

EDITOR: *Jim Cranshaw*

FORMERLY NAMED:
THE ANTIQUE RADIO AND PHONOGRAPH NEWS
 NOW NAMED:

THE HORN SPEAKER

The next issue will be the August issue.

1922 radio

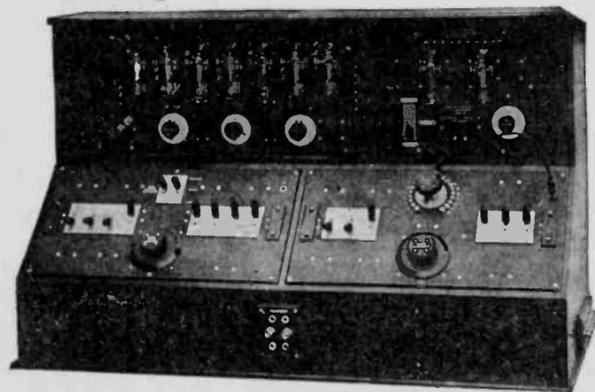


© Underwood & Underwood
GRANTLAND RICE
 Who reported the World Series
 Baseball games play by play

mid 20's british radios



Type V-2 Marconi broadcast receiver with loud speaker



A BRITISH MARCONI RECEIVER

The type RG5 general utility set, comprising detector, audio amplifier, antenna tuning circuit unit and closed circuit tuning unit. It is designed to meet the requirements of those who need an efficient and selective receiver to cover a very wide range of frequencies, 1000 to 10 kc. (300-30,000 meters)

THE EDISON PHONOGRAPH

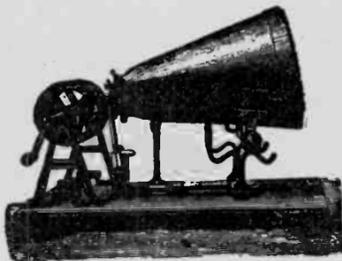
If a popular vote were to be taken to decide what invention was considered the most wonderful of all those produced during the latter part of the nineteenth century, it is probable that the majority of votes would be cast in favor of the phonograph. The X-ray apparatus for photographing through opaque substances, and the telephone, would surely come in for a large vote. But to most persons nothing quite so much approaches the realm of the miraculous as the little instrument, small enough to be carried in a good-sized coat pocket, which reproduces accurately all manner of sounds from violin notes to steam sirens.

It seems superfluous to say that the inventor of this marvelous instrument is Thomas A. Edison. The name "Edison phonograph" has become generic as well as descriptive.

On the 31st of July, 1877, Edison first applied for a patent on his "speaking phonograph." It was by no means the first instrument ever made upon which words could be recorded. Even as early as 1865, Mr. Leo Scott produced what was known as a "phonograph"—an instrument so arranged that the vibrations made by sounds were recorded on smoked glass, or some other similar substance, by means of a needle attached to a diaphragm. This instrument worked perfectly in simply recording sounds; but it did not reproduce these sounds, and apparently the inventor made no attempts to do so. His claim to priority in inventing a speaking phonograph, therefore, is absolutely groundless. A more reasonable claim might have been made by the Frenchman, M. Charles Cros, who, in April, 1877, sent to the Academy of Science, in Paris, a paper describing the way in which an instrument might be made that would reproduce such sounds as the human voice. But this was simply a description of a possible instrument, the actual construction of which had not been attempted. And when Abbé Leblanc, a short time later, constructed an instrument after the method described by Cros, it failed utterly as a sound-producer. It is evident, therefore, that Edison's claim to the invention of the first phonograph stands absolutely unchallenged.

In contrast to the wonderful effects that may be produced by this instrument is the simplicity of the construction of the instrument itself. The Edison phonograph of 1877 was fitted with a cylinder covered with tin-foil for receiving the impression of the sound waves. This cylinder was so arranged that, as it revolved, it moved at a definite rate of speed from right to left, this movement being controlled by the action of screw threads. Above this cylinder, and arranged so that a needle point prest into the tin-foil, was the recorder. This consisted of a cylinder about two

inches in diameter, over the lower end of which was attached a diaphragm of parchment or gold-beater's skin, with a needle or recording point fastened to the center. When sounds were projected into the upper end of the cylinder the vibrations thus set up caused the diaphragm to vibrate back and forth. This vibration, producing upward and downward movements of the needle, caused it to make indentations on the rotating cylinder of tin-foil beneath, recording precisely the vibrations made by the sounds in the cylinder. These sounds could then be reproduced by setting back the cylinder and rotating it at the same rate of speed as before, causing the needle to pass over the indentations in the grooves made while recording, thus reproducing the vibrations of the diaphragm. This was the principle of Edison's first phonograph, and this is the underlying principle of his own later perfected instruments as well as of all other forms of "talking machines," altho the details of the operating mechanism have been greatly modified.



Between 1877 and 1888 Edison was constantly making improvements in his invention until he had perfected the phonograph practically as we know it to-day. In the newer instruments the parchment diaphragm of the older instrument has been replaced by a thin glass plate; and the cylinders are no longer made of tin-foil but of a dark-brown waxy substance familiar as phonograph "records." Clockwork or electricity has been applied for rotating the cylinder, so that the old winding movement of the crank is now done mechanically.

A great improvement has been made in the pointed marker or recorder, and the corresponding instrument for reproducing the records. In place of the steel needle used on the first instruments, the

marker is now made of a small piece of sapphire with a chisel-shaped edge, while the point used in reproducing the sounds is also made of sapphire with its edges rounded and of a peculiar shape. The shape of this little point is very important, as clear reproductions are largely dependent upon its construction.

The advantage of the wax cylinders over those made of tin-foil is that they are more permanent and may be duplicated by molding an indefinite number of times. Furthermore they record sounds readily and reproduce them better.

For reproducing sounds three things are necessary in the shape and arrangement of the indentations in the grooves made by the recorder. It will be recalled that the pitch of any sound depends upon its number of vibrations per second—sounds of a high pitch or frequency having more vibrations than those at a low pitch. On the cylinder, therefore, a high note is recorded by a certain number of indentations in a given space, while low notes have a correspondingly less number. The number of indentations is quite independent of the loudness of the sound to be reproduced; this is controlled by the depth of the indentations made, a loud sound producing deep indentations while softer sounds are represented by shallow ones.

The fact that these little indentations will reproduce sounds seems wonderful enough to the ordinary mind, but the real wonder lies in the fact that qualities of sounds are also reproduced in the little grooves—the violin, for example, being almost as easily distinguishable from the French horn as it is in the orchestra itself. This quality of sound is reproduced by the form of the indentations in the wax, regardless of their frequency or depth. When it is considered that all the complicated vibrations determining pitch, loudness, and quality of sounds are recorded by minute, almost microscopic indentations in little grooves scarcely perceptible to the naked eye, it is little wonder that the Edison phonograph remains a constant source of marvel.

In the issue of the *North American Review* for May—June, 1878, Edison described his then recent invention, and recorded some of the prophecies as to the possibilities of its use in the future. He said in part:—

"The apparatus now being perfected in mechanical details will be the standard phonograph, and may be used for all purposes except such as require special form of matrix, such as toys, clocks, etc., for an indefinite repetition of the same thing. The main utility of the phonograph being, however, for the purposes of letter-writing and other forms of dictation, the design is made with a view of its utility for that purpose." » 2

New April Numbers of Columbia Records

Rosa Ponselle Is Newest Columbia Star

The greatest dramatic soprano in the world has made a Columbia Record of her supreme Metropolitan Opera triumph, "La Vergine Degli Angeli" (May Angels Guard Thee). Her impassioned notes sound as pure and sweet as the angels of which she sings.

49558—\$1.50



Today's Music Today

The newest, brightest stars of the musical firmament; the latest, biggest hits from songland; the most popular up-to-the-moment dance melodies—all are yours on Columbia Records every month. For April:

- Good-bye! Rosa Ponselle } 49558
12-in. } \$1.50
- Madame Butterfly (Selections) Part I } A-6094
Metropolitan Opera House Orchestra } 12-in. } \$1.50
- Madame Butterfly (Selections) Part II }
Metropolitan Opera House Orchestra } \$1.50
- Grenadiers of Sardinia—March } A-2685
Italian Grenadiers Band } 10-in. } 85c
- Hymn of Mameli }
Italian Grenadiers Band } 85c
- Memories of Easter Part I } A-2693
Morrissey and Columbia Stellar Quartette } 10-in. } 85c
- Memories of Easter Part II }
Morrissey and Columbia Stellar Quartette } 85c
- On the Road to Calais, from "Sinbad" } A-2690
Al Johnson } 10-in. } 85c
- It's Never Too Late to Be Sorry }
Sterling Trio } 85c
- Come On, Papa . . . Avon Comedy Four } A-2682
Oh, What a Time for the Girls When } 10-in. } 85c
the Boys Come Marching Home }
Avon Comedy Four } \$1.50
- Baby's Prayer Will Soon Be Answered } A-2691
Henry Burr } 10-in. } 85c
- I'm Glad I Can Make You Cry }
Lewis James } 85c
- Where the Silvery Colorado Wands } A-2683
Its Way . . . Charles Harrison } 10-in. } 85c
In the Evening by the Moonlight }
Columbia Stellar Quartette } \$1.25
- Lady of the Lake—Contra Dance }
Prince's Orchestra }
Introducing: 1—Turkey in the Straw; 2— }
McLeod's Reel; 3—Arkansas Traveler; }
4—McDonald's Reel; 5—Fisher's Horn- }
pipe. } A-6067
Hull's Victory—Contra Dance } 12-in. } \$1.25
Prince's Orchestra }
Introducing: 1—Lady Walpole's Reel; }
2—Opera Reel; 3—Speed the Plow. }
Kentucky Dreams—Waltz } A-6092
Yerkes Jazirimba Orchestra } 12-in. } \$1.25
The Girl Behind the Gun—Waltz }
Yerkes Jazirimba Orchestra } \$1.25
- Madelon (I'll Be True to the Whole }
Regiment) Medley One-step } A-6096
Columbia Band and Peerless Quartette } 12-in. } \$1.25
Introducing: 2—Comprenez-vous Papa; }
3—Cotton Hollow Harmony. }
In the Land of Beginning Again— }
Medley Fox-trot . . . Columbia Band }
Introducing: 2—Some Lonesome Night; }
3—Take Me Back to That Rose Covered }
Shack. }
- Tambourin Chinois . . . Sacha Jacobson } A-6093
Samuel Chotzinoff at the piano } 12-in. } \$1.50
- Thais—Meditation . . . Sacha Jacobson }
Samuel Chotzinoff at the piano } \$1.50
- It's Worth While Waiting for Someone } A-2680
Worth While, from "Little Simplicity." } 10-in. } 85c
Campbell and Burr }
Down the Lane and Home Again }
Samuel Ash } 85c
- Moonlight in the Greenwood } E-4163
Royal Serbian Tambouritz Orchestra } 10-in. } 85c
Jugo-Slav Mazurka }
Gypsy Orchestra } \$1.50
- The Nightingale Waltz } E-4099
A La Saison Waltz } Gypsy Orchestra } 12-in. } 85c
Gypsy Orchestra } 85c

Columbia Records are made
in all languages

New Columbia Records on Sale the
10th and 20th of Every Month

COLUMBIA GRAPHOPHONE CO.
New York

London Factory: 102 Clerkenwell Road, E. C.



NORA BAYES asks "How You Gonna?"

Our Nora, mimicking the rollicking rube, inquires: "How You Gonna Keep 'Em Down on the Farm—away from harm—after they've seen Paree?" Other side, "When Yankee Doodle Sails Upon the Good Ship Home Sweet Home."

A-2687—85c

Oscar Seagle and "Dear Old Pal"

The splendid baritone of Oscar Seagle grips your heart in this song of fellowship, faith and constancy. Its yearning harmony makes you yearn for your own old pals. On the back, "The Magic of Your Eyes," also sung by this great pupil of Jean de Reszke.

A-2684—\$1.00



"Your Boy Is On The Coal Pile Now"

Perfectly content to work on the coal pile to get a chance to sail for dear old France is this patriotic young naval recruit. You'll laugh—and sympathize. On the back, "Look What My Boy Got in France."

A-2688—85c



A Mardones Triumph Is "Toreador"

With his basso voice of immense sonority and volume, Mardones records for you the pageantry and glamor of the bull-ring, the superb arrogance of the torador. On the back, Verdi's "Ernani, Infelice e Tuo Credevi."

A-6095—\$1.50



"Singapore"—a Fox-Trot From Harem-land

The syncopation of this jolly medley gets into your head as well as your heels. The beat of it, the bells, the horns, the sustained melody sweep you along in a whirlwind dance. On the back, "Out of the East."

A-2686—85c



off the Record

Collectors who can attend the Nostalgia convention, see "On the Ship" on page 6, should

"spook" it out for old records, especially collectors interested in the recordings of the 20's and 30's. Rick Wilkins will be returning from college soon. He is the one who plans to write a book about records.



THE EDISON PHONOGRAPH

"The general principles of construction are a flat plate or disk, with a spiral groove on the face, worked by clockwork underneath the plate; the grooves are cut very closely together, so as to give a great total length to each length of surface—a close calculation gives as the capacity of each sheet of foil nearly 40,000 words. The sheets being but ten inches square, the cost is so trifling that but a hundred words might be put on a single sheet economically.

"The practical application of this form of phonograph is very simple. A sheet of foil is placed in the phonograph, the clockwork set in mo-

tion, and the matter dictated into the mouthpiece without other effort than when dictating to a stenographer. It is then removed, placed in a suitable form of envelope, and sent through the ordinary channels of correspondence to whom it is designed. He, placing it upon his phonograph, starts his clockwork, and listens to what his correspondent has to say."

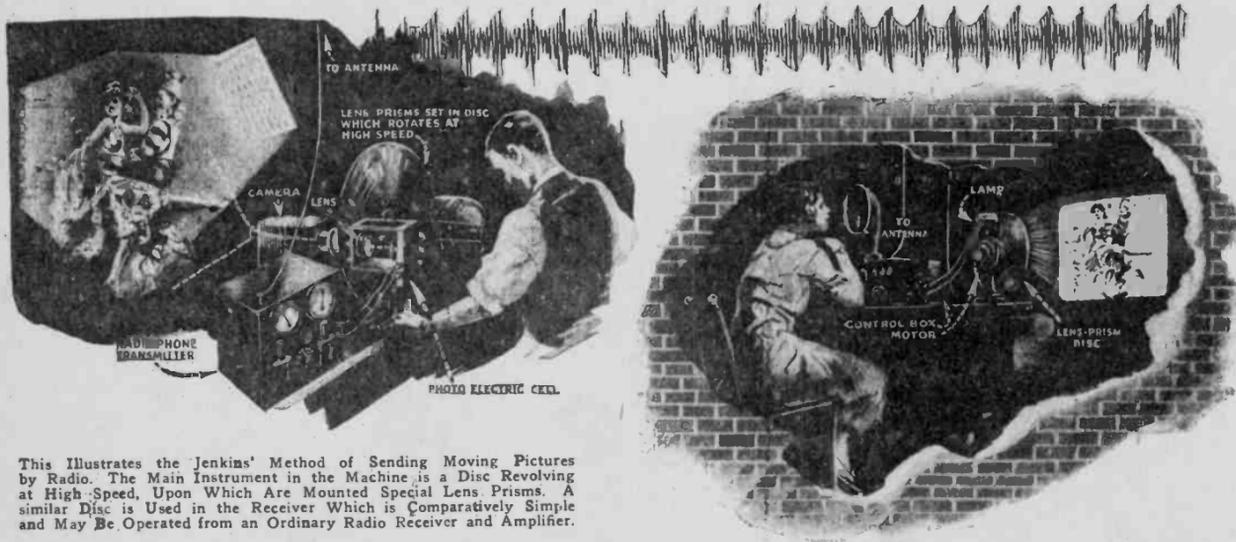
It will be seen that even at this time Edison foresaw clearly the future that was in store for his invention. And the significant part of his statement, foreshadowing the use of phonographs in dictating letters and documents, is now put in practical every-day use by thousands of persons all over the world. The cylinder records, however, are not used as Edison suggested—that is, sent through the mails in special cases or envelopes—but are turned over to typists who record the dictation on typewriting machines in the ordinary manner. This is but one of the many ways in which the phonograph has proved itself a most useful invention. But even without this important commercial value, the instrument affords a means of harmless amusement and entertainment of no small significance in the healthful development of a community.

"The Edison Phonograph" was taken from THE WONDERS OF SCIENCE IN MODERN LIFE by Henry Smith Williams, M.D., LL.D. and Edward H. Williams, M.D., Vol. IV, Funk & Wagnalls Co., New York and London, 1912....

Radio Vision

By H. GERNSBACK

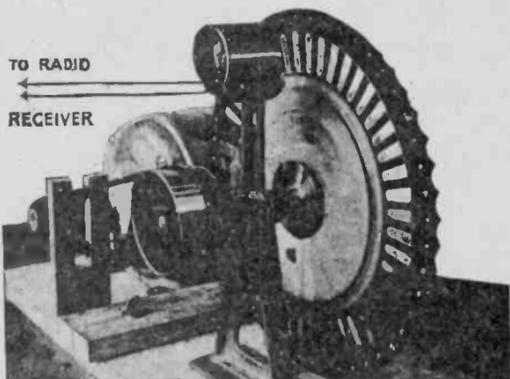
Member American Physical Society



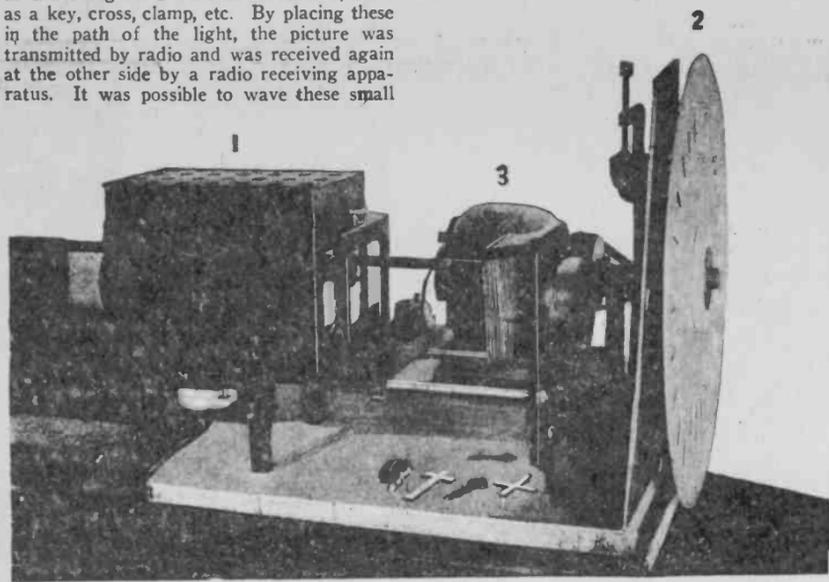
This illustrates the Jenkins' Method of Sending Moving Pictures by Radio. The Main Instrument in the Machine is a Disc Revolving at High Speed, Upon Which Are Mounted Special Lens Prisms. A similar Disc is Used in the Receiver Which is Comparatively Simple and May Be Operated from an Ordinary Radio Receiver and Amplifier.

I HAVE just left the laboratory of Mr C. Francis Jenkins of Washington, D. C., and am still under the influence of what I consider to be the most marvelous invention of the age. I have seen an actual demonstration of seeing, not only around corners through thin wires, but through space as well. The demonstration—a private one—took place before a General of the Army, his staff, and myself.

Mr. Jenkins, the well known inventor, has worked for many years on this invention. Mr. Jenkins, by the way, is the original inventor of the motion picture projecting machine; his old experimental apparatus is now in the United States National Museum, for which invention he was awarded the Elliot Cresson gold medal, by the Franklin Institute. Although the machine, the demonstration of which I have witnessed, is not as yet entirely perfected, I had been able to see my hand projected by radio and being received by radio. In one of the illustrations, you will observe several small objects in the foreground of the transmitter, such as a key, cross, clamp, etc. By placing these in the path of the light, the picture was transmitted by radio and was received again at the other side by a radio receiving apparatus. It was possible to wave these small



Above is a Back View of the Receiving Apparatus Which Projects on a Screen Pictures of Moving Objects Displaced Between the Lens and the Bellows of the Transmitter Shown Below. Note the Small Crosses of Metal and Keys Which Are Used in the Experiments.

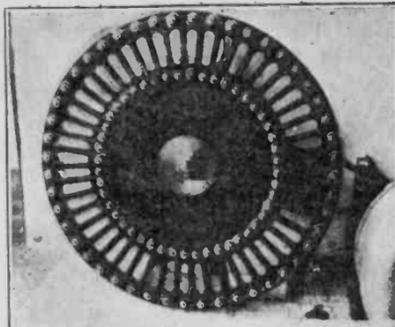


Radio News for December, 1923

objects in the path of the light ray of the transmitter and one could amuse oneself by seeing how these objects were actually being transmitted by radio.

While of course the apparatus used by Mr. Jenkins today may appear cumbersome and complicated, it should be remembered that the first telephone and the first radio outfit were no less complicated, and perhaps more so. It is not necessary to go into the technicalities, as we have in past issues of RADIO NEWS described some of the important parts of Mr. Jenkins' invention. The former articles, however, dealt exclusively with the transmission of pictures by radio and it is easily understood that there is a vast difference between transmitting a photograph and transmitting a baseball game while it is being played. The underlying principle of the two machines, however, is practically the same. Roughly, Mr. Jenkins, by means of revolving prisms, cuts up the light rays which vary the resistance of a light sensitive cell, such as, for instance, the well known Case Thalofide cell. The fluctuating currents after passing this cell are fed to a regular vacuum tube sending outfit where the variations of the light impressions affect the modulation of a lamp, as the voice does. Radio waves are then sent out into space and are received on a regulation radio outfit. The receiving apparatus is very simple. One of the illustrations shows the receiver. It consists of only three parts, namely: A revolving disk with prism and lenses, a motor and a special lamp. The special lamp is used in place of a telephone receiver or loud speaker and this is what happens: The waves as they come in light and extinguish the small pin lamp thousands of times per second. Looking at the lamp with your eyes, you would think it was fully lit. This is, however, not the case. The lighting and extinguishing take place so rapidly that one cannot follow them with the eye. After the light ray passes through the revolving prism lenses, the picture is automatically recomposed on a screen. There is very little complication here.

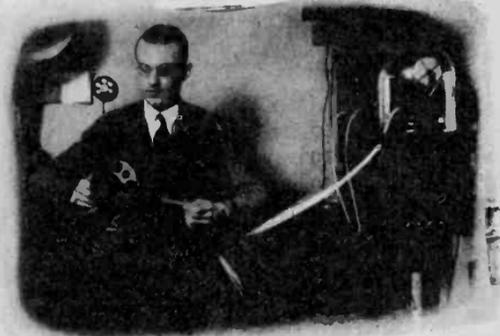
The day will come when you will be able to sit at home and witness a baseball game as it is being played five thousand miles away or you will be able to sit at home and not only listen to, but also actually see an opera as it is being sung and acted. In



Front View of the Receiver Disc Showing How the Lens Prisms are Mounted.

other words, not only the music, but the action will be broadcast simultaneously. In future wars, it will be possible for an Admiral to witness a naval battle and follow it with his own eyes, although his battleship squadron may be thousands of miles away.

With the Broadcasters 1923



GRAIN PRICES GOING OUT

This ticker at WLAG reports the prices of cash grain and grain for future delivery from the Exchange Room of the Minneapolis Chamber of Commerce



EDITH BENNETT

Who sang to Europe from WOR, the Bamberger store at Newark, N. J. She is considered by many as the finest radio singer



GANNA WALSKA

Grand Opera singer, the wife of Harold McCormick, broadcasting from the Waldorf Astoria studio of WJZ, in New York City

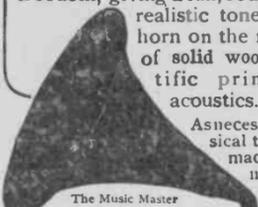


THE "HIRED HAND"

Announcing at WBAP, the Star-Telegram station at Fort Worth, Texas. He is president of the Radio Truth Society, with a membership of 10,000 fans

MUSIC MASTER Wood Horns (NOT VENEERED)

Your Phonograph at its best is to be heard *only* through the MUSIC MASTER WOOD HORN. For the MUSIC MASTER is the only resonant horn—the only horn with vibratory freedom, giving a full, round, rich and realistic tone. The one horn on the market built of solid wood on scientific principles of acoustics.



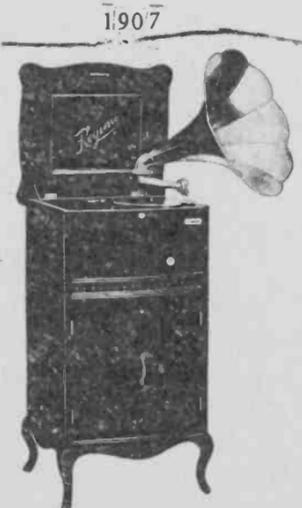
The Music Master

As necessary to the musical tone of talking machine or phonograph as the soundboard is to a piano.

Sent on one week's trial. Choice of oak, mahogany or spruce, for any make or style of machine. Money refunded if you are not satisfied. Ask your dealer for the MUSIC MASTER; if he can't supply you, write us. Full description sent on request.

Sheip & Vandegriff, Inc., 813 N. 5th St., Philadelphia
Berliner Gramophone Co., Montreal, Canadian Distributors.

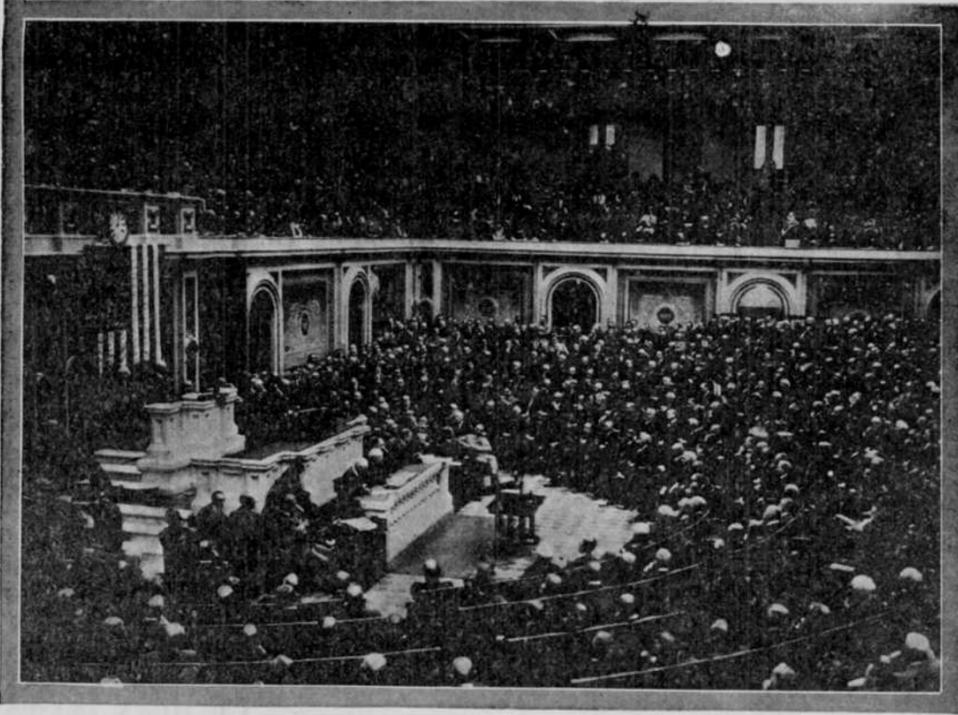
1908



The Reginald

The next issue of *The Horn Speaker*, which is published 10 times a year, will be the August issue.

Calvin Coolidge



© Kadel & Herbert and Wide World

A PAGE IN RADIO HISTORY

At 12:40 P. M., on Thursday, December 6, 1923, the President's voice as he delivered his annual message to the Congress was heard not only by the Congress, but by all who could listen-in on any one of six stations (WCAP, WEA, WJAR, WDAF, KSD, and WFAA). People from Maine to Texas heard the speech so clearly that the President's New England inflection was easily noticeable. Two microphones may be seen in front of the President's manuscript. UPPER LEFT: The amplifying panel located in the basement of the Capitol. UPPER RIGHT: The microphone control operator in the balcony of the house



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1923 RADIO

RADIO BROADCAST

Tricks Used in Staging Invisible Shows

How WGY Puts Across Scenes Without Scenery, Making Many a Home a Theatre. Queer Noise-Producing Devices that Help to Make the Drama Realistic to the Listener-In

By C. H. HUNTLEY
General Electric Company

THE radio audience is, in effect, an audience of the blind. It is evident that if plays are to be presented by radio, the producer must keep constantly in mind that the appeal to the imagination can be made only through the sense of hearing. Merely putting it in touch with the stage of a theatre, therefore, is not enough.

Until about a year ago, such attempts as had been made to broadcast plays were not particularly successful. Individual scenes from plays had been given occasionally, and "The Perfect Fool" and "Lightning" had been put on the air from the theatre in Chicago where they were presented. (That is to say, microphones were placed on or near the stage and the per-

formances were heard just as given.) But the interludes were tiresome to the radio listeners; and the stage "business," visible to those in the theatre, was utterly lost on those who followed the play by radio.

Edward H. Smith, an actor of professional experience, conceived the idea of adapting a play to meet the specific needs of play broadcasting and to solve the problems it presented. He suggested this to Kolin Hager, studio director of WGY, the General Electric Company's station at Schenectady. The idea appealed to Mr. Hager, who stipulated, however, that the play must not take more than forty minutes, as it was to be only one of several features of the program, and the interest of the radio public in such an effort was problematical.

The play chosen was "The Wolf," by Eugene Walter. In cutting down the three-act drama to a play of forty minutes, the second act was taken as the basis, with parts of the first and third acts blended in. A special finale was written. Mr. Walter had insisted that the play be given with a complete cast, and the actors who had had actual stage experience were selected for it. Viola Karwowska played the part of "Hilda"; Frank Finch was "Jules Beaubien"; James S. B. Mullarkey was "Andrew Mac Tavish"; Henry Miller was "Huntley"; and Mr. Smith doubled as "MacDonald" and "Ba'tiste Le Grand." Three of these



MARIE HODGEKINS

A guest artist at WGY, who made a hit in the play, "Under Cover." It is a pity that the radio audience could not see her as well as hear her

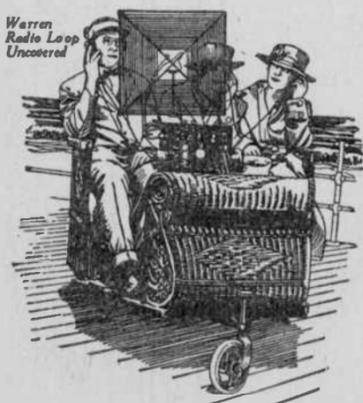
actors had previously appeared in the stage presentation of this play.

After several careful rehearsals, conducted as though on a real stage, the play was given. Then came the response, in the form of two thousand letters from appreciative listeners scattered throughout a territory within five hundred miles of WGY, expressing their thanks and approval. The section covered would doubtless have been greater had the play been given later in the season when the static was not such a handicap. Nevertheless, the screams of "Hilda" were so

realistic in Pittsfield, Mass., as they issued from a loud speaker there, that a policeman patrolling his beat hastened to the house from which the sounds came to find out who was being "battered and assaulted."

This first presentation gave the actors some valuable experience. It taught them that the greater the volume of sound, the farther back from the microphone they had to be. As the play neared the end, the din increased to such an extent that the operators of the station tried to soften it by decreasing the amount of power used. The result was that the close of the play was almost inaudible to some listeners. From then on, as an actor raised his voice, he retired farther and farther from the microphone.

So pronounced was the success of this first presentation that it was decided to make plays



Warren Radio Loop Uncovered



This battery of noise-arranged so as to see Cohn, Frank Oliver, E effect. Mr. Oliver is (on the "thunder-sheer" "smash effects." Mr

lating thunder, the the sound of hor: ably few of the I have given much effects are produ they are relative cause the success on the appeal to tant the visual fa ment is, is clear "movies."

What seem like commonplace to the most difficult met in preparing f Storm." In this in the crashing of roof of a cabin. conflagration, it w.

EDWARD H. SMITH (Left)
 Director of the WGY Players since September, 1922. He has been Director of The Masque, of Troy, N. Y., and did production work with "When Knighthood was in Flower"



FRANK OLIVER (Right)
 Since the age of 9 he has been on the stage, principally in Dublin and Glasgow. In the United States, he appeared first in "Treasure Island." He was a pioneer in Biograph motion pictures under D. W. Griffith, and director and scenic artist of the Newark Theatre Guild. In this last connection, he proved himself a painter of no mean ability



—AND AS IT'S DONE FOR THE RADIO AUDIENCE

The cast is arranged in the same order from left to right as in the picture on the opposite page, with the addition of Edward E. St. Louis (fourth from the left). Mr. St. Louis follows the entire play, the others having individual parts. Mr. Oliver is serving as property man, his job being to produce the rattle of the dishes, silver, etc. necessary to create atmosphere. His part is on the table before him

the WGY program, and to actors who had given the. It was still considered to have plays brought to compass, made up of minutes each. This time considerable difficulty in some took six weeks to re-Allah," which consists of 10 hours for presentation required length. After given, the popularity of mainly so great that the "Garden of Allah," the became a part of the week, and the WGY finite organization. In both dramas and come-

dies, had been given up to the close of June, when the regular players gave way, through the summer, to understudies. They have resumed their work this fall. As showing the appeal this form of entertainment has made to the public, it is interesting to note that "The Sign of the Cross," Wilson Barret's well-known play, which was given by the WGY Players during Christmas Week, brought 1,500 letters in one day, while the total number received in four days was approximately 6,000. Late in July letters of commendation on the presentation of "The Green Goddess," which was presented on March 8, and which in some ways was the most successful of the plays given, were still being received. The average theatre-goer has at least some conception of the back-stage apparatus used to help produce illusions—the devices for simu-



WHAT KIND OF NOISE ANNOYS AN OYSTER?

devices looks as if it might annoy anybody, but the volume and quality of the sound is the real thing to radio listeners. The players are, from left to right: Lola Sommers, Rose St. Louis, and Edward Smith. Between Miss Cohn and Mr. Oliver, on a stand, is the bell (it rains cats and dogs with his right hand, and producing the world's most terrifying thunder background) with his left hand. On the table are dishes for what is picturesquely called this is busy with the telephone effect, and Mr. Smith is coaxing the windstorm machine to the limit

of an approaching train, roofs, and so on. Problems to drama by radio as to how the same in broadcasting, where such more essential be presentation depends alone. How impor- in dramatic entertain- the popularity of the expedients have become WGY Players. One of sitions of this kind was e broadcasting of "The a forest fire culminates urning log through the provide the roar of the first planned to build a

fire in the rear of the building containing the studio and bring microphones sufficiently near to catch the sound, but on experimenting, it was found unsatisfactory. Gasoline torches were therefore temporarily installed in an adjoining room and provided a very efficient substitute. The crackling of ignited twigs was simulated by crumpling brittle paper in front of the microphone, and to produce the sound of falling limbs, a heavy table was thumped on the studio floor. The final scene, with the collapse of the roof under the impact of the falling log, was made real to the audience by the simple expedient of having one of the actors jump from a table on to a packing case and crashing in the top. It required four men to work these various effects. The result was that, while not a word had been spoken to indicate what was happening, the illusion of a forest fire was per-

fect. A man in Nevada wrote that when the tree crashed through the roof, he ducked!

Holding a folded newspaper against the edge of a moving electric fan makes a well-nigh perfect imitation of the droning whirr of an airplane; the rattle of dishes and silver at once conveys the idea of dining; the clink of coins suggests the giving of a tip, and an empty bottle in a pitcher of water at once conjures up visions of ice water. And at the risk of killing the romance for some who have been thrilled by radio dramas, it may be admitted that in the love scenes, the hero plants a kiss not on the lips of the heroine, but on the back of his own hand. Indeed, the hero and the fair lady are often at opposite ends of the room.



Infinite attention is given this matter of sound. If one of the actors is supposed to be talking while eating, he actually eats a sandwich. Wireless telegraph messages are real messages, sent by a bona fide operator by use of a spark set installed for the purpose. The clicking of a telegraph which the audience hears is that of a real sounder operated in the studio. Regulation thunder-making and other devices familiar to the stage are employed, and entrances and exits are marked by the banging of doors.

The members of the cast do not, of course, appear in costume. They read their parts from manuscript, which is typewritten on paper especially selected for its freedom from crackling sound when the leaves are turned, and each actor is furnished with a complete copy.

Reading the parts instead of committing them to memory obviates any danger of forgetting, and makes the presentation smoother than it could possibly be otherwise. Each play is, however, very carefully rehearsed before it is given. In the case of "Madame X," there were four general rehearsals and numerous others for individual players as well. The care that is exercised is evident from the fact that during rehearsals, the players' director, Mr. Smith, is in another room from the rest of the cast when he is not acting a rôle, and hears the play through a receiving set just as it would sound to the great audience. He issues his directions through a loud speaker.

Two microphones are used in transmission, one for men and one for women, this being necessitated by the difference in the quality of

their voices. Voice quality is of the utmost importance in this work. According to Mr. Smith, the ideal voice for the purpose is of low rather than high pitch. The enunciation must be very clear, and naturally clear, as any stilted attempt at precision tends to spoil the effect. The value of pause is something that must be learned. The careful actor in this work shades the pauses to almost a fraction of a second. The volume is usually confined to that of an ordinary conversation. If the scene calls for more, the actor steps back from the microphone.

Nervousness, of course, tends to raise the pitch of the voice, but nervousness is not a factor among the WGY Players. Stage fright, even among the amateurs who sometimes take minor parts to complete a cast, has not been noticeable. The whole atmosphere of the studio when a play is being given is one of congeniality, and a performance takes on, so far as the actors are concerned, something of the nature of a rehearsal, inasmuch as no audience is visible. The realization that thousands are listening does, however, spur the players to their best efforts.

That illusion and atmosphere may be created by sound alone, the presentation of plays by radio has definitely established.

In a letter received at the studio following the presentation of "The Green Goddess," a listener wrote: "I want to add my appreciation of 'The Green Goddess' broadcasted last week. It was superb. Maybe I enjoyed it more because I am familiar with the 'Hill Station' region of the Himalayas. You got the local color splendidly. The palace and social life of the Rajah were very vivid. The English 'resident' was perfect, as were also the Major and his wife. The Doctor was just the kind that appeals to all of us."

The radio drama has an advantage over the movie drama in that it is carried right into the home, whether it be an isolated farm-house or a city apartment. Thus, it is available to those who are unable to go out for their entertainment. It creates a stage in every home equipped with receiving apparatus.

Judging from the favor with which it has been received and the progress it has made in a single year, the radio drama will rapidly develop into a recognized branch of the dramatic art.

on the Air

Nostalgia

The 7th annual convention of Nostalgia in Oklahoma City at the Hotel Oklahoma on June 22, 23, 24 and 25 will bring four big days of returning to the days and nights of early radio, movies, comics, etc.

There will be 30 hours of nostalgic movies, such as "I Love a Mystery," "Four Fathers," "Last of the Mohicans," "Wild Bill Elliot," "Karloff," etc. There will be old time Saturday type serials to relive such as "Fighting Devil Dogs," "Dick Tracy," "Tarzan," etc.

In the trading room you can find over 100 tables of pulps, comics, radio tapes, radio premiums, posters etc. Auctions Galore! They have arranged a room for old radio programs. Top radio programmers will be guests at the convention. There will be talks. A big banquet is in store for the members.

For information, tickets, tables, etc. write to: Mr. Ed Baldwin, Convention Secretary, 3249 N. Roff, Oklahoma City, Okla. 73112.

Radio, phonograph and record collectors should heed the possibilities of this convention.

Antique Show

The East Pembroke Lions Club is pleased to announce that we will hold our 2nd Annual Antique Show on Sunday, June 11, 1972. The show will be held rain or shine in the Holy Name of Mary Church Hall, East Pembroke, New York. Six miles west of Batavia, N. Y., on Route #5, 5 miles east of New York Thruway Exit 48A.

Tables are available at \$10.00 each, payable in advance on a first come first serve basis. If you would be interested in showing at this event, please send inquiries to Pat Cutini, 2114 Main Road, Corfu, N. Y. 14036, phone 716-762-8270, or Lyle F. Tupper, Secretary, Box 57, East Pembroke, N. Y. 14056, phone 716-762-8785.

Silk Covered Wire

Alan Douglas wrote that he will sell No. 20 (64 X 38) green Litzendraht wire for 5¢ a foot, No. 23 (32 X 38) red Litzendraht for 5¢ a foot, No. 31 red Belden Silkenamel for 2¢ a foot, and No. 31 blue Belden silkenamel for 1¢ a foot. Al warned in his letter, "Litz is extremely hard to solder: a bottle of chemical wire stripper (GC Strip - X is a must." His address is Box 225, 409 Barlow's Landing Rd., Pecosset, Mass. 02559.

On the other side of the continent George Badger has some silk covered wire for sale. He wrote, "I have spools of D. S. S. C. green silk covered wire. These spools are the original Belden spools of about 1910 vintage. They are in mint condition. I will send a list for as SASE." (self addressed stamped envelope). His address is 341 LaMesa Drive, Menlo Park, Ca. 94025.

1912 not 1917

In regard to the April issue of The Horn Speaker, E. B. Redington W4ZM, of Springfield, Va., wrote: "Enjoyed The Horn Speaker very much. The 1917 Amateur Radio Station first appeared as a supplement to Modern Electrics, September, 1912. I have one of the original lithographs. Background is solid blue with white lines. Title is "A Modern Wireless Station". 1917 rigs were much more sophisticated.

Ed. Better than ever.

Radio News for September, 1924

History of Radio Inventions

By A. H. MORSE

A.M.I.E.E., Member I.R.E. New York*

1897. Marconi filed (in March) the complete specification of his invention of 1896. The specification is largely taken up with particulars of modifications in the coherer and other details, but the part which is of chief interest is that which refers to the use of an elevated aerial, carried at one end. In this connection, the specification says: "The larger the plates of the receiver and transmitter, and the higher from the earth the plates are suspended, the greater is the distance at which it is possible to communicate at parity of other conditions." This does not quite conform to the provisional specification filed in 1896—nine months previously; and, no doubt, it indicates the results of experiments which had been made in the interim. Further on, the specification reads: "Balloons can also be used instead of plates or poles, provided they carry up a plate or are themselves made conductive by being covered with tinfoil. As the height to which they may be sent is great, the distance at which communication is possible becomes greatly multiplied. Kites may also be successfully employed if made conductive by means of tinfoil." The actual use of an aerial, elevated at one end and earthed at the other—an earthed vertical oscillator—marked the beginning of great progress in

E. F. W. Alexanderson, the inventor of the high frequency alternator.

verified with ease and certainty." The complete specification was filed on February 1, 1898. This invention was regarded as of such outstanding merit that, in 1911, when the British patent thereon was due to expire, it was (in part and conditionally) extended for a period of seven years—a unique distinction in the history of the art. Upon its extension, the patent was acquired by the Marconi Company, which fact was undoubtedly conducive to a more general recognition of its merits. For instance, in 1916, Fleming says: "Sir Oliver Lodge stated clearly, in a fundamental patent applied for in 1897, the right conditions for conducting syntonic radio telegraphy and for isolating stations, and the necessity for the employment of trains of feebly damped waves." Whereas, in 1907, he said: "The full scientific explanation of these principles, covering what is called syntonic telegraphy or the tuning of electrical circuits, was fully given long before the date of Sir Oliver Lodge's 1897 British patent. For example, they were fully set out in two papers published in 1895 in Germany by Oberbeck and by Bjerknes." Further, in the same early statement, Fleming tells us that apparatus which he had made in accordance with Lodge's specification failed to work, "while that made in accordance with Marconi's worked perfectly." The apparatus referred to was being demonstrated in Germany in 1900 before the officials of the German Patent Office by Professor Fleming on behalf of the Marconi Company. If Fleming's citations were relevant to Lodge's invention of 1897, they must have been even more so to Marconi's of 1900; moreover, they give a greater significance to the earlier inventions of Braun.

In the same reference, Professor W. H. Eccles has said: "During the years between 1896 and 1910, Marconi, aided by Lodge's invention of the tuning coil, carried wireless telegraphy substantially to its present (1922) form," while Professor G. W. O. Howe has said of this invention that "it shows a remarkably clear insight into the problem of tuning and selectivity. It constitutes a great advance on Marconi's patent of the previous year."

As instancing the basic nature of the invention, it may be mentioned that the British Admiralty have recently been condemned by Lord Moulton, as Arbitrator, to pay compensation in the nature of royalty to the patentee thereof, on the basis of user throughout the whole period of the life of the patent—21 years. This patent, therefore, has the further distinction of being the earliest relating to radio, to be disinterestedly declared to be of a basic nature. (Br. Pat. 11,575/97; U. S. Pat. 609,154.)

1898. In the complete specification of the invention last referred to, Lodge pointed out that it was not necessary to have a spark gap in the aerial circuit. He also disclosed for the first time, a receiver inductively coupled to the aerial circuit.

In the same year, Lodge invented a loud speaker, using the now well-known device of a coil, connected to a diaphragm and floating

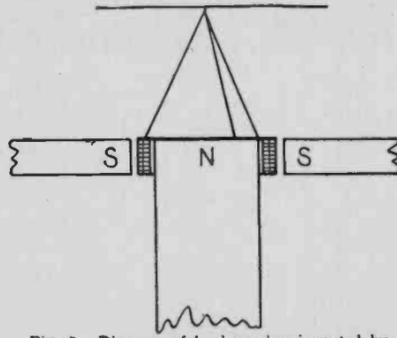
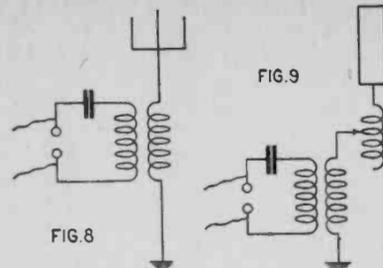


Fig. 7. Diagram of loud speaker invented by Lodge in 1898.

the art. (Br. Pat. 12,039/96; U. S. Pats. 586,193, and re-issue 11,913.)

In May, Professor Oliver Lodge filed an application for a patent on "Improvements in Syntonized Telegraphy without Line Wires," the main feature of which was the provision of means whereby the frequency of the transmitter and receiver could "be



Two transmitting circuits that were among the first of the kind patented.

*Late Supt. Dom. DeForest Wireless Telegraph Co. and United Wireless Telegraph Co.; Engineer, Marconi's Wireless Telegraph Co.; Wireless Adviser, Indo-European Telegraph Co.; Managing Director, Marconi Wireless Telegraph Company of Canada.

in a strong magnetic field. (Br. Pat. 9,712/98.) (Fig. 7.)

1899. S. G. Brown obtained a patent on a method of directional transmission and reception. The method involved the use of two aeriels, a function of a wave-length apart, which aeriels might be looped together. The specification also disclosed the use of a rotary interrupter, whereby a musical note would be obtained. (Br. Pat. 14,449/99.)

Ferdinand Braun obtained patents on a transmitter designed to radiate longer waves than those radiated by the Righi or usual type of oscillator. To this end he proposed a closed oscillatory circuit, containing Leyden jars and induction coils, inductively coupled to a radiating circuit. This use of coupled circuits in the transmitter constituted a very important advance, but Braun did not specifically claim it, or he could have held the whole art to ransom. (Ferdinand Braun, who shared the Nobel Prize with Marconi in 1909, died in Brooklyn in 1918.) (See Br. Pat. 1,862/99; German

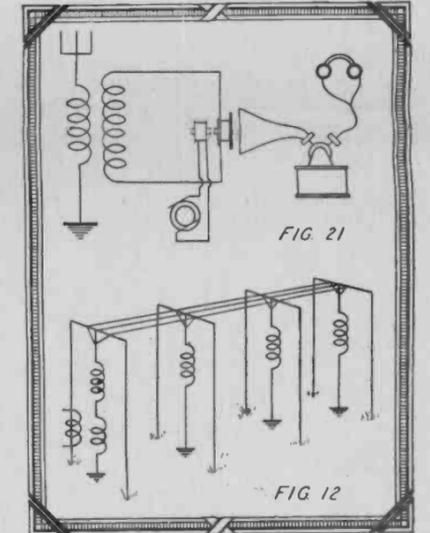


Fig. 12. Antenna designed by Marconi. Fig. 21. The Fessenden method of automatic recording.

1972 MEET

The Antique Wireless Association will conduct their National Historical Radio Conference at the Smithsonian Institution in Washington, D. C., on September 22, 23 and 24.



A switchboard which when installed in Richmond, Va., in 1882, served the needs of the twenty-five telephones that the city contained. It had capacity for expansion to serve about two hundred subscribers.

Federal's Finest, The Wonderful "Fifty-Nine"

Users enthusiastically proclaim the Federal "Fifty-Nine" as "Federal's Finest". The "Fifty-Nine" represents the accomplishment of an ideal after over a quarter century's patient striving.

It gives all the beauty of Federal Tone, Selectivity and Distance Range, plus a simplicity of operation that opens the real thrills of radio to novice and professional alike.

Federal
Standard RADIO Products

FEDERAL TELEPHONE AND TELEGRAPH COMPANY
Buffalo, New York

Priced at \$177
With headphones.
For loop reception (No. 61)
\$46 Extra

Boston New York
Philadelphia Chicago
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Bridgeburg, Canada

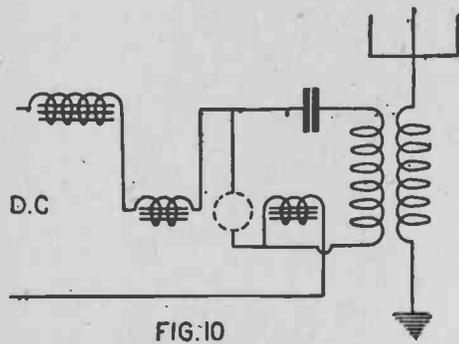


FIG. 10

Diagram of generator with magnetic blowout.

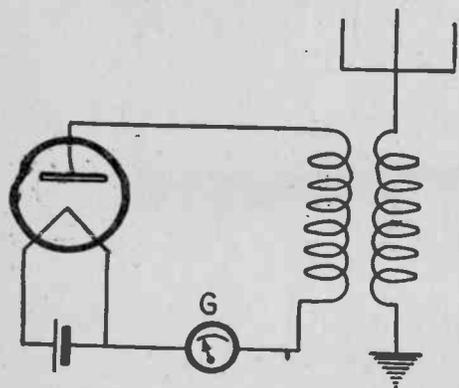


FIG. 11

One of the first steps in the evolution of the triode tube, the diode.

111,578/98; also Br. Pat. 22,020/99.) (Fig. 8.)

1900. In April, Guglielmo Marconi applied for a patent on an invention which comprised practically all that was in the 1897 invention of Lodge and the later inventions of Braun, and a little more. At the transmitter, he employed separate oscillating and radiating circuits, coupled to each other, and at the receiver, separate absorbing and oscillating circuits similarly coupled; all circuits were tuned to the same frequency or harmonics of that frequency, and (inferentially) sufficiently loosely coupled to enable them to oscillate in resonance. This patent was made the basis of several successful infringement suits, and when it was strengthened by the acquisition of Lodge's 1897 patent it gave the Marconi Company for a time almost a monopoly of syntonic wireless telegraphy in England and America. (Br. Pat. 7,777/00; U. S. 763,772.)

William Du Bois Duddell, of London, applied for a patent on a static method of generating alternating currents

"practically" continuous waves. (U. S. Pat. 70,647; Br. Pat. 17,706/02.)

1903. Valdemar Poulsen, of Copenhagen, successfully applied for a patent upon a generator, as disclosed by Duddell in 1900, plus the magnetic blow-out proposed by Thomson in 1892, and a hydrogenous vapor in which to immerse the arc. (Br. Pat. 15,599/03; U. S. Pat. 789,449.) Reference will be made later to this invention, which was not commercialized for some years. (Fig. 10.)

R. A. Fessenden invented the method of telegraphing by changing the frequency of the transmitted wave. (Br. Pat. 28,290/03.)

1904. On January 1, Dr. A. Wehnelt obtained a German patent (No. 157,845) on a two-electrode vacuum tube rectifier of alternating currents. The filament or cathode of Wehnelt's device was coated with oxide, similar to those incorporated in the inventions of Von Lieben in 1911, and Frankliu in 1913.

On November 16, Professor J. A. Fleming, of London, applied for a patent on the use, in connection with radio, of a vacuum valve or diode very similar to that described by Edison in 1883. According to his specification, Fleming had "discovered that if two conductors are enclosed in a vessel in which a good vacuum is made, one being heated to a high temperature, the space between the hot and cold conductors possesses a unilateral electric conductivity." While it is true that Edison was making use of the limited rather than the unilateral conductivity of the gaseous path, there is evidence both in the preamble and the claims of his specification that he was aware of the asymmetry of the conductivity; moreover, the property had been publicly discussed long before 1904 by Fleming and others, including Elster and Geitel.

As disclosed by Fleming's specification, the diode was not a very satisfactory detector. Its importance lay in the fact that it was one step in the evolution of the triode rather than in its own utility. The patents on the diode became the property of the Marconi Company, and after the specification of the British patent had been amended by disclaimer an unsuccessful attempt was made to secure an extension. (Br. Pat. 25,850/04; U. S. Pat. 803,684.) (Fig. 11.)

1905. R. A. Fessenden, of America, applied for a patent on a "beat" or "interference" method of detecting continuous and other Hertizian waves. The invention provided a method, rather than an instrumentality, and there being few, if any, continuous wave stations then in commercial oper-

ation, little use was made of it for some time. Nevertheless, the invention was undoubtedly one of the most meritorious in the history of radio, and it now has a very wide application. (U. S. Pats. 1,050,441 and 1,050,728, granted in 1913, Br. Pat. 6,203/07, see U. S. Pat. 1,141,717 to Lee and Hogan in 1915, Br. Pat. 24,458/13.)

G. Marconi applied for a patent on an inverted "L" aerial. The directional property of this aerial, which, according to the specification, was equally pronounced in transmitting and receiving, has been acclaimed by Fleming and many others. (This, by the way, is not to be confused with the "Marconi Beam.") The specification states, "This receiver may be used with great advantage to determine the direction of a transmitter, say, for instance, on a ship at sea," and explains that if "such an antenna be swivelled about its detector end in a horizontal plane, and signals be received with the antenna in a certain position, the operator will know that the transmitting station is in the line of the antenna; in other words, that its tail end is pointing directly away from the transmitting station."

As to the directivity of this type of aerial for transmission purposes, there seems to be a great conflict of opinion; and despite what has been said to the contrary, it appears that when such an aerial is high enough to be an efficient transmitter, its directivity is negligible, except perhaps when the ratio of distance to wave-length is very small.

Such a directive aerial as Marconi claimed

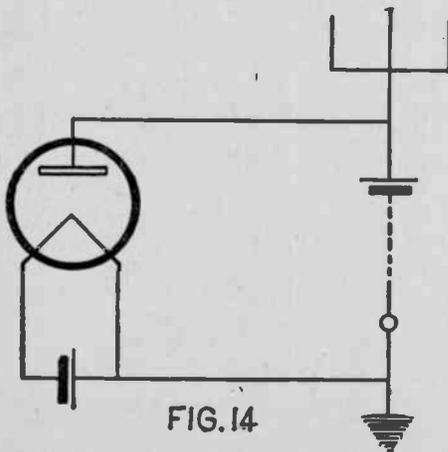


FIG. 14

The "B" battery applied to a diode tube, patented by DeForest.

this to be would be invaluable for long distance point-to-point stations, like those proposed for the British Imperial Chain. However, the 1922 report of the Wireless Telegraphy Commission recommended for these stations aerials of a symmetrical type.

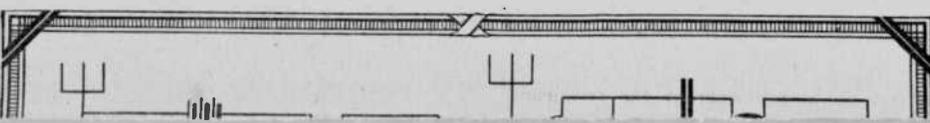
T. L. Eckersley tells us that the directive effect of an "L" aerial "is very small" and is almost entirely destroyed when the earth screen is used, while Professor Fleming states that theory points to the fact that "any bent oscillator, however arranged, has no asymmetry of radiation for very large distances." However, in *The Times Engineering Supplement* of March, 1919 (some years later), Fleming tells us that such a directional aerial "is now generally employed in long distance high-power stations which are intended to communicate with a corresponding distant power station," and that it radiates most strongly in its own plane and away from its open end.

Marconi further points out in his specification that, while aerials of this type are preferably earthed only at one end, "they may be connected to earth at their tail ends or at other points, and inductances and condensers may be inserted in these earth connections." (Fig. 12.) This, as has been pointed out by Mr. E. H. Shaughnessy, of the British Post Office, constitutes a pretty full disclosure of the multiply-tuned aerial, which was later patented to Alexanderson (Br. Pats. 130,064, 142,610; U. S. Pat. 1,360,167/8), but according to C. S. Franklin when "correctly adjusted as regards phase" such an aerial radiates most strongly in a direction at right angles to its length, which is not in accord with the Marconi claims.

In the circumstances, one is not disposed to quarrel with Professor Howe's statement that the action of this Marconi "directional" aerial is very complex (Br. Pat. 14,788/05. See also Br. Pats. 3,127/06 and 20,230/09.)

A British patent was awarded to W. P. Thompson, as agent for a German firm, on a flat-top aerial with duplicate counterpoise. (Br. Pat. 14,221/05.) (Fig. 13.)

Professor Max Wien, of Germany, invented the quenched gap discharger (what was practically a quenched gap was patented to T. B. Kinraide, of Boston, in 1898),



1915 Ad

COMPLETE WIRELESS STATION \$10.10 Reduced to \$8.90



Historical Exhibit

McMahon's Vintage Radio

Re-live the pioneer days of wireless and radio in this new 240-page book.

- Discover a new hobby.
- See*old-time ads and pictures.
- Read about the rough-and-tumble early days of a new industry.
- See hundreds of photos and data on wireless and radio equipment.
- Own the only available collector's handbook.
- You can't lose; ten-day moneyback guarantee.



Vintage Radio, Box 2045, Palos Verdes Peninsula, California 90274

Enclose check to VINTAGE RADIO for \$3.95 per copy (\$4.15 in California), Postpaid.

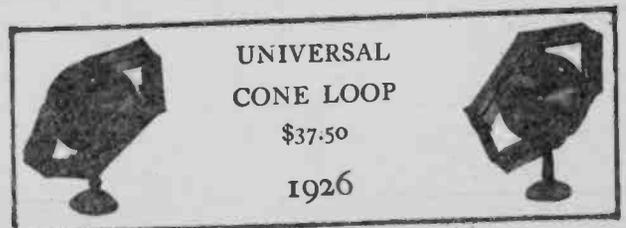
Name _____
 Street _____
 City _____ State _____ Zip _____

In our age of complexity there is a sense of refreshment in enjoying the simplicity, logical circuit layouts, general design and craftsmanship of early radio receivers at historical radio exhibits.

The members of the Indiana Historical Radio Society in the People's Bank at Waynedale in Fort Wayne, Indiana had a meeting which included twelve exhibits and an auction of early gear. The aim of the society is to establish a museum dedicated to the history of early radio.

In the picture from left are Joe Duray, Warren Johnson, Del Barrett, Julian Stark and Ed Rossig, the society's membership from Fort Wayne. Notice the Magnavox amplifier, Federal Xtal set, 21" Music Master wood horn speaker, DeForest Interpanel, and the Reinhartiz 3-tuber that Julian Stark built when he was 14, 51 years ago, and he still plays it.

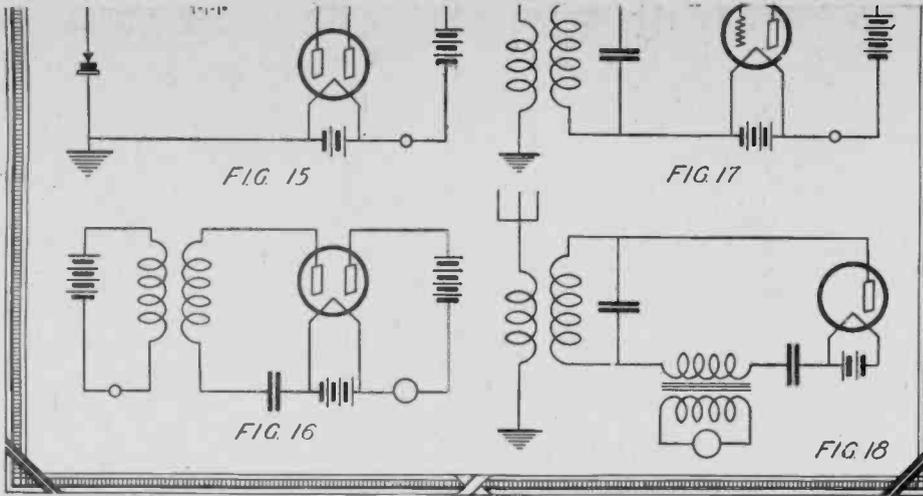
Ross Smith, who is with Chicago Telephone Supply, now CTS of Elkhart, Indiana, exhibited a diorama of 100 years of communication, beginning with the telegraph key and sounder.



from a direct-current supply, which method followed very closely upon the lines of that of Elihu Thomson of 1892. Duddell suggested electrodes of carbon, but he proposed no magnetic blow-out. He stated that his invention could be used for producing oscillations of high frequency and constant amplitude, which could "be used with advantage in wireless telegraphy," especially where it was "required to tune the transmitter to sympathy." Duddell's invention (Br. Pat. 21,629/00) became the basis of the Poulsen arc, and also of an interesting transmitter evolved by Von Lepel.

1902. G. Marconi invented an improved form of magnetic detector (Br. Pat. 10,245/02). This detector constituted a great advance on the coherer, and it had a wide application until the advent of the Fleming Valve (Diode), the Crystal and Electrolytic Detectors.

R. A. Fessenden was awarded a patent covering broadly the voice modulation of



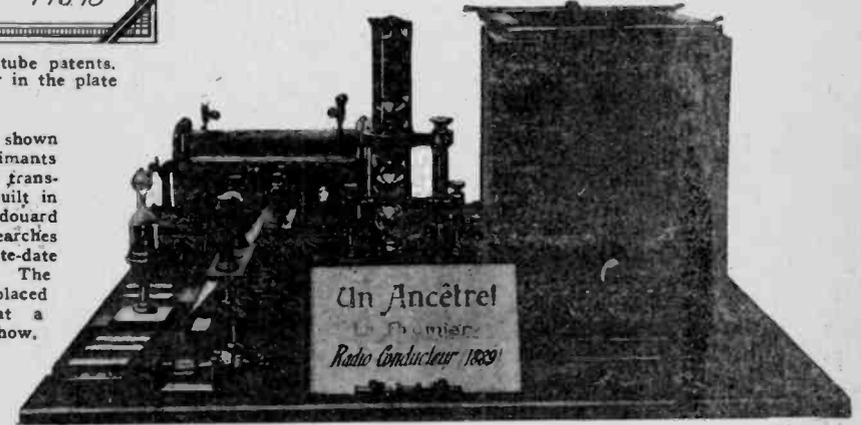
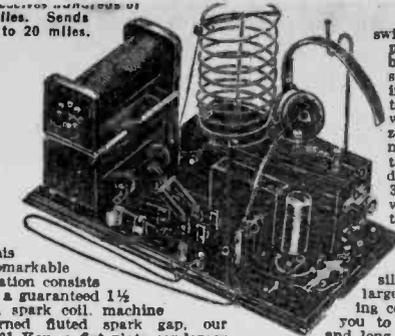
Figs. 15, 16 and 17 show diagrams in the development of the DeForest electron tube patents. Fig. 18 shows a Marconi patent for an induction coil as a step-down transformer in the plate circuit.

Radio News for June, 1925

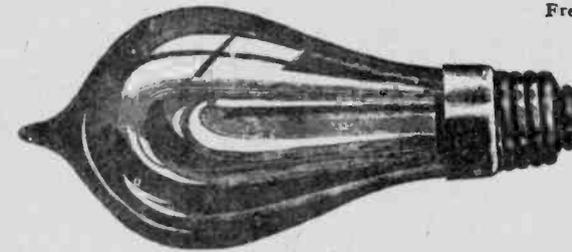
At the right is shown what French claimants say is the original transmitter. It was built in 1889 by Dr. Edouard Branly, whose researches are said to ante-date those of Marconi. The apparatus was placed on exhibition at a French Radio Show.

switch, 500 ohm potentiometer, buzzer and switch to toll if your two detectors are working. Buzzer battery in nicked case, tubular condenser, our new 3-action cat whisker detector, base wire wound double slide tuner, No. 30 silk wire wound large capacity loading coil that allows you to get Arlington and long wave stations. Send stamp for our large catalog "AM" of remarkable values.

THE HANDEL ELECT. CO., 138-140 Centre St., N. Y.



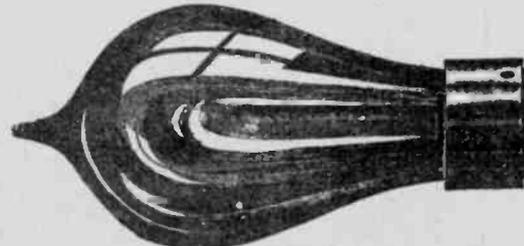
"HERE IS THE SUGAR WE OWE YOU, AND MA SAYS CAN SHE BORROW YOUR HEAD PHONES AND B BATTERY. WE'RE GONA HAVE COMP'NY TONIGHT"



TO FIT EDISON SOCKET.



TO FIT SAWYER-MAN SOCKET.



TO FIT THOMSON-HOUSTON SOCKET.

INCANDESCENT LAMPS.



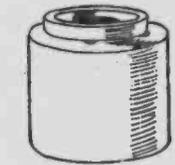
EDISON



SAWYER-MAN OR WESTINGHOUSE



UNITED STATES OR WESTON



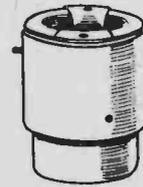
THOMSON-HOUSTON



EDISWAN



BRUSH-SWAN



MATHER-PERKINS



SHAEFER

Various forms of incandescent lamp base. The types of lamp base used, varies among the different makes, but all may be classified into three general types: the screw, the clip, and the bayonet bases. The Edison or the screw type is the one most commonly used in this country. It fits into a screw threaded base provided with contact points for making the electrical connections. Its principal advantages are simplicity, reliability, and cheapness, also its capability of permitting the lamp to be lighted or extinguished by simply screwing it in or out about one turn, an advantage not possessed by the other types. It is provided with contact points similar to the Edison, but the lamp is held in place in the socket by means of spring clips which press against it on all sides. The Edison and other swan bases are of the bayonet type. They are provided with small pins on the sides which fit into corresponding slots in the sockets. After being inserted, they are turned slightly around and thus securely locked in place.

1929 COLOR

An early demonstration of color television was made in 1929; the American flag, a varicolored ball, a bouquet of roses, a slice of watermelon, etc., were reproduced in their natural colors.

Although various features of the television apparatus have been known for many years, it was not until after current-amplifying devices were developed that much progress was made. In 1925 C. Francis Jenkins, in America, and J. W. Baird, in England, almost simultaneously exhibited images transmitted by electric current. Dr. E. F. Alexanderson of the General Electric Company, and Dr. H. E. Ives of the Bell Laboratories, developed the same principles, and the first public demonstration was made by Dr. Ives in 1927. B.M.W.

THE WORLD BOOK ENCYCLOPEDIA
1931 p 7086

OLD RADIO TUBES: Pre-thirties, 250 types all guaranteed. Send \$1 for list. Refundable first order. Limited supply. MIDCO HS5 Box 15370 Long Beach CA. 90815.

INTERESTED in buying or trading for collections of radios or parts. Ham equipment available for trade. Walt Jackson, W5ZYA, 2929 N. Haskell, Dallas TX. 75204 Day time 214 526-2023, 214 262-7855 evenings or weekends.

BUY, SELL, TRADE & REPAIR all wind-up phonographs: **Wanted Edison & Columbia reproducers, horns & 2 min. records.** Ken Wood, 1731 E. Austin Nacogdoches TX 75961.

I AM INTERESTED in four-minute Edison phonograph cylinders. Kent Biffle, 1259 Tenneco Bldg., 1010 Milam St., Houston, Texas 77002.

WANTED, advertising and technical literature on McMurdo Silver and Scott radios and associated items. J. W. F. Puett, 3008 Abston Dr., Mesquite, Texas 75149.

WANTED comic books, big little books, pulps, any radio and cereal giveaways, rings dealing with radio shows. Rogofsky, Box HS1102, Flushing, New York 11354.

WANTED to buy all types of phonographs Edison, Victor, Columbia, etc. Also we are interested in one item or complete collections. Please send photo, description, and price wanted first letter to G. W. MacKinnon, 453 Atando Avenue, Charlotte, North Carolina 28206.

FOR SALE: Crystal radios, horn phonos, battery radios, hurdy gurdy grind organs, etc. Send SASE for free list to S. Leonard, Speakeasy Antiques, 799 Broadway, New York N. Y. 10003. Tel. 212-389-4144.

FOR SALE: Antique radios, parts, books and magazines. R. Matson, 388 Concord Road, Bedford, Mass. 01730.

PROFESSIONAL CW operators, retired or active, commercial, military, Gov't, police, etc. invited to join Society of Wireless Pioneers, W7GAQ/6, Box 530 Santa Rosa, CA. 95402.

THE HORN SPEAKER

P. O. Box 12
Kleberg, Texas 75145

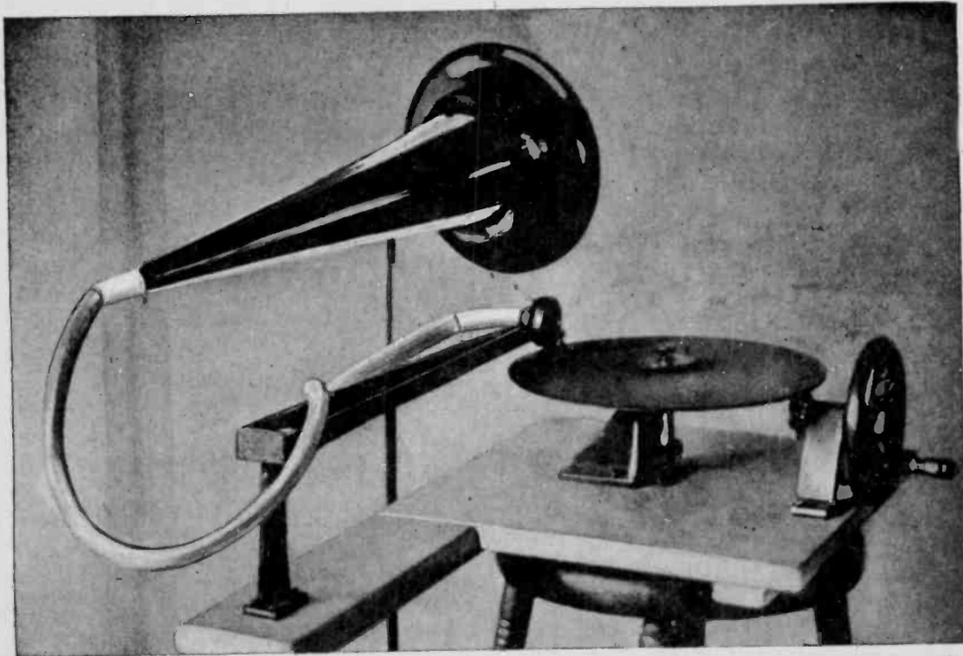


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EDITOR: *Jim Cranshaw*

FORMERLY NAMED:
 THE ANTIQUE RADIO AND PHONOGRAPH NEWS
 NOW NAMED:

THE HORN SPEAKER



FIRST DISK TALKING MACHINE (GRAMOPHONE). EXHIBITED IN 1888

The following words are a quote from, Emile Berliner Maker of the Microphone, by Frederic William Wile, The Bobbs Merrell Co. 1926, P. 189.

EMILE BERLINER

INVENTS THE GRAMOPHONE

After having fully satisfied himself that the lateral cut was the only logical and perfect process for correctly recording the voice, Berliner's next step was to rig up a turn-table similar to that used nowadays on disk talking machines. His machine was hand-driven, which meant the turning of a handle during the whole time a record was played, but it contained a fly wheel that insured regularity of motion. A small framework that could be moved side-wise by a screw held the recording sound box. On the turn-table Berliner laid a heavy round glass plate made for the purpose, which could be taken off and blackened over a smoky flame. The recording sound box was carefully adjusted, so that an elastic stylus just touched the smoky surface of the glass plate. In this manner a flat disk record was finally produced. After the record had been "fixed" by shellac varnish, Berliner took it to Joyce, who quickly turned out the first flat disk-record made by the photo-engraving process. This historic "pancake" has an honorable place among scientific relics in the National Museum at Washington.

While Berliner reproduced from this first disk record, he noticed that even when he disengaged the screw mechanism the record groove itself would hold the stylus of the sound box. Immediately he realized that in voice reproducing the screw mechanism could be discarded. It has never been used since then.

Besides its reproducing superiority, the gramophone mechanism was of materially greater simplicity. For reproducing a phonograph-graphophone record, because it was done in a soft material, a fine screw mechanism was required to propel the reproducing sound box and stylus needle across the record lines. In the gramophone record, which was in hard material like metal or composition, the record disk is merely revolved; the needle of the sound box is dropped into the groove, and this, while playing the music, not only vibrates the diaphragm (throwing the music into the horn), but also propels the needle across the record disk at the same time. It will be seen that this *automatic* propulsion is necessarily smoother than where propulsion is caused by an outside, unrelated force. The self-propulsion which Berliner originated was eventually applied to all existing talking machines as soon as Berliner's patent expired in 1912.

Famous Radio Patents

By CHARLES H. KESLER

Member of Bar of District of Columbia, and of New York Patent Law Association

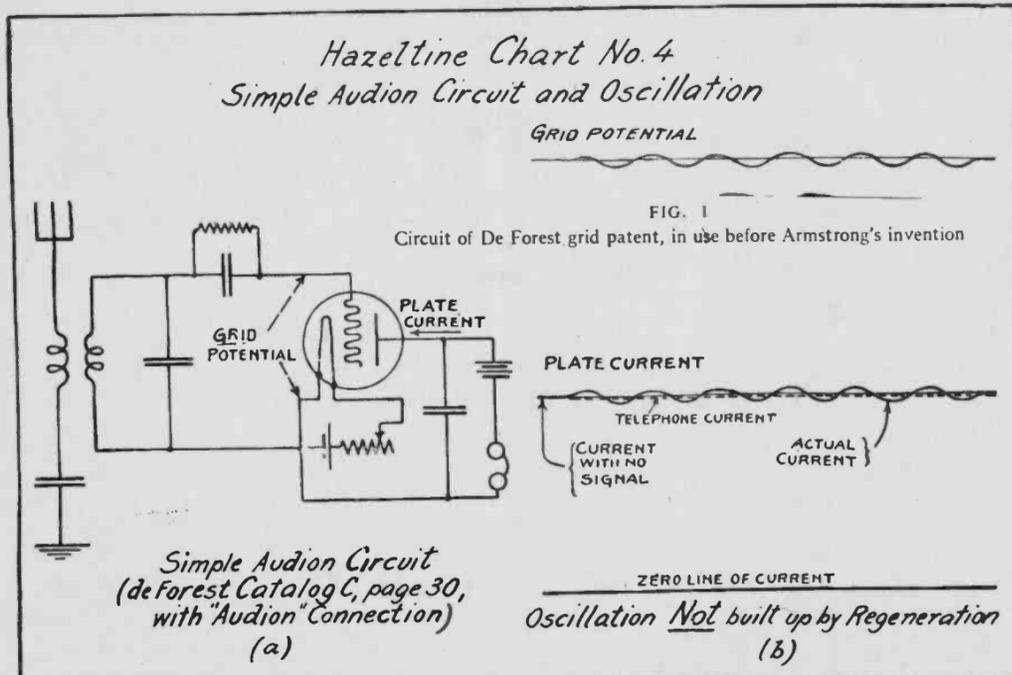
WHILE several courts have decided that the Fleming patent covers the audion when used as a detector, such courts are divided on the question of infringement when the audion is used as an amplifier and as a generator of oscillations.

Beginning in 1912, Armstrong, De Forest, Hogan, Langmuir, Meissner, Vreeland, Waterman, Weagant, and others, while using the audion as a detector, independently observed that it could oscillate or generate oscillations. These observations and investigations have resulted in numerous inventions involving the oscillating tube circuit and amplification, the most noteworthy of which is the Armstrong circuit. With the impetus given to the use of

tubes by these investigations, it is but natural that the question should arise as to whether such improved circuits infringed the Fleming patent.

A tube when oscillating is acting in a reverse manner. Instead of putting an oscillating current into the tube to get a rectified or direct pulsating current, a rectified current is imposed on the tube and an oscillating current is obtained. The action is analogous to that of an electric motor which, while producing motion, when current is passed through it, will produce a current when its armature is mechanically rotated. Neither Fleming nor De Forest contemplated this use of their tubes at the dates of their inventions.

The district federal court in New York has decided that the Fleming patent covers the



Famous Radio Patents *

oscillating circuits (such as Armstrong's) and also the amplifying radio circuits. Although it was admitted that Fleming, at the date of his invention, had no knowledge of the use of his radio tube as an oscillator, yet the court was convinced that the two-electrode Fleming tube would oscillate when used with a battery and condenser and decided that the audion when used as an oscillator infringed the patent, Fleming being entitled to cover all uses of his invention whether appreciated or not, especially when it is a reversible use.

In the Federal courts of Delaware and California, however, on motions for preliminary injunctions, the courts, while granting injunctions on the Fleming patent against the manufacture and sale of tubes as detectors, refused to grant such injunctions in so far as the tubes are made and sold as oscillators or amplifiers. In other words, the courts refused to decide the question definitely before all the facts were before them at final hearing or trial, a preliminary injunction being issued only in clear cases.

Appeals have been taken by the Radio Corporation from these interlocutory decrees. It will be some time before these courts will definitely decide the points in issue, if at all, since the Fleming patent has now expired. After all the facts are presented, the courts may decide that Fleming covered the audion as an oscillator or an amplifier or both, or may decide in favor of the defendants. In each case an appeal can be taken. All we can say at this time is that the Fleming patent covered the audion when used as a detector but, as no appellate court has passed on the other questions, we do not definitely know if the patent covered the audion when used as an oscillator or amplifier in radio.

Of course the two De Forest patents also cover the improved tube circuits such as Armstrong's. No one can use the Armstrong circuit without a license and, even if licensed under the Armstrong patent, the regenerative circuit cannot be used unless licensed tubes are used (a license being implied from the purchase of a tube from an authorized seller.)

The rights in the two De Forest patents are owned by the American Telephone and Telegraph Company, which may license others to make, use and sell the tubes and by the De Forest Company, which has limited and restricted rights to make, use, and sell them. The Radio Corporation of America, prior to the expiration of the Fleming patent, was the sole licensed distributor of radio tubes under the Fleming and De Forest patents, such tubes being manufactured by the General Electric Company and the Westinghouse Company. The De Forest Company can now manufacture tubes under its patents, being no longer under injunction by reason of the basic or dominating Fleming Patent.

The American Telephone and Telegraph Company recently sued the Radio Audion Company and the De Forest Company for infringement of the De Forest patents in the District of Delaware, in which suit the validity of the De Forest patents was conceded. The defense was a certain "immunity contract" given the Radio Audion Company by the De Forest Company, the latter agreeing not to sue the former for infringement. On a motion for preliminary injunction, the court decided that the De Forest Company could not grant such immunity to the Radio Audion Company, which in effect was a license (the De Forest Company having no right to grant licenses) and held the Radio Audion Company to be an infringer. It seems that an appeal has been taken by the defendants, a bond being given in place of the injunction, pending appeal. The De Forest Company was held to be a "contributory infringer" merely. If this decision is affirmed, as it probably will be, the Radio Corporation and the De Forest Company will be the only authorized sellers of tubes for amateur purposes.

We will now continue the story of the audion and tell what Armstrong did. Between 1908, when the De Forest grid patent issued, and 1912, very little was accomplished, so far as the court records show, in improving the audion and in understanding or studying its properties. It was little used commercially. About 1912, a young student by the name of Armstrong was making himself a nuisance to the professors at Columbia University because he was using the laboratory to determine data and constants of inductive and reactive

devices. Professor Arendt told Professor Mason to "get Armstrong and his stuff out of the laboratory." In fact, because of his interest in radio, Armstrong came near "flunking"—as it is called among the flunkable.

This work of Armstrong at Columbia and at his home culminated in the invention of the now well-known regenerative or feed-back circuit, an instrumentality on which he was granted patent No. 1,113,149, which has been held to be valid and infringed, and to cover the regenerative circuit whether used as an amplifier or as a generator of oscillations and amplifier, either in receiving or transmitting. I have been informed that Armstrong has received for this patent and his recent patent covering super-regeneration, sums amounting to a million dollars.

The Armstrong Patent came before the court in the Southern District of New York in the case of Armstrong and Westinghouse Company vs. The De Forest Company. What the Armstrong invention is and what it is not was ably presented to the court by Prof. L. A. Hazeltine of Stevens Institute by means of two charts (Figs. 1 and 2). In chart 4 (Fig. 1) is shown a wiring diagram which was old or was in use before Armstrong's invention. In fact it is the circuit of the De Forest grid patent which I described in RADIO BROADCAST for January. In chart 5 (Fig. 2) is shown an Armstrong circuit (Fig. 4 of his patent). It will be noticed, comparing the two circuits, that each comprises an input circuit including the grid and filament and an output circuit including the plate and filament. What is the essential difference in the two circuits? The difference is so slight that it may not be foolish to point it out: the relocation of the telephones in the common portion of the input and output circuits. But it was this slight change in the arrangement that made all the difference in the world. For, as the court found, we have here the feed-back circuit and regeneration.

Armstrong made a deep study of the audion and read everything which had been written on the subject. The invention was one, however, requiring experimentation—trying this and that—until the right arrangement was obtained and understood. In his investigations Armstrong made two important scientific observations, first, that the audion had an inherent capacity, acting like a condenser, and secondly, that the radio-frequency oscillations, to an extent, were carried over into the output circuit and superimposed on the direct current produced by the battery in that circuit. As far as the record of the case definitely shows, Armstrong was the first so to crystallize or appreciate these ideas or facts as to attempt to utilize them practically by tangible means, an instrumentality, a circuit. Whether Armstrong first made these observations and then made the invention, or made the invention and then formulated the theory is immaterial. As the court found, there was an invention, while the observations made served to make the invention clear and understandable from a scientific standpoint.

Professor Pupin, the Columbia University electrical wizard, testified that all he knew about tubes he learned from his "pupil" Armstrong. At that time he thought the tube had no capacity, because of the conductive "space charges" therein. He was greatly astonished when Armstrong showed the fact to be otherwise. An inventor or patentee is not bound by any theory of operation of his device. It is enough if the device will work and can be intelligently adjusted to work. Armstrong's theory of operation of the audion and of regeneration is now generally accepted, however, as being correct (that is, of being consistent with all the facts as now known).

How Armstrong utilized the inherent capacity of the audion as a coupling to feed back the high-frequency oscillations in the output circuit to the input circuit, to reinforce the oscillations therein, is shown in Fig. 3 (which happens to be Fig. 3 of his patent). Comparing this figure with Fig. 1 (chart 4), the essential difference resides in the tuning inductance coil L' . The output or plate circuit is tuned to the frequency of the incoming oscillations. The circuit is otherwise the same except for the condenser C_4 shunting the battery to provide a free path for the electrical oscillations. The telephones in Fig. 3 are not located in the common path but may be, if so desired, to increase the coupling between the output and input circuits. The capacity coupling between the output and input circuit is very critical, as it

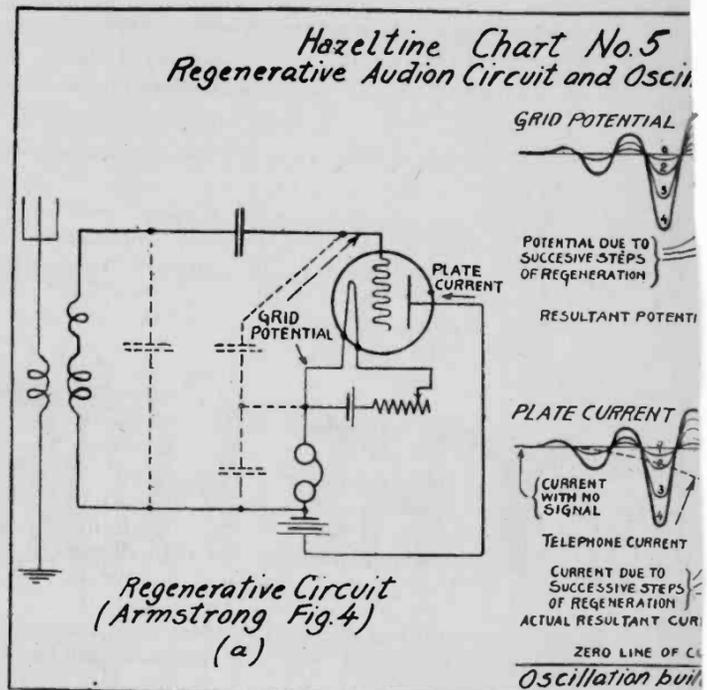


FIG. 2

Here, with the relocation of the telephones in the common portion of the input and output circuits, we have the "feed-back" circuit and regeneration. C

was shown at the trial by an actual demonstration how, by merely moving the hand, the circuit could be put into and out of the "hissing" state, the oscillating state.

The invention covered by the patent was described by Prof. Hazeltine as follows:

The provision of an arrangement for transferring oscillating current energy from the plate circuit to the grid circuit whereby oscillations present in the grid circuit are assisted. Any arrangement by which oscillating current energy is transferred from the output or plate circuit of the audion to the input or grid circuit to sustain the oscillations in the grid circuit is included in the principle of the Armstrong invention.

The "arrangement" referred to, shown in chart 5, is the telephones, including the telephone leads, forming a capacity coupling, as indicated in broken lines in the figure. The "arrangement" of Fig. 3 is the audion acting as a capacity coupling and functioning as such by reason of the coil L .

After having found out what regeneration is (if it be sufficiently clear) we can now compare the results obtained and action of such a circuit with those of the simple audion circuit, as represented graphically in charts 5 and 4. In chart 4, at the right (marked b), the upper curve represents the variations in grid potential and the lower curve the corresponding variations in plate current. These variations are caused by the incoming signal and are weak, and the dip in the average plate current is likewise weak.

In chart 5 (above b) we find curves marked 1 identical with the curves on chart 4, representing the grid potential and plate current for the first half cycle. During the next half cycle energy is transferred to the grid circuit by the feed back due to the variation of the plate current. This low plate current causes a building up of potential in the plate circuit, which is transferred to the grid circuit, reinforcing the low oscillation to give a greater oscillation 2, 3, 4, etc., that is, a higher variation in the grid potential, which in turn causes a higher variation of the plate current 2-3-4, the effect being cumulative, the variation being built up by increments applied successively, but even then substantially instantaneously.

The curves shown in chart 4 and 5 do not represent the magnitude of the energy in the circuits, but only grid potential and plate current, the energy varying as the square of the plate potential or of the plate current. For example, if the plate current in chart 5 has

a variation twenty times as great as the current variation of chart 4, then the energy in the oscillation which determines the intensity of the signal will be 400 times as great in the chart 5, which could not be illustrated for lack of space.

Another characteristic of the Armstrong circuit is that the potential of the plate varies inversely as the potential on the grid. That is, when the potential of the grid decreases the potential on the plate increases and vice versa. This is not true of the circuit of chart 4. Hence in the Armstrong circuit, as the plate potential

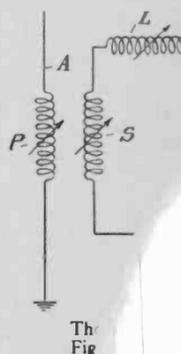
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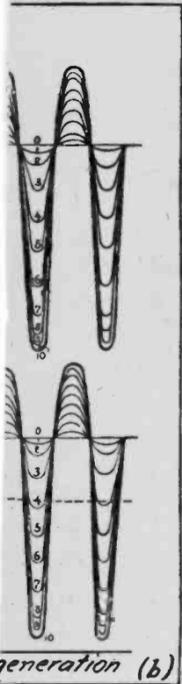
And another or not the patent circuit in an os defendants attempt was the invento prior to Armstre generative oscilla were introduced i money was taken avail, especially Forest filed some 1912 and 1915, a closed regenerati that De Forest fil was after Armstro and after Arms *Electrical World*, publication is nov on the subject a sufficiently intere

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arrangement to anyone. On that date he took a sketch of the apparatus and had it witnessed before a notary. His squadmate, Burgi, went with him and saw the sketch, but in testifying was not decided as to whether he understood the circuit or not. This sketch is identical with Fig. 2 of the patent (Fig. 4). However, it was not plain sailing for Armstrong at the trial, for not only had the notary died meanwhile but it was shown that the notary's recorded signature did not agree with the signature on the sketch. Testimony had to be taken to show that the signature was genuine and that the notary sometimes signed his name differently. In view of all the facts, the court decided that January 31, 1913, was the date of Armstrong's invention, thus beating Meissner by two and a half months.

It was a close call for Armstrong, not because he disclosed his invention to others, but because he didn't do it as fully and timely as he should have done. Although he was successful, he was successful only after going to a lot of trouble and expense to prove his point of early invention.

It is a misconception that a large number of inventors have, that they should keep their inventions secret, at least until the application has been filed. How do they expect to prove priority of invention, either in a patent office interference or in a suit without witnesses, without something tangible such as a sketch or apparatus which can be authenticated by others? When an invention is conceived, make a sketch of it and have it signed and dated by several witnesses. Be sure that they understand the invention. But a mere sketch is not an invention. The sketch must be reduced to practice, as it is called; the invention must be reduced to practice. One way of reducing an invention to practice is to make the device or assemble the circuit, and also to make it work or perform the function for which it is intended. This does not mean a "model" but a full-sized actual practical thing that will work. Then have Bill Smith and Henry Jones see the thing and understand what it is. Let them see it work and point out to them the results obtained.

To strengthen still further the chain of evidence, sit down and write out everything that was done at the demonstration and make a sketch of what was seen and have everyone sign and date it. Now an invention has been made which can be proved, and if the invention as made checks up with the original sketch, the "date" of the invention is the date of the original sketch; provided diligence is exercised in the reduction to practice, the application can then be filed at leisure, but preferably as soon as possible.

In some cases, owing to a lack of capital, the inventor is unable to reduce his invention to practice. In such cases the application should be filed as soon as possible, the filing of the application being considered a "constructive reduction to practice." But a constructive reduction to practice is rather sketchy under a recent decision, in which it was held that the filing of an application cannot be considered a constructive reduction to practice where the invention shown and described in the application cannot, in fact, be constructed to make a practical operative device. So it is better to actually try the thing out before filing an application, so that the details of the invention can be covered and one can feel assured that what is shown and described in the application is operative.

In an interference proceeding in the patent office, the question of who was the first inventor among several applicants, or between an applicant and patentee, is decided. Testimony is taken just as in a law suit. The application of the Armstrong patent in suit, for instance, was in interference in the patent office with an application of Langmuir of the General Electric Company, in which interference Armstrong won out.

There is pending in the patent office at the present time an interference between pending applications of Armstrong, De Forest, Meissner and Langmuir involving the question as to who is the first inventor of the regenerative oscillating circuit, Armstrong having filed an application which he considers an improvement over the invention of the patent in suit, which covers regeneration or the feed-back circuit for all purposes. In this interference, priority of invention was awarded to Meissner by the examiner of interferences, on the ground that Armstrong had not proved a date of invention earlier than the filing date of Meissner in Germany; the examiner taking the diametrically

opposite view to the courts on substantially the same state of facts. The examiner believed that Armstrong lacked corroboration and that the sketch, as a sufficient disclosure of the date of invention, was not proven. It is understood that the examiners-in-chief have reversed the lower tribunal and awarded priority to Armstrong. It may be several years before a final decision is reached, as a defeated party can now appeal to the commissioner and from the commissioner to the Court of Appeals of the District of Columbia. In case the defeated party does not like the decision of the Court of Appeals, an action can be filed in any district court of the United States in which the commissioner is willing to appear to compel an issuance of a

patent covering the invention in issue. Even though Armstrong may win out in the long run, it will be seen how important it is to fully disclose the invention as early as possible and to have available witnesses, drawings and apparatus to prove the invention and earliest date, especially in case of an interference and also in litigation. At least, large expense can be saved.

In summary, the Armstrong patent has been held valid in the second circuit and covers not only the feed-back circuit, when used as a receiver for amplifying, but also when used either as a receiver to produce beats by causing local oscillations, or as a transmitter to produce electrical oscillations.

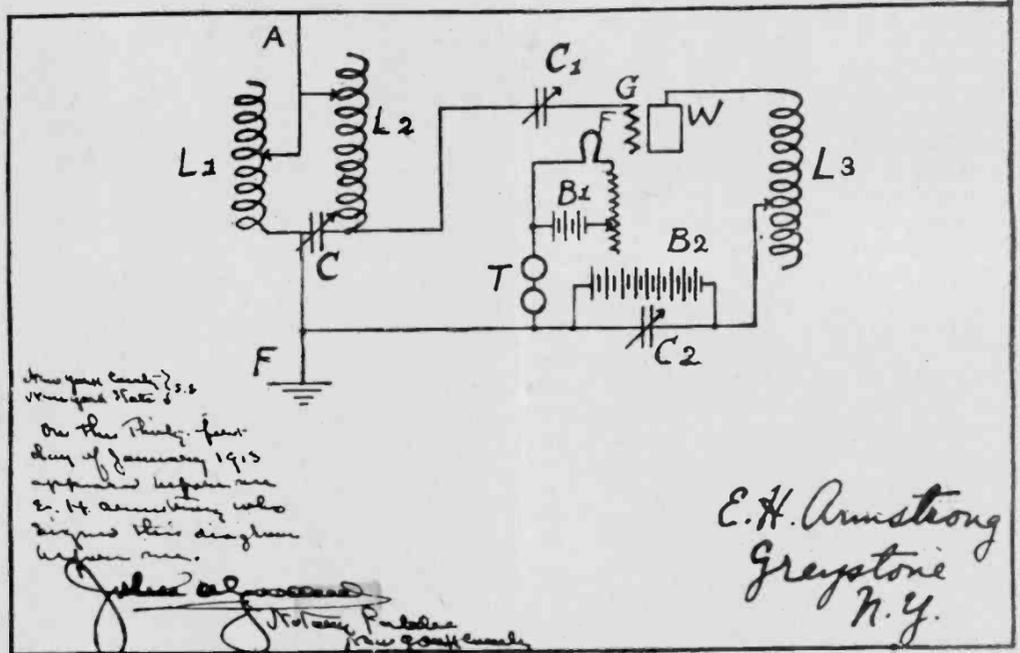


FIG. 4

The original drawing of the feed-back circuit which largely determined the court in Armstrong's favor



Whether Armstrong will secure a patent covering more specifically the feed-back as an oscillator depends on the outcome of the present interference. With the court decision to back him up he is in a very good position, I should say. While the court has been very liberal with Armstrong, and given the patent a very broad interpretation, yet it had no occasion to pass on all types of apparatus in which the feed-back may be or can be present, either deliberately or intentionally or accidentally or incidentally. In radio-frequency amplification, for instance, it has been found difficult by those who have no desire to infringe the Armstrong patent to prevent regeneration by reason of the inherent capacity of the tube, such regeneration being more detrimental to clear reception than advantageous.

Although Armstrong lays no claim to cover audio amplification by the cascade arrangement,

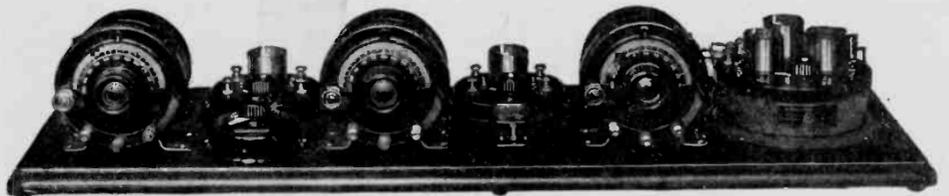
I understand he claims to cover certain arrangements of radio amplification, where it is necessary to have circuits tuned to the high frequencies, and especially when there are adjustments capable of varying the amount of regeneration.

It must be admitted that the endeavors of engineers to avoid patents have always resulted in important contributions to the development of the art, yet it is also an advantage to know where we stand and it is hoped (without wishing anyone any hard luck) that the courts can soon pass upon the scope of the Armstrong patent as applied to radio-frequency amplification.

While the Westinghouse Company is the owner of the Armstrong patent, fifteen or more other manufacturers are licensed under it and these as a rule advertise this fact and place a notice of the license on their sets. The patent expires in 1931.

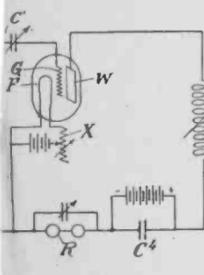


* Famous Radio Patents is a reprint of an article from Radio Broadcast, March 1923.



The Atwater Kent Radiodyne Receiving Set

The salesman is not lying.
 Oh, by no means! Purchasers of this set will be able to hear 2LO loud and clear.
 It is merely necessary that they move to London.



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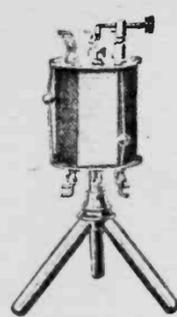
ACE \$20

Type V Armstrong Regenerative Receiver

1923 ads



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9 Inches High Beautifully Nickel Plated

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The Wonderful High Grade Crystal Radio Receiving Set

SIMPLICITY EFFICIENCY QUALITY

The Martian Sliders (2) for sharp tuning produce clearness and volume

One, two, three or four headsets can be used. One to eight persons can "listen in" at one time.

Tuning Coil is non-shrinkable.

Anyone Can Install and Operate the Big Four

Guaranteed to receive concerts from all broadcasting stations within a radius of 30 miles.

If your dealer cannot supply you, we will send you a Martain Big Four set prepaid anywhere in the United States upon the receipt of Price, \$7.50

JOBBERS and DEALERS - WRITE OR WIRE FOR DISCOUNT SHEET

WHITE MANUFACTURING COMPANY

93-107 Lafayette Street Newark, New Jersey

off the Record

Rick Wilkins called to tell me that he has prepared a 800 word manuscript on record collecting. The Horn Speaker has been earnestly seeking manuscripts that will benefit record collectors. The Horn Speaker is eager to print Wilkins' work as well as others.

on the Air

The Horn Speaker is still in the process of preparing the March 1925 Radio News Directory for reprint.

Many people have asked about back issues of The Horn Speaker. Many are available at 50¢ each. To simplify matters the January, 1973 issue of The Horn Speaker will be Volume II No. 1. The January 1972 issue of The Horn Speaker or The Antique Radio News as it was called then, was numbered No. 30, a number which grew out of retail sales tabloids. Anyway, No. 30 is the first issue.

Classified ads for the September issue will be 4¢ a word, which is a substantial cut in price to promote more classified ads. Since most readers appreciate photographs of the "for sale" items, a cost of only \$2.00 in addition to the ad will be charged for printing photos of your "for sale" items.

WANTED: John Rider Vol. 1 1933 edition. K. Parry 17557 Horace, Granada Hills, Calif. 91344.

FOR SALE: One Victor Phonograph 1904 model, hand wind consolette, black chippendale, 3 feet high, 3' long, 2' deep, very good condition. Reasonable offer. Frank E. Dandola, 1014 Bay Ridge Ave., Brooklyn 19, New York.

ANTIQUe radio parts discovered in San Francisco warehouse. Untouched in 50 years. SASE for list. Geo. M. W. Badger, W6RXW 341 La Mesa Drive, Menlo Park, CA. 94025.

FOR SALE: Crystal radios, horn phonos, battery radios, hurdy gurdy grind organs, etc. Send SASE for free list to S. Leonard, Speakeasy Antiques, 799 Broadway, New York N. Y. 10003. Tel. 212-389-4144.

FOR SALE: Antique radios, parts, books and magazines. R. Matson, 388 Concord Road, Bedford, Mass. 01730.

NEED Crosley Model 52 Schematic. R. A. Misak 5524 N. Major Ave., Chicago, Illinois 60630.

BUY, SELL, TRADE & REPAIR all wind-up phonographs: Wanted Edison & Columbia reproducers, horns & 2 min. records. Ken Wood, 1731 E. Austin Nacogdoches TX 75961.

I AM INTERESTED in four-minute Edison phonograph cylinders. Kent Biffle, 1259 Tenneco Bldg., 1010 Milam St., Houston, Texas 77002.

WANTED to buy all types of phonographs Edison, Victor, Columbia, etc. Also we are interested in one item or complete collections. Please send photo, description, and price wanted first letter to G. W. Mackinnon, 453 Atando Avenue, Charlotte, North Carolina 28206.

WANTED comic books, big little books, pulps, any radio and cereul giveaways, rings dealing with radio shows. Rogofsky, Box HSL102, Flushing, New York 11354.

NEED knobs and four-prong type speaker for 1931-2(?) Atwater Kent Model 61. Mark Oppat, 31800 Balmoral, Livonia, Michigan 48154.

INTERESTED in buying or trading for collections of radios or parts. Ham equipment available for trade. Walt Jackson, W5ZYA, 2929 N. Haskell, Dallas TX. 75204 Day time 214 526-2023, 214 262-7855 evenings or weekends.

WANTED, advertising and technical literature on McMurdo Silver and Scott radios and associated items. J. W. F. Puett, 3008 Abston Dr., Mesquite, Texas 75149.

LOTS of old type radio tubes; new and used. 1 large old floor model phonograph; 1 small old portable phonograph; lots of old 78's records. Clement V. Lechnir, Director of Experimental Physics, 221 South Marquette, Prairie DuChien, Wisconsin 53821. SASE

WANTED: Rider's Technical Manual of Schematics, Vol. 1. F. E. "Pat" Patterson, P. O. Box 253, Longview, Texas 75601.

FOR SALE: Scott All-harmonic, good condition, 30 tubes, \$175.00; Scott All Wave, double tuning, restored, \$115.00; Radiola III good condition with old style WD 11s, \$65.00; Curved-top Philco model 61, \$42.00; Steinite, needs restoring, \$25.00; Radiola superhetrodyne, \$60.00; Freed Eisemann NR-7 \$45.00; Mega Phono horn, blue and brown, \$25.00; Magnavox horn speaker fair condition, works, \$25.00; Leader Horn speaker \$45.00. Jim Cranshaw, 9820 Silver Meadow Dr., Dallas TX 75217, Phone 214-286-1673.

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