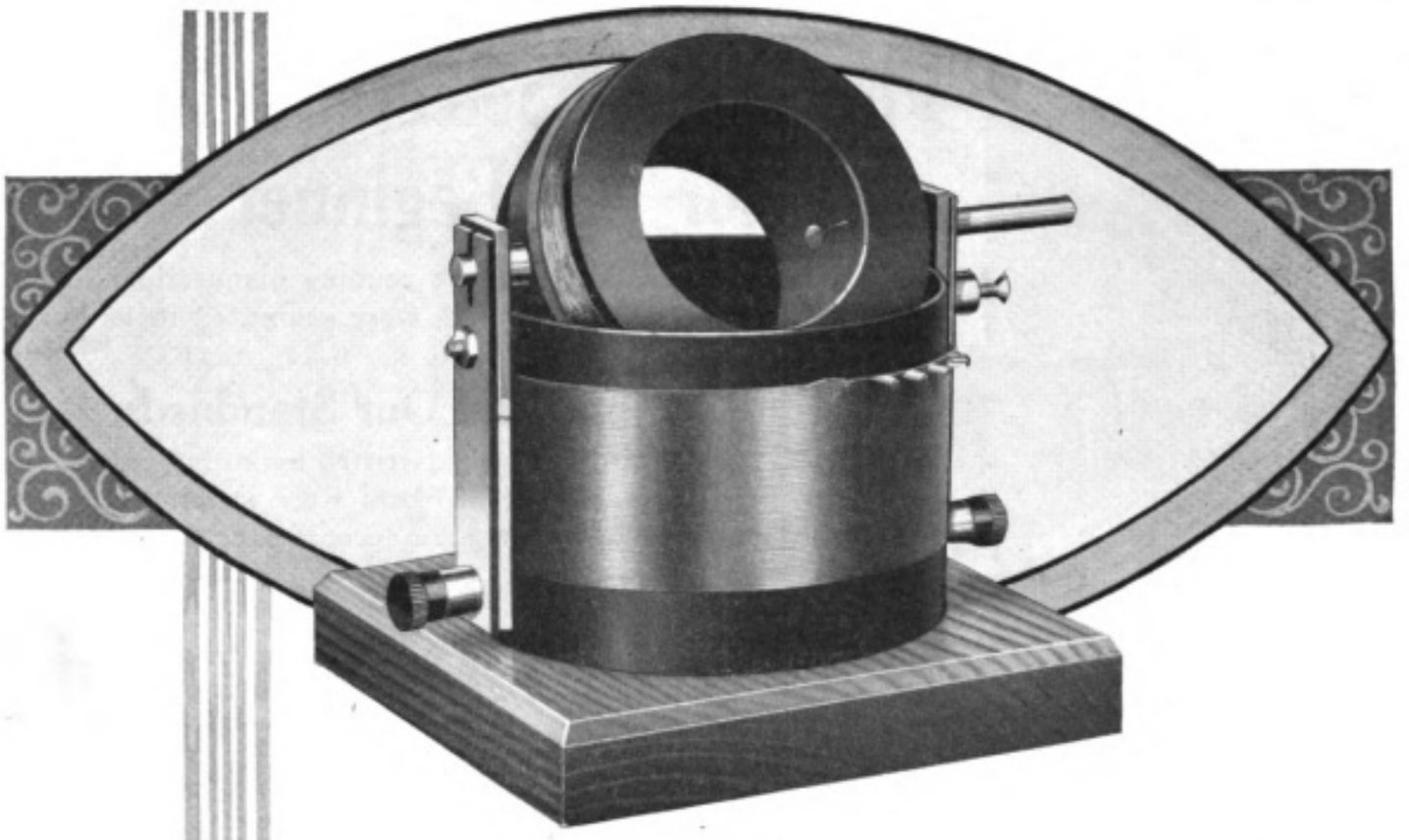
WHAT is probably the first book exclusively devoted to the new Armstrong Super-Regenerative circuit has just appeared from the pen of George J. Eltz. Being the result of his experiences with the circuit, and also representing advice and suggestions made by Mr. E. H. Armstrong, the inventor himself, the book may be said to be practical and authoritative.

Though the subject necessarily is technical, Mr. Eltz has managed to present it with the minimum of theory, contenting himself, quite wisely, with outlining just enough of the theoretical in general terms to explain why the circuit operates as it does. Complete details are given of the various methods of securing the super-regenerative effect. Numerous hook-ups are given, fully numbered with reference to foot-notes stating the values of the different parts.

Constructional details are shown for a complete receiver, including even a drawing for drilling the panel. In this chapter there is the most complete series of photographs of an assembled radio set that has ever appeared in a book, so far as is known. No less than seven photographs show the set from top, bottom, back, three-quarter views from each end, and front. With the dimensioned drawings and wiring diagram it would be a stupid man who would go wrong. The chapter closes with instructions for converting an ordinary Grebe CR-5 regenerative receiver into a super-regenerator, a process that is quite possible with this and many other straight regenerative sets, though so far this is not generally known.

An important chapter is devoted to the constructional and electrical details of the filter circuit that is essential, and which has given trouble to some constructors.

The Armstrong Super-Regenerative Circuit, by George J. Eltz. New York, 1922, can be obtained of THE WIRELESS PRESS, 326 Broadway, New York City, Price $1.00.



The Thoroughbred Vario-Coupler

An essential to every worth while radio set

IT is an interesting thing to observe that A. Frederick Collins, in "The Radio Amateur's Handbook" (Thomas Y. Crowell Co., New York), places the vario-coupler first in the list of parts essential to a successful regenerative receiving set. This only serves to emphasize the importance of a proper vario-coupler as essential to every set.

The Thoroughbred Vario-Coupler because of its exclusive features is chosen by experienced amateurs to complete their sets. The Thoroughbred Vario-Coupler is of the all-moulded type which reduces losses and is not subject to dampness. The first seven taps on the primary are tapped one turn at a time and the last seven, a tap at each seven turns. The user is thus able to tune in one turn at a time—a feature not found in any other vario-coupler.

The amateur can use it with base on a table or he can mount it on a panel merely by removing this base.

The secondary of the Thoroughbred Vario-Coupler is wound with fine wire in order that it may be used for plate and tickler, thus doing away with the need for a variometer. On the average aerial it has a wave length of 200 to 700 meters. You can buy it at good radio and electrical stores for $5.00.

The Thoroughbred Vario-Coupler is but one of fifteen radio products manufactured by the Marshall-Gerken Company in their new and larger plant at Toledo, Ohio.

Write for Interesting Literature

THE MARSHALL-GERKEN CO.
Jackson and N. 12th Street Toledo, Ohio

Thoroughbred Apparatus

Amateur Radio Stations of the United States

Supplementary List brought up-to-date from August WIRELESS AGE

First District

1 ABS Joseph Lyman .....North Perry, Maine
1 ADW Emery E. Chapman, 702 Newport Ave., Attleboro, Mass.
1 ADX Horace W. Fuller, Hiller St.....Marion, Mass.
1 ADZ Richard F. Shea, Humarock Village..Scituate, Mass.
1 AEB Raymond Sherwood, Hills Pt. Rd....Westport, Conn.
1 AEG George Peterson, Jr., Hillside Ave..Eastern Pt., Conn.
1 AEL Beckley, F. C., 55 Ashley St.....Hartford, Conn.
1 AEQ Homer Richardson, 56 Grove St.....Dover, N. H.
1 AER Powers-Tucker Radio Co., 14 Putnam St., Fitchburg, Mass.
1 AEW Robert V. Howard, Camp Merienfeld..Chesham, N. H.
1 AEY Roland E. Ford, Liberty St.....So. Hanson, Mass.
1 AFE Frank J. Page, 29 Nonquit St.....Dorchester, Mass.
1, AFF Aubrey B. Call, Peltema St.....Pittsfield, Maine
1 AFH Chas. L. Wilcox, 3891 N. Main St..Bridgeport, Conn.
1 AFL John C. Stiles, 22 Wyman St.....Stoughton, Mass.
1 AFN Thos. C. Howard, Second Beach Rd..Newport, R. I.
1 AFR Frederick Buck, Jr.....Fort Adams, R. I.
1 AGC Alpha A. Learned, 76 Camp St.....Providence, R. I.
1 AGG Fredk. C. McClary, 49B Eutaw St..Lawrence, Mass.
1 AGS Lauren L. McMaster, 36 Yale Ave., Wakefield, Mass.
1 AGT Thomas P. Hiekey, 14 Denny St.....Worcester, Mass.
1 AHC Chester Doubleday, Peaceable St.....Ridgefield, Conn.
1 AHJ Otis B. French, Plimpton Road..Watch Hill, R. I.
1 AHP Herbert O. Harris, 32 Prospect St..Haverhill, Mass.
1 AHT H. Russell Burdick, 22 Park Ave....Westerly, R. I.
1 AHW Carroll C. Moulton, 261 Denver St., Springfield, Mass.
1 AIG Walter Schryer, 2 Roberts Court....Hartford, Conn.
1 AII Walton E. Blake.....Kittery, Maine
1 AIY Alfred M. Winchell, R. F. D. No. 1..Waterbury, Conn.
1 AJH John J. O'Connell, 54 Fairen Ave., New Haven, Conn.
1 AJK Leslie A. Harlow, 3 Mayflower St.....Plymouth, Mass.
1 AJQ William A. Green, 92 State St.....Berlin, N. H.
1 AZU Westinghouse Elec. & Mfg. Co., 12 Farnsworth St., Boston, Mass.
1 WB Edmund I. Waldman, 73 Whitmarsh St., Prov., R. I.

CHANGE OF ADDRESS

1 ET George A. Brown, 301 Prospect St...Pawtuchet, R. I.
1 HM Leon W. Bishop, 160 Cottage St.....Athol, Mass.
1 MK George A. Chute, 32 Bullard St.....Dedham, Mass.
1 AUL Leslie J. Clark, Lincoln St.....N. Andover, Mass.
1 FD Albert E. Snow, 30 Cary Ave.....Chelsea, Mass.
1 BFL John H. Karl, 568 Union St....New Bedford, Mass.
1 BGY Stephen J. Kalder, 33 Tripp St....Fall River, Mass.
1 BLU Bertram P. Hathaway, 530 South Beach St., Fall River, Mass.
1 BOG Malcolm E. Hart, 64 Kellogg St..Fall River, Mass.
1 BPE Jas. P. Lightbown, 535 Birch St....Fall River, Mass.
1 BUE Milton T. Silvia, 41 Sycamore St..New Bedford, Mass.
1 BZP George Marshall, 368 Allen St..New Bedford, Mass.
1 CJM Fredk. J. McLane, Jr., 32 Underwood St., Fall River, Mass.
1 CTT William F. Smith, 207 Brook St..New Bedford, Mass.

Eighth District

8 CTA James C. Dettling, 59 Hawthorne Ave..Crafton, Pa.
8 CTB Elmer J. Emery, R. F. D. No. 4....Auburn, N. Y.
8 CTC Fremont F. Purdy, 422 E. 4th St..Huntington, W. Va.
8 CTD Duane Nathan Hadley, 56 Walnut St....Shelby, Ohio
8 CTE Carl R. Sherman, 1225 Dudley Ave.....Utica, N. Y.
8 CTF Clarence C. Young, 1505 Federal St., Pittsburgh, Pa.
8 CTG Thos. Welch Elder, 424 S. 10th St..Coshocton, Ohio
8 CTH Harold W. Pletcher, 689 Prescott Ave..Dunmore, Pa.
8 CTI Forrest W. Dana, R. F. D. No. 5....Paulding, Ohio
8 CTJ Edwin D. Strickland, Cor. Market & 2nd Sts., Warren, Pa.
8 CTK John G. C. Miller, 25 Gelston St....Buffalo, N. Y.
8 CTL Ferdinand Carl Kaffer, 707 Wolf St., Syracuse, N. Y.
8 CTM Willard J. Laidlaw.....Marlette, Mich.
8 CTN Charles Stowell, 225 N. 2nd St.....Olean, N. Y.
8 CTO Lion Gardiner Mason, 7306 Hermitage St..Pitts., Pa
8 CTP Richard M. Brown, 532 Donner Ave..Monessen, Pa.
8 CTQ William S. Gruber, 306 Leah St.....Utica, N. Y.
8 CTR Harry E. Fitch, 219 W. Church St....Elmira, N. Y.
8 CTS James J. Gallagher, 116 5th St.....Renovo, Pa.
8 CTT William F. Ludwig, 441 Avenue D..Rochester, N. Y.
8 CTU Carl Schardt, 12813 Marston Ave....Cleveland, Ohio
8 CTV John H. Schneider, 157 Main St., Cooperstown, N. Y.
8 CTW Kenneth Newcomer, 606 Fayette St., Connellsville, Pa.
8 CTX Alpheus E. Worth, 367 N. 5th St.....Indiana, Pa.
8 CTY Arthur H. Cramp, 12 Locust St....Pittsford, N. Y.
8 CTZ John S. Narhell, 350 Lehigh Ave.....Palmerton, Pa.
8 CUA Ruskin S. Freer.....East Liberty, Ohio
8 CUB Adam D. Sechrist, R. F. D. No. 1....Arcanum, Ohio
8 CUC Chas. C. Richardson, 268 Main St....Greenville, Pa.
8 CUD Ralph R. Hill, 918 Academy St....Watertown, N. Y.
8 CUE Wm. J. Williams, 1118 Sibley St..Gd. Rapids, Mich.
8 CUF Harker F. Thomas, 458 E. Church St....Marion, Ohio
8 CUG Leslie E. Johnson, 55 Sturgis St..Jamestown, N. Y.
8 CUH James B. Jones, Neal St.....Turtle Creek, Pa.
8 CUI Edwin C. Warren.....Capac, Mich.
8 CUJ Robert B. Conaughty, 42 First St..Waterford, N. Y.
8 CUK Wm. H. Snefsky, 1354 Tennessee St..Dormont, Pa.
8 CUL Duane Ingraham, 83 Main St.....Herminie, Pa.
8 CUM Earl Perkins, 2260 E. 100th St.....Cleveland, Ohio
8 CUN Ralph F. Clements, 724 Whitney Ave., Wilkinsbg., Pa.
8 CUO Theo. S. Begg, 214 Eakin St..Columbus Grove, Ohio
8 CUP Ernest H. Hobbs, 401 W. Cortland St., Groton, N. Y.
8 CUQ Ed. J. Deutsch, 4124 Bailey Ave....Cleveland, Ohio
8 CUR Dante Dominzi, 3607 West Blvd....Cleveland, Ohio
8 CUS Harold H. Geyser, 330 Hill St.....Sewickley, Pa.
8 CUT A. McTighe, 7122 Lemington St.....Pittsburgh, Pa.
8 CUU William Graff, 43 Nichols St.....Rochester, N. Y.
8 CUV Frank J. Ambrose, Jr., 1612 5th Ave....Arnold, Pa.
8 CUW Earl V. Fischer, 150 Avery St.....Rochester, N. Y.
8 CUX Lester Klentz, 11902 Castlewood Ave., Cleveland, Ohio
8 CUY Geo. B. Rinehart, 15 Jones St. Ingram, Pitts., Pa.
8 CUZ George Biddle Lang, Pine Road.....Edgeworth, Pa.
8 CVA Harry J. Kuhlman, 118 Crescent Blvd..Dayton, Ohio
8 CVB Chas. N. Page, 64 Midland Ave....Columbus, Ohio
8 CVC Gerald Haines, R. D. No. 4, Catherine Ave., Dayton, Ohio
8 CVD Warren F. Copp, 92 E. Dayton St., W. Alex., Ohio
8 CVE Chester Hersh, 1410 Lamar St.....Dayton, Ohio
8 CVF Raymond C. R. Schultze, 1424 Nixon St., Pitts., Pa.
8 CVG Leonard M. Wittlinger, 47 Portland Ave., Dayton, O.
8 CVH Elmer C. Warn, 436 N. Kilmer St....Dayton, Ohio
8 CVI Harold H. Greene, 118 Oxford Ave.....Dayton, Ohio
8 CVJ Albert H. Harris, 30 Clover St....Rochester, N. Y.
8 CVK Marion Sousiin, 1016 Edison St.....Dayton, Ohio
8 CVL Maurice A. Ruid, 1545 E. 122nd St., Cleveland, Ohio
8 CVM John F. Remsberg, 335 Oakwood Pl., Springfield, Ohio
8 CVN Paul F. Jackson, 825 Linwood St.....Dayton, Ohio
8 CVO Reuben P. Dethl.....Cresson, Pa.
8 CVP James Lafer, 3061 W. Grand Blvd....Detroit, Mich.
8 CVQ Chas. Kenny, 2959 Somerton Rd., Cleveland Hts, O.
8 CVR John W. D. Page, Park Ave. Verona Apts., Cleve., O.
8 CVS Francis W. Davis, 153 12th Ave....Columbus, Ohio
8 CVT William R. Butler, 705 Easton St....Dayton, Ohio
8 CVU The Wireless Shop, J. W. Brewer, 209 N. Finley St., Punxsutawney, Pa.
8 CVV Emery G. Smith, R. F. D. No. 1..Irishvalley, P.
8 CVW Ralph G. Kilpec, 11703 Kinsman Rd., Cleveland, Ohio
8 CVX Norman L. Geidel, 5638 Northumberland Ave., Pittsburgh, Pa.
8 CVY Samuel D. Conley, 228 10th St.....Aspinwall, Pa.
8 CVZ Edmund H. Simpson, 630-a Middle Ave., Wilmerding, Pa.
8 CWA Forest Keenan, 19 Colorado Ave., Highland Pk., Mich.
8 CWB Ward Kennedy, 648-a Middle Ave..Wilmerding, Pa.
8 CWC Winfield W. Heckert, 402 E. Church St., Oxford, Ohio
8 CWD Raymond P. Murphy, 186 Granville St., Newark, Ohio
8 CWE Arthur R. John, 257 High St.....Dayton, Ohio
8 CWF Ronald Warner.....Derrick City, Pa.
8 CWG John L. Zimmerman, 552 Second St..Shamokin, Pa.
8 CWH Chas. F. MacNish, 4504 Hector St., Cincinnatti, Ohio
8 CWI Raymond Floyd, 507 Allison St.....Washington, Pa.
8 CWJ Wm. C. Giles, 2705 East St., N. S. Pittsburgh, Pa.
8 CWK Theo. R. Glick, 416 12th St....Huntington, W. Va.
8 CWL Hertz Battery Co., Frank Nelson, 1236 E. 79th St., Cleveland, Ohio
8 CWM Chas. H. Emerick, 318 E. Decatur St....Eaton, Ohio
8 CWN William S. Hoxe, 306 Linwood St....Dayton, Ohio
8 CWO Forrest I. Rose, 2620 May St.....Cincinnati, Ohio
8 CWP Raymond E. Stukey, 610 N. Broad St., Lancaster, O.
8 CWQ R. H. Marshall, Jr., 425 Lincoln St....Bellevue, Pa.
8 CWR Robert E. Baird, 34 W. First St....Dayton, Ohio
8 CWS Thornton Ellis, 1221 Grand Ave.....Dayton, Ohio
8 CWT Donald Barnhart, 100 Wayne St.....Warren, Pa.
8 CWU Bruce E. Gramkee, Elmwood St.....Solus, N. Y.
8 CWV Walter A. Huff, Jr., 424 5th St., Parkersburg, W. Va.
8 CWW Nelson B. Smith, Curtiss Ave.....Solus, N. Y.
8 CWX Roy W. Waller, 319 Wall St. (home) 617 N. 4th St. (station) Cambridge, Ohio
8 CWY Halley S. Wilcox.....Millerton, Pa.
8 CWZ J. Ralph Bush, Madison Barracks No. 41, Sackett Harbor, N. Y.
8 CXA Karl T. Bradley, Bethany College..Bethany, W. Va.
8 CXB Edward Cooper, Jr.....Bramwell, W. Va.
8 CXC Cleon W. Millard, 712 N. Tioga St.....Ithaca, N. Y.
8 CXD Thurlo A. Louden, Broadway St.....Scottville, Mich.
8 CXE Henry A. Koerner, R. F. D. No. 3..Marion, Ohio
8 CXF John E. Penniman, 231 Stuart Ave..Kalamazoo, Mich
8 CXG Clarence E. Gibson, 3 Spring St.....Athens, Ohio
8 CXH Luther E. Counts, Linn St.....Coshocton, Ohio
8 CXI Roy E. Wise, 258 E. 8th St.....Holland, Mich.
8 CXJ Delbert R. Dunlap, Box 57.....Hemlock, Ohio
8 CXK Victor E. Donato, 59 E. Market St..Alliance, Ohio
8 CXL Oren White.....New Straitsville, Ohio
8 CXM Clarence L. Doty, 519 Nancy St..Charleston, W. Va.
8 CXN J. Clyde Lewis, 212 W. Wash. St., Grafton, W. Va.
8 CXO Charles W. Kraus, 23 Helena St....Rochester, N. Y.
8 CXP Russell B. Stewart, Glen St..Yellow Springs, Ohio
8 CXQ John A. Sloat, 241 Broadway St....Monticello, N. Y.
8 CXR James L. Robinson.....Plain City, Ohio
8 CXS Louis Nolz, Main St.....Herminie, Pa.
8 CXT H. Clifford Allen, 26 Coolidge St., Glens Falls, N. Y.
8 CXU Paul M. Barnes, 3321 Blanchard St....Toledo, Ohio
8 CXV Paul H. Bowley, 76 Third St.....Gloversville, N. Y.
8 CXW Kenneth H. English, 625 S. Lawn Ave..Coshocton, Ohio
8 CXX Carroll B. Kerr, 190 E. Mark St.....Marion, Ohio
8 CXY Franklin Yoder, 223 Spring St.....Wooster, Ohio
8 CXZ Leslie H. Jenks, 303 State St.....Carthage, N. Y.
8 CYA Paul H. Sanborn, 1435 4th Ave, Huntington, W. Va.
8 CYB Harry E. Daugherty, 120 W. Temple St. Washington C. H., Ohio
8 CYC Fred E. Kinne, 21 Valley St.....Jamestown, N. Y.
8 CYD Arthur Wm. Laurien, 21 Sands St..Cortland, N. Y.
8 CYE Allen Thompson, Alison Thompson.....Avoca, N. Y.
8 CYF John E. Oliver, 218 Edgar Ave....Steubenville, Ohio
8 CYG Adam Wiodarski, 395 Hudson Ave..Rochester, N. Y.
8 CYH Morris T. Decker, 39 North St., Baldwinsville, N. Y.
8 CYI Reginald Collin, 234 Edgar Ave....Steubenville, Ohio
8 CYJ Anzie B. Dreher, 514 Scott St....Stroudsburg, Pa.
8 CYK Rowland Plain, 1 Laurel Ave....Binghamton, N. Y.
8 CYL Roy H. Mason, 400 Oswego St.....Syracuse, N. Y.
8 CYM Arthur T. Wood, 425 4th Ave....Huntington, W. Va.
8 CYM Sanford R. Pierson, 87 Academy St..Liberty, N. Y.
8 CYO Doyle C. Swartsel, 2121 Burnet St..Cincinnati, Ohio
8 CYP C. R. Pardridge, Jr., 118 S. Water St..Saginaw, Mich.
8 CYQ Ralph W. Pitt, 343 Birr St.....Rochester, N. Y.
8 CYR Herschel E. Satterfield, 713 E. End Ave., Pitts., Pa.
8 CYS Robt. M. Whitmer, 91 Wabash St., Battle Creek, Mich.
8 CYY Carasen A. Myers, 429 Perkins St.....Akron, Ohio
8 CYU George W. Gravatt, 2172 Alger Rd..Lakewood, Ohio
8 CYV Geo. Snow, Jr., 5538 Northumberland Ave., Pitts., Pa.
8 CYW Maurice E. Kopf., 16 W. Seventh St..Monroe, Mich.
8 CYX Gordon A. Atwater, 13621 Bienheim Rd., Cleveland, O.
8 CYY Paul J. Hiller, 1558 Winchester Ave., Lakewood, O.
8 CYZ Harold C. Heiss, 9506 Columbia Ave., Cleveland, O.
8 CZA Joe Brown, 835 4th St.....Fairmont, W. Va.
8 CZB Donald McGeorge, 3289 Dellwood Rd., Cleveland, O.
8 CZC Horace M. Gilman, 4150 Second Blvd..Detroit, Mich.
8 CZD Walter H. Fuller, 2600 Hubbard Ave., Detroit, Mich.
8 CZE Arthur C. Givenswood, R. F. D. No. 2, Worthington, O.
8 CZF Lawrence J. Schoeneman.....Anchorville, Mich.
8 CZG James McC. Bradfred, 18 Tallawanda Hts., Oxford, O.
8 CZH Charles Frick, 218 Boyd Ave.....Van Wert, Ohio
8 CZI Louis C. Roess, 112 Innis St.....Oil City, Pa
8 CZJ Oscar H. Bonter, 226 Ross St., Cambridge Spgs., Pa.
8 CZK Claude A. Schmidle, Center Ave....Ebenezer, N. Y.
8 CZL Paden M. Hissem, 2738 Glen Mawr Ave., Pitts., Pa.
8 CZM Henry Bormann, 3172 W. 114th St., Cleveland, Ohio
8 CZN Carl A. Gimmy, 13503 Emily St., E. Cleveland, Ohio
8 CZO Charles Gault, R. F. D. No. 2.....Ypsilanti, Mich.
8 CZP Boy Scouts of America, Troop No. 31, (Camp) Weles Island, N. Y.
8 CZQ Boy Scouts of America, Troop No. 31, (Launch) Weles Island, N. Y.
8 CZR Robert E. Stealey.....Parkersburg, W. Va.
8 CZS Fred V. Collins (Portable)....Highland Park, Mich.
8 CZT Thomas W. Scott, 1201½ Chestnut St., Connellsville, Pa.
8 CZU Kenneth W. Conrad, 5 Lincoln Ave...Batavia, N. Y.
8 CZV Loyd Brothers, N. Main St.....Wellington, Ohio
8 CZW Ray Spence, 208 Putnam Ave.....Marietta, Ohio
8 CZX Jos. D'Agostino, 137 Monongalia Ave., Morgantown, W. Va.
8 CZY Rupert Stephens, E. State St.....Scottville, Mich.
8 CZZ Horace L. Prange, 309 W. South St., Kalamazoo, Mich.
8 DAA Joseph Briggs, 78 Taylor St.....Cortland, N. Y.
8 DAB Albert H. Ernst, 147 Garvin Ave.....Elyria, Ohio
8 DAC Wm. Woodroe, 1417 Clairmont Ave..Detroit, Mich.
8 DAD Scott Mueller, 2818 Corydon Rd., Cleveland Hts., O.

8 DAE John C. Erickson, 1214 Carlyon Rd., E. Cleveland, O.
8 DAF Robt. L. Kistler, 7467 McClure Ave., Swissvale, Pa.
8 DAG Howard S. Pyle, 2354 Glenside Ave., Norwood, Ohio
8 DAH Harry L. Pearson, 1217 Monterey St., Pittsburgh, Pa.
8 DAI Harry E. Johnston, 620 Chandler Ave., Detroit, Mich.
8 DAJ Robt. H. Collingwood, 1323 Niagara Ave., Niagara Falls, N. Y.
8 DAK Ed. P. Durr, 4730 N. Edgewood Ave., Cincinnati, O.
8 DAL Arthur Eckhart, 2104 Third St., Dayton, Ohio
8 DAM Lawrence Theisen, 15 Victoria Ave., Buffalo, N. Y.
8 DAN De Mont F. Stevens, 717 Meredith St., Dayton, Ohio
8 DAO Ray Edward Urban, Broadview Road, Independence Twp., Ohio
8 DAP Willard B. Frazer, 727 Frost Ave., Rochester, N. Y.
8 DAQ George A. Morse, R. F. D. No. 2, Williamson, N. Y.
8 DAR K. Milton B. Miller, 468 Glenwood Ave., Rochester, N. Y.
8 DAS Harley McClain, Box 262, Millersburg, Ohio
8 DAT Stanley F. Northcott, 1204 Birney St. N., Bay City, Mich.
8 DAU William A. Warren, 2210 N. East St., Lansing, Mich.
8 DAV Donald P. T. Christy, Harrison Ave., Old Forge, N. Y.
8 DAW Russell Whitehurst, High St., Ashley, Ohio
8 DAX Cletus J. Collum, 1094 Smith St., Essexville, Mich.
8 DAY Olin McPherson, 2510 Grand Ave., Parkersbg., W. Va.
8 DAZ Daniel L. O'Hair, Lock Box 27, Lyons, N. Y.

REASSIGNED CALLS

8 AY Arthur J. Cramer, Jr., 141 Hoyt St., Buffalo, N. Y.
8 BP Carl G. Gutman, 3584 E. 120th St., Cleveland, Ohio
8 CI Wm. H. Marshall, 7301 McClure St., Swissvale, Pa.
8 DC Paul A. Rescal, 740 Scott St., Springfield, Ohio
8 DM David Hershkowitz, 7824 Melrose Ave., Detroit, Mich.
8 FD Joseph A. Monat, 124 Greenfield St., Buffalo, N. Y.
8 FL Laurence M. Ball, 941 Longfellow Ave., Detroit, Mich.
8 JY Stewart S. Brown, H. Hoover, 1767 Eastham St., Cleveland, Ohio
8 OG Lester Fild, 2077 W. 42nd St., Cleveland, Ohio
8 PB Tracey S. Smith, Jr., 707 Burlingame Ave., Detroit, Mich.
8 RJ George Haberty, Jr., 191 Carlyon Rd., E. Cleve., O.
8 TA Arbie L. Bailey, 347 S. Maple St., Akron, Ohio
8 TD Richard H. Howe, Buckeye Lake, Ohio
8 TW John M. Barnhart, 812 Sherman St., Steubenville, O.
8 AV John D. Haynes, 266 Preston Rd., Columbus, Ohio
8 CX Mensal L. Johnson, 3079 Texas Ave. Dormont, Pittsburgh, Pa.
8 CY Malcolm L. Rivkin, 147 Winona Ave., Highland Park, Mich.
8 CZ Harold G. Jones, 629 John Ave., Coshocton, Ohio
8 DZ Wm. Kaus, 423 E. Euclid Ave., Springfield, Ohio
8 FN William Threm, 2325 Vine St., Cincinnati, Ohio
8 GB Boy Scouts of America (A. H. Watts), Lansing, Mich.
8 GH Hal J. Shafer, Community Drive, Dayton, Ohio
8 GW George W. McKay, 32 W. Third St., Xenia, Ohio
8 HN Willet E. Batchelder, 396 Vine St., Akron, Ohio
8 HR Isadore Levine, 4833 Holyoke Ave., Cleveland, Ohio
8 IK Maurice J. Granger, Snake Road, Catskill, N. Y.
8 KJ Irving C. Davis, 1034 Devonshire St., Detroit, Mich.
8 KM Boy Scouts of America (A. H. Watts), Clear Lake, Mich.
8 KV John G. Rice, 922 Waite St., Middletown, Ohio
8 MA Kenneth J. Chase, 196 Wellington Ave., Rochester, N. Y.
8 MB L. Wm. Collingridge, 3254 W. 126th St., W. Park, O.
8 MN Warren A. Pearsall, Watkins, N. Y.
8 NA Clarence O. Aber, 29 West Ave., Buffalo, N. Y.
8 NR Howard W. Sinclair, Hufford's Grove, So. Lebanon, O.
8 NX Walter J. Barnwell, 131 Island Ave., Lansing, Mich.
8 PO Edwin A. Hadden, 10321 Olivet Ave., Cleveland, O.
8 QH John C. Larkin, 615 N. High St., Hillsboro, Ohio
8 QP Carl B. Osborne, 221 Park Place, Conneaut, Ohio
8 QY LeVoy M. Lind, 675 Hazel St., Akron, Ohio
8 QZ Oscar P. Sutton, 114 Shore Haven Drive, Euclid, O.
8 RP Wesley C. Allison, Jr., 513 Bayne Ave., Bellevue, Pa.
8 RV Earnest H. Roy, 295 Maple St., Buffalo, N. Y.
8 SK John B. Atwood, 1237 Fearmont St., Pittsburgh, Pa.
8 TH Ervin Stephenson, 1909 16th St., Parkersburg, W. Va.
8 WD C. J. Jenks, 154 Front St., Buffalo, N. Y.
8 AAO Alfred J. Ball, W. Liberty St., Hubbard, Ohio
8 AAQ Marcus A. Monaghan, Jr., 1437 Woodward Ave., Lakewood, Ohio
8 AAS James A. Vickery, 386 W. Main St., Bellevue, Ohio
8 AAW Henry E. Kenry, 911 Elmwood Ave., Buffalo, N. Y.
8 AAX Will F. Ehrick, 218 W. Lucas St., Bucyrus, Ohio
8 ABM Carlton S. Bacon, 240 Field Ave., Toledo, Ohio
8 ABT W. B. Jameson, 1019 Rex Ave., N. E., Canton, Ohio
8 ACC Robert H. Bahney, 516 E. Main St., Massillon, Ohio
8 ACZ George M. Bost, Middle Ridge, Perry, Ohio
8 AEU John D. Graves, Jr., 692 N. Walnut St., Van Wert, O.
8 AFR William A. Cawley, R. F. D. No. 3, Milton, Pa.
8 AFV Adam R. Miller, Fifth St., McDonald, Ohio
8 AFX Richard M. Hoe, 17410 Shaw Ave., Lakewood, Ohio
8 AGW Howard A. Seyse, 506 Woodlawn Ave., Buffalo, N. Y.
8 AHD Walter K. Jeffery, 2173 Hilliger Ave., Detroit, Mich.
8 AIW Mendall Schmelder, 112 Weld St., Rochester, N. Y.
8 AKC Robt. Dalrymple & R. Keith Scott, 206 Sycamore St., Dayton, Ohio
8 AKG Jay C. Adams, 48 N. Wabash St., Battle Creek, Mich.
8 AKJ Robert C. Blair, 194 Glendale Ave. (Portable) Detroit, Mich.
8 AKO Wilfred L. Deming, 267 Windemere Ave., Highland Park, Mich.
8 ALF John Leighner, 606 E. Pearl St., Butler, Pa.
8 ACF Thomas W. McNeary, 27 Highland St., Wshgtn., Pa.
8 AIU Charles Wein, 1166 Genesee St., Buffalo, N. Y.
8 AJS Kendrick Leavenworth, 937 Chicago Blvd., Detroit, Mich.
8 AKT Paul C. Snyder, R. F. D., Shady Ave., E., Conneaut Lake, Pa.
8 ALG Albert H. Moses, Chestnut St., Jefferson, Ohio
8 AMU Arthur N. Stergard, 3235 W. 30th St., Cleveland, O.
8 AOV Wm. C. Moore, Cor. Adams & Bagley Sts., Detroit, Mich.
8 APM George Wells, 613 Lake Blvd., St. Joseph, Mich.
8 AXE Martin E. Wendland, 411 Sheridan St., Bay City, Mich.
8 BEW Roy Simmonds, Earl Perkins, 2279 E. 100th St., Cleveland, Ohio
8 BIH Werner C. E. Anzelin, 11 McClellan Ave., Amsterdam, N. Y.
8 BIY Paris B. Reeves, Jr, 740 Washington Rd., Mt. Lebanon, Pa.
8 BLW Lawrence B. Rial, 28 Washington Ave., Batavia, N. Y.
8 BMO Laurence W. Lloyd, 410 N. Mildred St., Charles Town, W. Va.
8 BPJ William J. Baker, R. F. D. No. 14, Dayton, Ohio
8 BQZ Paul Bliss, Wall St., Jefferson, Ohio
8 CDJ Paul F. McGinley, 413 E. 6th Ave., Tarentum, Pa.
8 CFK Ernest R. Baldwin, 2020 Pine Grove Ave., Port Huron, Mich.
8 CNS Leland J. Lease, East Liberty, Ohio
8 CYN J. S. A. Guy Dickey, 465 E. Central St., Delaware, O.
8 CQL Robert J. Topp, 306 Wilkinson St., Syracuse, N. Y.
8 CSS Carl Anderson, 422 Third St., Marietta, Ohio
8 ALL Hewitt S. Morris, 1025 Mary St., Parkersbg., W. Va.
8 AMT Wm. L. Bell, 141 N. Orchard St., Dayton, Ohio
8 AMV Ralph G. Folsenlogen, 1714 Queen City Ave., Cincinnati, Ohio
8 AMX Harry S. Brown, 610 Drummond St., Clarksbg., W. Va.
8 ANH Frank H. Church, 504 E. Erie St., Albion, Mich.
8 ANT Geo. E. Francis, Jr., 117 Magee Ave., Rochester, N. Y.
8 AOL Francis H. Garrahan, 393 Northampton St., Kingston, Pa.
8 AOM William Burston, Main St., Farwell, Mich.
8 AOY Chester G. Kaufman, 517 Prescott Ave., Scranton, Pa.
8 API Edward G. Berschig, Brook Park Ave., Box 22, Brook Park Village, Ohio
8 AQZ John A. Perry, Defiance, Ohio
8 ARL Theo. R. Carter, 1722 Whitney Ave., Niagara Fls., O.
8 ARP Vincent E. Ball, 52 Hammerschmidt St., Buffalo, N. Y.
8 ARV Ladimir H. Svoboda, 3632 E. 125th St., Cleveland, O.
8 ARZ Tony Gallo, Dullois, Pa.
8 ASC David G. Hopkins, 2437 Clifton Ave., Cincinnati, O.
8 ASN Myron A. Rawson, 128 Bath St., Elyria, Ohio
8 AUA George B. Sears, 186 Exeter St., Buffalo, Ohio
8 AUK Chas. G. Chapel, 430 Almyra Ave., Youngstown, O.
8 AUS Chester Beltz, 3829 Nemphis Ave., Cleveland, Ohio
8 AUY Elmer H. Kumpf, Crittenden, N. Y.
8 AVC Harold Abell, 1556 E. 86th St., Cleveland, Ohio
8 AVM Wesley B. Hargraves, 724 Carlysle St., Akron, Ohio
8 AVS William C. Babcock, 112 Head St., Penn Yan, N. Y.
8 AXT Earl Hanson, 688 Carlysle St., Akron, Ohio
8 AZA Richard Greenewald, 316 S. Tyler St., Van Wert, O.
8 AZO Howard B. Mounts, 264 Field St., Rochester, N. Y.
8 BBD Elmer W. Zimmerman, 45 Cheltenham Drive, Buffalo, N. Y.
8 BBL Harry Dudley, 287 E. Utica St., Buffalo, N. Y.
8 BEH Fredk. C. Marx, 541 Evanswood Pl., Cincinnati, O.
8 BKY Warren G. Leeka, 613 E. Center St., Marion, Ohio
8 BSJ Clyde A. Neth, 102 E. Fayette St., Connellsville, Pa.
8 BYN Howard C. Storck, 694 Carpenter St., Columbus, Ohio
8 CCP George J. Gray, 329 E. Third St., Cincinnati, Ohio
8 CDX Douglas Lewis, 2946 Zephyr Ave., Pittsburgh, Pa.
8 CEK Albert C. McKinley, 615 N. State St., Marion, Ohio
8 CGN J. Paul Welrick, 221 S. Market St., Loudonville, O.
8 CJN Floyd A. Hamel, 209 W. Martin Ave., Amherst, O.
8 CNL Allen E. Apple, 115 S. Euclid Ave., Dayton, Ohio

Ninth District

9 CJP John N. Thompson, 749 Harvland St., Gary, Ind.
9 CJG Franklin M. Henry, 108 Peadstow Blvd., Manitou, Colo.
9 CJH Harry Uebel, 2236 S. 18th St., St. Louis, Mo.
9 CJI Radio Service Station, 1009 Sumner St., Berlin, Wisc.
9 CJJ Floyd H. Arvanette, First and Hastings Sts., Hastings, Nebr.
9 CJK Harry A. Wright, 256 Wabash Ave., Oakland, Kans.
9 CJL Homer J. Graves, Plainview, Nebr.
9 CJM Prescott D. Grout, 219 23d St., Wilwaukee, Wisc.
9 CJN Philip F. Walker, Toulon, Ill.
9 CJO Ben J. Chromy, Hopkins, Minn.
9 CJP George L. Gerner, 2000 W. 41st St., Roesdale, Kans.
9 CJQ Edward L. Ruth, R. R. No. 3, Freeport, Ill.
9 CJR Edward L. Beaver, 910 Third St., Milwaukee, Wisc.
9 CJS Marion J. Junkins, Byrant, S. Dak.
9 CJT Harry Nielsen, 4708 N. 39th St., Omaha, Nebr.
9 CJU Karl K. Boagland, 501 S. Race St., Urbana, Ill.
9 CJV Earle F. East, 2141 G. St., Lincoln, Nebr.
9 CJW George L. Edwards, Gibson, Mo.
9 CJX Wm. J. O'Neill, Jr., 123 Summit St., Downers Grove, Ill.
9 CJY Theo. P. Kinn, 1224 California St., Denver, Colo.
9 CJZ Marvin Fallgatter, 328 S. State St., Waupaca, Wisc.
9 CKA Charles H. Guillaume, Elk Point, S. Dak.
9 CKB Edgar W. Hubbard, 517 Cimarron Ave., LaJunta, Colo.
9 CKC John D. McLane, 113 8th Ave., N., West Bend, Wisc.
9 CKD Wm. F. Mathemeier, 81xth St., Webster, S. Dak.
9 CKE Jos. L. Jenkins, 1104 Burham Ave., Johnson City, Ill.
9 CKF Burritt Robinson, Route No. 2, Kansas City, Mo.
9 CKG George H. Smith, 871 41st St., Milwaukee, Wisc.
9 CKH Tom D. Fox, 1603 Shelby Pl., New Albany, Ind.
9 CKI Melvin G. Thomas, 306 Jackson Ave., Seward, Nebr.
9 CKJ Alex R. Meier, Box 253, Russell, Kans.
9 CKK George E. Perkins, 803 Main St., Sac City, Iowa
9 CKL Lloyd C. Bolin, 1106 Michigan Ave., Menominee, Mich.
9 CKM Anthony E. Mendlitz, 623 Sandusky Ave., Kansas City, Kans.
9 CKN Willis H. Ellison, 1906 Thalman Ave., Indianapolis, Ind.
9 CKO Arden F. Henry, 1516 Camp Ave., Rockford, Ill.
9 CKP Everett Haven, 2040 G St., Granite City, Ill
9 CKQ Delbert V. Cummins, Wilmot, S. Dak.
9 CKR Gregory S. Mallarian, 11421 N. Bdwy., Fargo, N. Dak.
9 CKS S. Forrest Martin, 416 S. Buchanan St., Maryville, Mo.
9 CKT W. Ed. Marquart, 102 S. Union Ave., Madison, S. Dak.
9 CKU Burgess Lee Willman, 3503 E. 25th St., Indianapolis, Ind.
9 CKV Stanley Carroll, 3322 Oakland Ave., Minneapolis, Minn.
9 CKW George F. Metcalf, 57 W. Chestnut St., Wauwatosa, Wis.
9 CKX Clint McCollister, 400 N. 8th St., Independence, Kans.
9 CKY Leslie Davis, Perry, Mo.
9 CKZ Wallace Howard, 701 Arapahoe Ave, Boulder, Colo.
9 CLA Lawrence A. Gustafson, 237 Forest Ave., Oakland, Kans.
9 CLB Warren E. Lane, 2311 Longest St., Louisville, Ky.
9 CLC Clifford B. Garrison, 7 Dartford Pl., St. Louis, Mo.
9 CLD Fredk. V. Truehood, 2534 Madison Ave., Granite City, Ill.
9 CLE M. D. McMenas, Courtland, Kans.
9 CLF Gordon J. Kingston, Giltner, Nebr.
9 CLG Madison High School Radio Club, W. Center St., Madison, S. Dak.
9 CLH Lowell L. Lindstrom, Gresham, Nebr.
9 CLI Jesse D. Bandridge, Jr., 602 W. 4th St., Webb City, Mo.
9 CLJ James Turner, 200 N. Oakland Ave., Decatur, Ill.
9 CLK Jacob L. Fenman, 1928 N. 6th St., Sheborgan, Wisc.
9 CLL John W. Thomas, Main St., Sisseton, S. Dak.
9 CLM Lawrence Woofe, 502 E. Gale St., Wnsfield, Ill.
9 CLN Arthur E. Thompson, 409 E. Main St., Gas City, Ind.
9 CLO Sidney C. Farwell, 2215 W. 5th St., Sioux City, Iowa
9 CLP Arlson F. Koch, 210 W. College St., Albert Lee, Minn.
9 CLQ J. M. Swigert, 919 42d St., Des Moines, Iowa
9 CLR Chas. H. Schaaf, 266 Juneau Ave., Milwaukee, Wisc.
9 CLS Dana McNeil, 152 Pleasant Drive, Pierre, S. Dak.
9 CLT Pat Deal, 113 S. Third St., Lindsborg, Kans.
9 CLU Lee Ross Watts, 2708 Mondamin Ave., Des Moines, Ia.
9 CLV Glenn Northfield, 2542 Jackson St., N. E., Minneapolis, Minn.
9 CLW Ralph C. Olsen, Burlingame, Kans.
9 CLX Francis J. Coseglia, 1028 Clinton Ave., Oak Pk., Ill.
9 CLY Frank G. Packwood, 202 W. Davidson Ave, Chaffee, Mo.
9 CLZ Jas. M. Martin, 447 S. Earl St., Jacksonville, Ill.
9 CMA Karl E. Emerson, 639 Arkade St., St. Paul, Minn.
9 CMB Roger McGraw Bary, National Home, Danville, Ill.
9 CMC Homer A. Huber, 5424 State St., Granite City, Ill.
9 CMD Alfred B. Jex, 103 Fayette St., Pittsfield, Ill.
9 CME Albert K. Moore, R. F. D. No. 8, Sedalia, Mo.
9 CMF Ross F. Mahacek, 402 Alleghany St., Austin, Minn.
9 CMG Eugene C. Voix, 103 W. Pearl St., Winamac, Ind.
9 CMH Wm. H. West, 720 Grand St., Springfield, Mo.
9 CMI George G. Sheley, 705 S. Clark Ave., Marion, Mo.
9 CMJ Lytton C. Hetland, Audubon, Minn.
9 CMK Nieland B. Van Arsdale, 2864 Bristol St., Omaha, Nebr.
9 CML Chas. L. Hopper, 215½ E. Adams St., Spgfld., Ill.
9 CMM Paul B. Nerson, 622 Main St., Anoka, Minn.
9 CMN Sami. J. Saegesser, 2505 E St., Granite City, Ill.
9 CMO Racine Electric Shop, 1403 Wshgtn. Ave., Racine, Wisc.
9 CMP Kenneth Bolish, 112 E. Clark St., Champaign, Ill.
9 CMQ Clyde E. Miller, Bradfall Ave., Wahoo, Nebr.
9 CMR Harry R. Likens, 1620 E. Winchester Ave., Ashland, Ky.
9 CMS Butler A. Isaman, 1101 N. Kan Ave., Hastings, Nebr.
9 CMT Clifford H. Keach, R. F. D. No. 1, Box No. 3, E. Mason Rd., Dwight, Ill.
9 CMU Clinton L. Bopp, 108 Grant St., Clear Lake, Iowa
9 CMV Alfred Riedel, 1474 24th St., Milwaukee, Wisc.
9 CMW Lowell W. Mahon, 527 Smithland Ave., La Junta, Colo.
9 CMX L. C. Roemisch, P. O. Box 267, W. McHenry, Ill.
9 CMY Leo Ross Clark, Forrest, Ill.
9 CMZ Leo G. Haim, R. No. 4, Box 85, Cor. 86th and Jersey Sts., West Allis, Wisc.
9 CNA Wm. A. Jacoby, Jr., 326 Linwood St., Indianapolis, Ind.
9 CNB Frederick Buck, Jr., Ft. Leavenworth, Kans.

REISSUED

9 DG Elizabeth A. Gerdner, Lincoln and Washington Sts., Springfield, Ill
9 EU Earl R. Thornburg, Grimes, Iowa
9 TQ George S. Dozier, Stanford, Ky.
9 AAX Oliver W. Manley, 9031 Lafayette Ave., Chicago, Ill.
9 AG1 Walter Smith, Burlingame, Kans.
9 AGJ Donald S. Bennett, 3429 5th Ave., Minneapolis, Minn.
9 AGT Wm. H. Hebal, 324 McCulloch St., Stevens Pt., Wisc.
9 AOI Geo. K. Jacobsen, 3208 Holmes Ave., Minneapolis, Minn.
9 AXR Gaston Music & Furniture Co., 2d and Denver Sts., Hastings, Nebr.
9 BBA Howard Roy Starks, Jr., 928 61st St., Chicago, Ill.
9 BNE Radi-Fone Sales Co., 218½ First St., Columbus Junction, Ia.

CHANGE IN ADDRESS

9 KD Wm. H. Hobbs, 2001 Edgeland St., Louisville, Ky.
9 HL Berschel Stults, R. R. No. 5, Columbus, Jctn., Iowa
9 JX Ned Van Campe, 4035 Monroe St., Chicago, Ill
9 QW Elder W. Bates, 440 E. 110th Pl., Chicago, Ill.
9 OQ Vincent Johnson, Kane Hotel, 1921 Champa St., Denver, Colo.
9 CKU Burgess L. William, 2503 E. 25th St., Indianapolis, Ind.
9 DNC Paul Palmer, 3145 "S" St., Lincoln, Nebr.
9 DNO Donald F. Stiver, 426 Fifth St., Columbus, Ind.
9 DSL James H. Best, Mystic, Iowa
9 DTE Joe E. Finch, Box 43, R. No. 1, Wheatridge, Colo.
9 DTU Arthur G. Hebb, Jr., 1927 Pepper Ave., Lincoln, Nebr.
9 WQ Leroy Schilling, 3956 Zuni St., Denver, Colo.

EXPERIMENTAL LICENSES

9 XL Northwestern Radio Co., Inc., 250 State St., Madison, Wisc.
9 XAB Western Radio Co., 6 W. 14th St., Kansas City, Mo.

TECHNICAL AND TRAINING

9 YAD School of Engineering of Milwaukee, 415 Marshall St., Milwaukee, Wisc.

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Amazingly adaptable for RADIO panelling and insulation. Gives positive and permanent insulation and utterly eliminates vibration. Imparts a professional finish to any home-made set.

Tests highest in every particular. Unheard of di-electric strength (proved constant 5.2). Resists water, heat and milder acids. Cannot warp or swell. Finished a sleek, everlasting black. Tough and hard; yet *easily machined*.

Tell us who your electrical supply man is and we will write you where to get Bakelite-Dilecto X. X. cut to your exact requirements.

The Continental Fibre Company

Factory—Newark, Delaware

Dealer Service from:

NEW YORK.....233 Broadway
ROCHESTER.....85 Plymouth Avenue, S.
CHICAGO.....332 S. Michigan Avenue
PITTSBURGH.....301 Fifth Avenue
SAN FRANCISCO.....525 Market Street
LOS ANGELES.....411 S. Main Street
SEATTLE.....91 Connecticut Street

bakelite dilecto

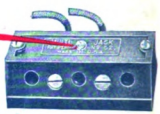
GRADE XX

RADIO ESSENTIALS

PLAY SAFE! LOOK ~ FOR ~ THE PACENT TRADE MARK

Pacent Radio Jack

Pacent Twin Adapter



Pacent Multi-Jack

Pacent Radio Plug

Pacent Audio-former

Pacent Universal Detector Stand

Pacent Duo-Lateral Coil

WHY TAKE CHANCES?

THE PACENT TRADEMARK IS A SAFE BUYING GUIDE

It Is Your Guarantee of Quality, Satisfaction and Service

IN the ordinary purchases which you make every day, you invariably depend upon some mark of quality as an assurance of value and satisfaction. In buying radio materials the average purchaser is a great deal more dependent upon the reputation of the manufacturer than in buying everyday commodities. A radio instrument may look good and act bad. How much more important it is in this case, therefore, to look for the trademark of a competent, dependable manufacturer. The Pacent trademark on any radio products is an absolute assurance of satisfaction.

WHAT THE PACENT TRADEMARK MEANS TO YOU

It means that the device bearing this trademark was made to fill a definite, important radio need: that is the meaning of PACENT RADIO ESSENTIALS. It means that the product was originated by a radio expert and has passed the acid test of experience. The Pacent Universal Plug was the **first** radio plug; the Pacent Jacks were the **first** radio jacks, and so with the Twin Adapter, Multi-jack and other PACENT RADIO ESSENTIALS. Every Pacent product is also backed up with Mr. Pacent's fifteen years personal experience in the radio industry.

The Pacent trademark means that the product is one of a group generally recognized by radio authorities as leaders in their line. Pacent jacks and plugs are standard with the largest radio manufacturers. Pacent Duo-lateral Coils, besides being used in **standard sets of wide distribution**, were approved and used by Major Armstrong as **important elements in his new super-regenerative circuit**, together with other Pacent products. All PACENT RADIO ESSENTIALS are also approved and sold by the leading **radio distributors.**

Therefore, when you buy PACENT RADIO ESSENTIALS bearing the Pacent trademark you are absolutely sure that you are getting the best for your money. You are playing **safe.** Don't accept substitutes, imitations or something "just as good." **Insist on seeing** the Pacent trademark.

DON'T IMPROVISE—PACENTIZE

SEND FOR DESCRIPTIVE BULLETINS

DEALERS AND JOBBERS—The Pacent Sales Policy is to a great extent responsible for the popularity **of Pacent products. Write for outline of our Sales Plan.**

PACENT ELECTRIC COMPANY

INCORPORATED

Executive Offices:
150 NASSAU STREET
NEW YORK, N. Y.

Branch Offices:
CHICAGO, ILL., 33 So. Clinton St.
PHILADELPHIA, PA., Bourse Bldg.
WASHINGTON, D. C., Munsey Bldg.

Member Radio Section, Associated Mfrs. Electrical Supplies