

FORMERLY NAMED:
THE ANTIQUE RADIO AND PHONOGRAPH NEWS

NOW NAMED:

THE HORN SPEAKER

off the Record

In the coming months *The Horn Speaker* will feature illustrated articles about outstanding phono-graph collections.

The Bill Perkins collection is scheduled to be featured in the near future. Many collectors are familiar with the work Bill has been doing to manufacture needles for the oldies.

Ken Wood of Nacozoches, Texas is moving to a new home in the same area. His new home will provide a display area for his phono-graphs. *The Horn Speaker* is eager to photograph his display room when it is ready.

on the Air

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John sold his collection of radios to Jesse G. Parker

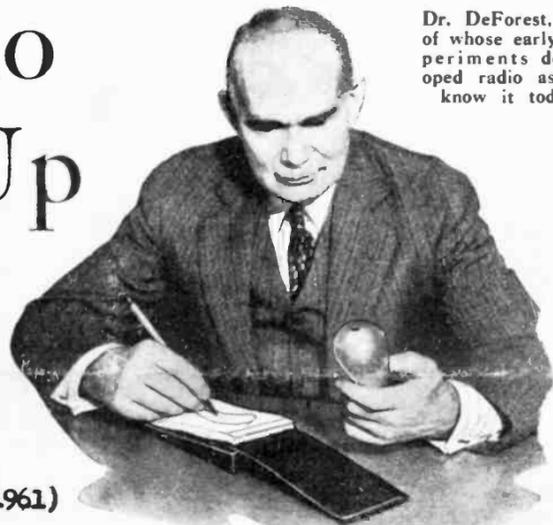
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How the Radio Tube Grew Up

An intimate story of the vacuum tube from the first crude model to the highly perfected tube of today—as told by the pioneer inventor who had the courage of his convictions

By Lee DeForest, Ph.D. (1873-1961)



Dr. DeForest, out of whose early experiments developed radio as we know it today

WITHOUT the audion, or three-element vacuum tube, there would be no radio industry. At least, the radio industry would not be catering to the public at large, supplying millions of radio sets and tens of millions of radio tubes each year, and maintaining over six hundred broadcasting stations pouring forth a steady stream of entertainment and enlightenment—and considerable advertising. Rather, there would be a relatively small communication business for the handling of marine and transoceanic traffic. In the final analysis, it is the vacuum tube that has brought about simplified and practical radio. Hence, in the production of radio tubes—the veritable footlights of the world's stage—is reflected the rapid progress of the radio art, science and industry.

The giant radio tube industry of today came about through an accident. Many of my readers may recall the story. However, for the newer members of the radio fraternity, I may be permitted to repeat the brief details.

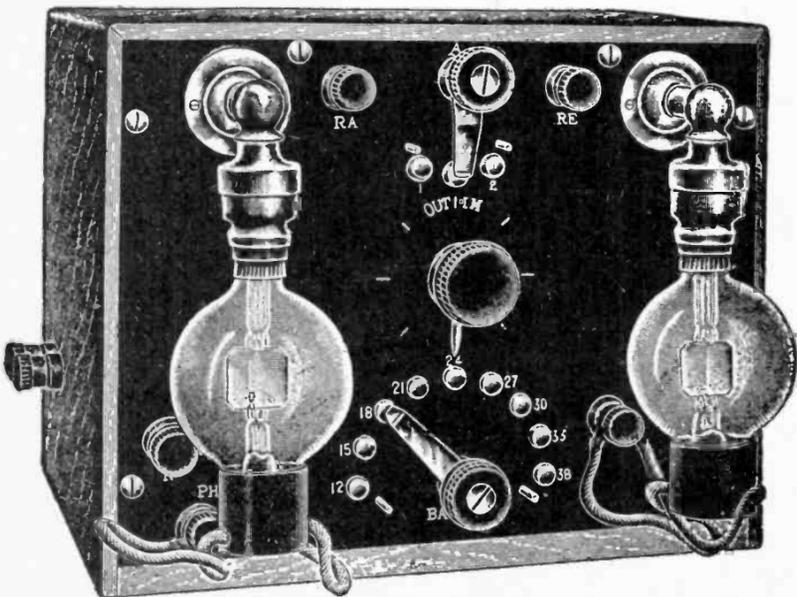
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The first gaseous detector took the form of a standard Bunsen burner, with a trough-like electrode containing common table salt and a piece of platinum wire about it, placed in the blue flame of the burner. A battery and headphone were shunted across the flame, through the electrodes. The salt was used to improve the action. The antenna and ground were connected to the two electrodes. Fair results were obtained from this detector.

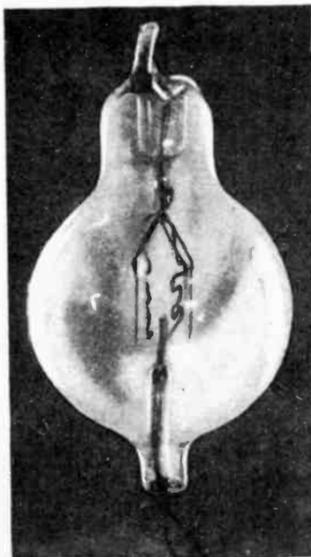
However, marine wireless was our main consideration in those days. And since there was no illuminating gas available on shipboard, I decided to use a glass bulb filled with gas, and a heated filament as the source of heat, operated entirely by batteries. One discovery led to another. The fact that much of the signal energy passed through the battery and headphone instead of through the gaseous medium led to the idea of a separate and distinct path for the wireless signal, and in turn the third element made its appearance, first as a metal band around the outside of the glass bulb, then as a second plate quite close to the first or real plate, and finally in the shape of a zigzag length of wire which, for want of a better name, I called the grid. So by 1906 I had developed the audion or three-element tube, in all respects similar to the standard radio tube of today.

The next step was to manufacture the audion. At first I tried to interest the large lamp companies, since the audion was very much in their line, being a modified electric lamp. But to no avail. The lamp companies had no time to bother with this fantastic experiment. Somewhat of a contrast, to be sure, with present-day conditions when so many lamp companies have rushed into the vacuum tube business.

Finally, (Continued)



Professional type of audion detector. It is provided with two super-sensitive Audion Bulbs, high voltage local battery, potentiometer switch graduated to show voltage at any point, switch to change from one bulb to the other, and rheostat to change brilliancy of filament. This detector is used by the U. S. Army and Navy, and is furnished in oak and hard rubber; size, 9 1/4 by 9 by 7 inches. Three dry cells to light filament are necessary.



THE PHONOGRAPH AND ITS INVENTOR

EDISON AND HIS INVENTIONS

PART 11

After getting out this machine Edison no work on the phonograph for some years, his time being occupied with the telephone and electric lamps. During this time two brothers, Graham and Chichester Bell, and one Charles Taintor developed and improved the ideas started by Edison. A thin wax coating on a paper cylinder was substituted for the tin foil, and the spindle was turned by a clock-spring-driven motor instead of by hand.

When Edison again turned his attention to the phonograph, he introduced an all-wax cylinder and invented a machine by means of which the surface of a worn record could be shaved off and a new record made on the fresh surface.

In making a record for the modern phonograph or graphophone, the cutting is done by a very small sapphire point having a circular concave end with very sharp edges. This point gouges minute depressions into the wax. The vibrational movement of this point is caused by a diaphragm made of French glass, $\frac{1}{16}$ inch thick, which is connected with the sapphire point by a delicate series of weights and levers.

The reproducing is accomplished by a sapphire ball with the same diameter as that of the gouge. This process is simply a reversal of that used in making the record, and its delicacy is such that a record may be used one hundred times with apparently no wearing effect.

It is interesting to notice that the reproducing parts of a phonograph have functions exactly corresponding to those possessed by bones in the ear called the "hammer," "anvil," and "stirrup."

RECORD MAKING

Phonograph records are made in two shapes, cylindrical and flat. The cylindrical records are usually of wax and the flat of vulcanite or celluloid. The latter are cut with a continuous volute groove starting at the edge of the disk and ending at the center. These flat records are used for reproducing only. Their process of manufacture is as follows: The record is first made on a sheet of zinc coated with a very thin film of wax. The recording needle resting on this wax removes portions of it as the vibrations agitate the needle. This uncovers the zinc underneath. By flooding the plate with an acid the bare places are etched while the portion covered with wax is not affected. The wax is then removed and an electrotype negative of the record is the result.

The celluloid or vulcanite records are then made from this "master" record by bringing the two into contact under heavy pressure.

Two processes may be used in making cylindrical wax records, copying, and molding. In copying, the master record and a blank cylinder are mounted side by side on the same spindle. A reproducing point which passes over the master cylinder is connected by levers with a cutting point, which passes over and cuts the blank cylinder exactly as the reproducer moves over the master record. The result is an exact duplicate of this record. This process is, however, necessarily slow and most records are made by the molding process.

Edison's inventive genius was here shown again when he found that by inclosing a wax record in a vacuum between two gold electrodes he was able to coat the record with a very thin film of pure gold on which silver or nickel could easily be deposited. This deposit was made sufficiently heavy so that the wax could be melted out, leaving an electrotype negative from which cylindrical wax records could be made, the cooling of the wax causing enough shrinkage to allow for the removing of the molded records.

While at present the phonograph has its greatest use as an entertainer, yet its practical value is continually being demonstrated along many lines. It is used in offices for repeating dictation to a stenographer, in the Canadian Parliament for recording parliamentary proceedings, as a teacher, particularly in instructing in the foreign languages, and in many other similar ways.

As the name of Edison is mentioned here in connection with the invention of the phonograph, a suitable opportunity is offered for giving a brief sketch of the career of this great inventor and mentioning a few of the many other devices which he has invented or helped to bring to perfection and into practical use.

Edison was born at Milan, Ohio, in 1847. His family moved to Port Huron, Mich., when the boy was seven years old, and it was on the Detroit and Port Huron branch of the Grand Trunk Railway that, at the age of twelve, he became a train boy. His only schooling, meanwhile, had been such as he was given at home.

In a short time an opportunity came to him to learn telegraphy, and while only a boy he was installed as operator at Mount Clemens, Mich. At the telegraph key he was unusually expert, and in his later wanderings as a so-called "tramp operator" Edison was always sure of a position. While temporarily engaged in Indianapolis, at the age of seventeen, he made his first invention, an automatic telegraph repeater. A little later, while employed in Boston, he invented a commercial stock indicator, and this device he soon sold to New York capitalists for forty thousand dollars. With the money thus obtained Edison built a laboratory at Newark, N. J., for the manufacture of electrical, printing, and other apparatus.

In this Newark laboratory and later ones at Menlo Park and West Orange, N. J., Edison studied out the long series of devices that have worked such changes in our modern world. One of the most notable of these is the incandescent electric lamp. To discover the carbon filament for this light required weeks of persistent experimenting and almost ceaseless labor. **Others of his leading inventions are the carbon**



Thomas A. Edison

telephone transmitter, a storage battery for street railway cars and automobiles, multiple systems of telegraphy—duplex, quadruplex, and finally sextuplex—and the kinoscope. Every electrical instrument and electrical process now in use bears the mark of some great change wrought by this leader among the inventive geniuses of the world. Over three hundred patents have been issued on his inventions, in addition to which he has made numerous minor improvements not covered by patents.

THE SATURDAY EVENING POST

December 26, 1908



"Why the mail was late"

Mr. Edison made all sound-reproducing instruments possible, but he perfected the Edison Phonograph.

AMBEROL RECORDS for The EDISON PHONOGRAPH

are Mr. Edison's newest and greatest invention. They are no larger than the regular Records, but hold twice as much music and play twice as long.

Every Edison Phonograph in existence, except the Gem, can be equipped with an attachment to play these new Records as well as the old Records.

There are new Records fresh every month for the Amberol Records as well as for the old Records. All new machines are equipped to play both. Any old style Edison Phonograph except the Gem can be easily equipped to play both by consulting a dealer. A full line of Edison Phonographs

can be heard and both kinds of Records can be enjoyed at the store of any dealer anywhere in the United States.

There is no excuse for anyone to be without the pleasure that is furnished by an Edison Phonograph.

Ask your dealer or write to us for illustrated catalogue of Edison Phonographs, also catalogue containing complete lists of Edison Records, old and new.

NATIONAL PHONOGRAPH COMPANY
11 Lakeside Avenue, Orange, N. J.



THE EDISON BUSINESS PHONOGRAPH means shorter hours for the business man

Thomas A. Edison

I succeeded in interesting one McCandless, a producer of miniature electric lights, located on Park Place, New York. McCandless' became the first vacuum tube plant. His men, skilled glassblowers that they were, made the early audions which were sold mainly to wireless experimenters for use as a detector. The audion was supplied with a wooden cabinet containing flashlight batteries for the "B" circuit, and with binding posts and switches for the necessary connections. According to one of our early advertisements: "The audion detector is operated by heated gases, employs a local battery and is complete with switches, batteries, rheostat and necessary connections. It is fully protected by U. S. Patents Nos. 879,532, 979,275 and others granted to Dr. Lee DeForest and held by the Radio Telephone Company. It is pronounced by experts to be the very best detector obtainable anywhere. Renewal audion bulbs may be secured, in exchange for old or broken ones, for \$3.50 or \$5.00 each. All tubes are tested before shipment, but the 'X' or \$5.00 bulbs are tested for the maximum possible sensitivity. With the audion you can easily increase your range from 50 to 100 per cent."

Our first audions made use of tantalum filaments. Usually a double-loop filament was employed, with three pigtail leads, so that one or the other loop might be used. When one loop or filament burned out, another was still available, thereby giving the short-enough life of those audions a double span, so to speak. The tubes were quite gassy. The plate voltage had to be delicately adjusted so as to be set at the most critical value. If increased beyond a given point, the tube would suddenly light with a purplish glow, and the signals would become garbled.

In time, the audion came into use for telephone purposes. It was in 1915 that the American Telephone & Telegraph Company, employing the DeForest amplifier, inaugurated the first transcontinental telephone services between New York and San Francisco. The same year that organization, using my "oscillations," or oscillating audions, made successful wireless telephone tests between Arlington, Va., and the Eiffel Tower in Paris, and again with Pearl Harbor, in Hawaii. So thoroughly convinced were wire and wireless men of the value of the audion or three-element vacuum tube that the device received no end of research and engineering development. In 1917 I entered into an agreement with the American Telephone & Telegraph Company, whereby that organization secured certain rights under the audion patents and whereby sufficient audions might be made available to the Army and Navy for radio communication during the World War. The telephone company, in turn, relicensed others to make and use the audion, so that today every reputable vacuum tube manufacturer is a relicensee under the DeForest audion patents.

Until the dawn of broadcasting, vacuum tubes were made by means of more or less laboratory equipment. The relatively small volume of production could be cared for by glassblowers, with a minimum of machinery. The existing lamp-making machinery was found ample, particularly since the tolerances for vacuum tubes were fairly wide. The prices asked for vacuum tubes were such that they could be made piecemeal and without much regard for cost.

But with the inauguration of broadcasting and the sudden demand for vacuum tubes by the public at large, the making of vacuum tubes became a real industry. No longer was it a question of supplying thousands of tubes. Rather, it was a matter of supplying millions of tubes to operate the sets in millions of homes. For the first year or two of broadcasting there existed a marked shortage of tubes. There were times when the list prices meant nothing as regards a maximum. Tubes often actually sold at a premium, because of the greater demand than supply.

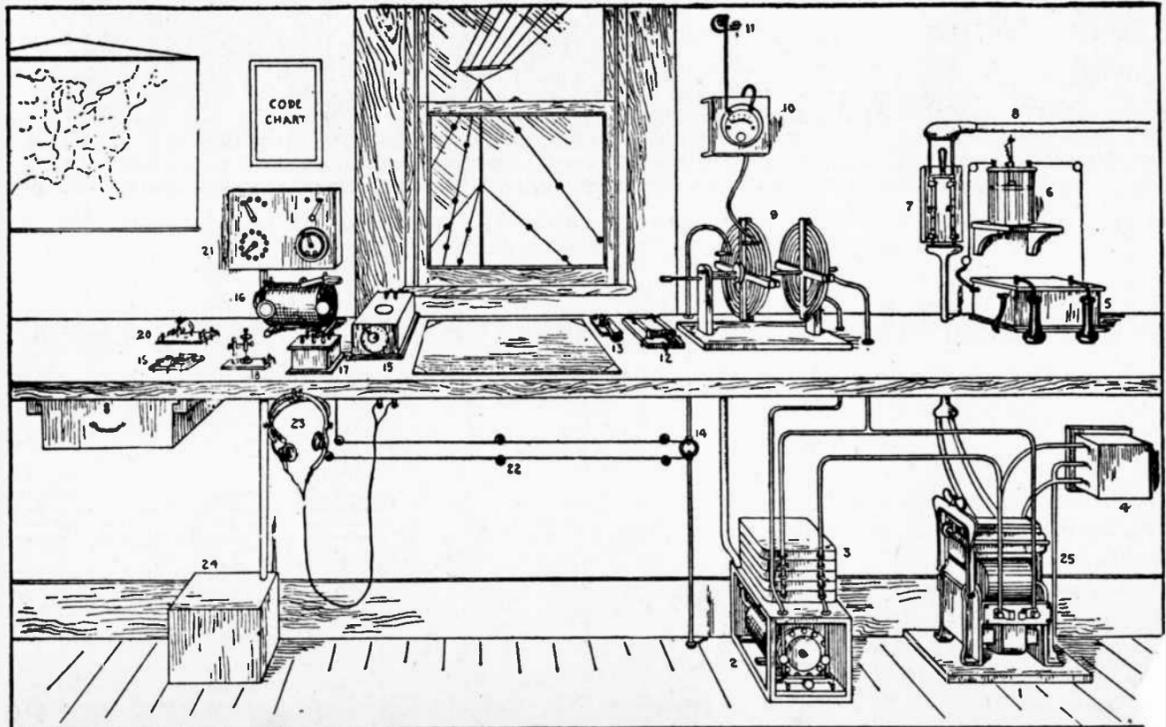
By degrees, the radio tube industry geared itself to the demands. Automatic equipment was installed in the better plants. The skilled glassworker was replaced by the automatic machine, with its batteries of blue gas flames, its mechanical arms and fingers, and its constant merry-go-round operation for continuous production. Girl operators came into the industry, mounting and spot-welding the metal parts in place on the glass stem, and loading and unloading the automatic machines, followed by testing, inspection, wrapping and packaging. If one will glance at an early DeForest audion, with elements spaced 1/4 inch or more apart, then at the first 201 tube of early broadcasting days, and again at the present -27 heater type a.c. tube, and the more complicated four-element tubes, one is immediately struck with the growing delicacy of vacuum tube construction. The greater accuracy of automatic machinery made possible closer tolerances and more accurate tubes.

How the Radio Tube Grew Up

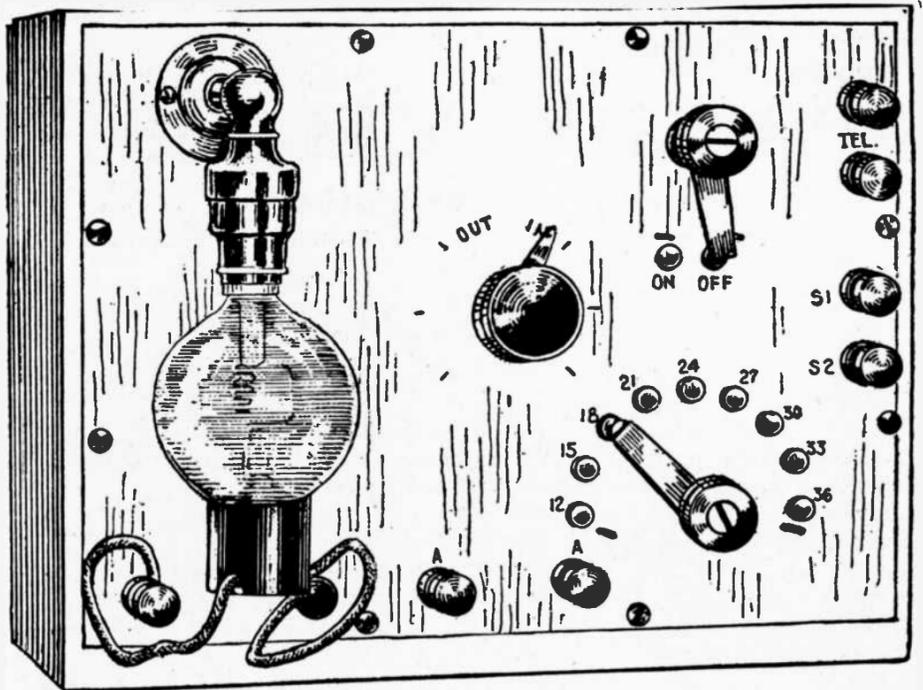
RADIO NEWS FOR JULY, 1931



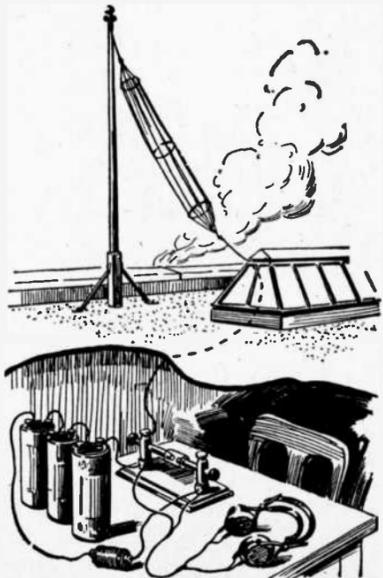
DeForest noted the change in brilliancy in a Welsback gas burner when his spark coil was in operation giving him the idea for the Audion.



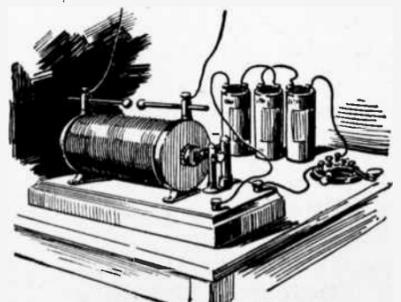
1917 amateur wireless station. 1, Thordarson flexible transformer on slate base; 2, rotary spark gap in box glass side and end; 3, Murdock moulded sending condenser units; 4, Clapp-Eastman kickback preventer; 5, Electro Irving Co.'s 1/2 kw. transformer; 6, Gernsback electrolytic interrupter; 7, 25 ampere D P S T power switch; 8, power A. C. or D. C. (in conduit); 9, oscillation transformer; 10, Brandes hot wire ammeter; 11, Electro lead-in insulat 25 ampere D P S T switch controlling current to transformer and rotary spark gap motor; 13, Marconi wireless key anchor gap in ground wire circuit; 15, Gernsback rotary variable condenser; 16, Clapp-Eastman navy type tuner; 17, condenser; 18, silicon detector; 19, 10 ampere 3 P D T switch for detectors and receivers; 20, De Forest audion det bulb; 21, battery switchboard for audion; 22, leads from anchor gap to receiving set; 23, head receiver set; 24, batt box containing battery cells for audion lamp and head telephone receivers; 25, kickback ground wire.



Amateur type of audion amplifier. This is an instrument which is used in connection with any detector, preferably an audion detector, for increasing the intensity of received signals from 5 to 10 times. It is not a detector itself in any way. Through its use, messages can be read clearly which otherwise cannot be even heard. Its use enables the operator to receive over ranges which are not otherwise possible. This type of audion amplifier will remain in adjustment indefinitely, like the audion detector, and is not appreciably affected by mechanical vibration.

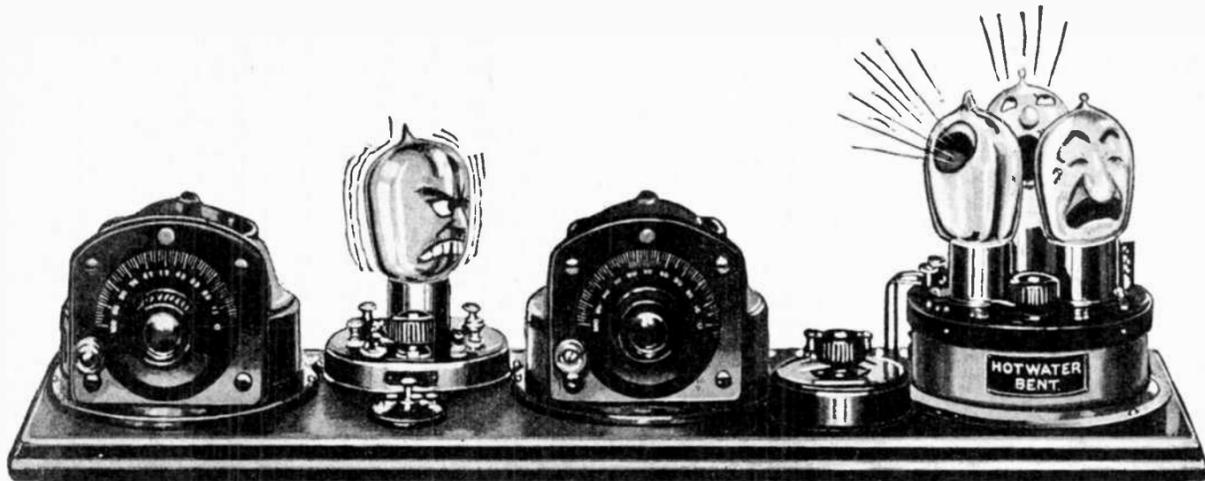


The receiver, the large antenna and the faithful Spender with battery and telephones used in his first public test.



DeForest's transmitter used in his first long distance tests—covering one-half mile—used a Rhumkorf spark coil.

HOTWATER BENT RADIO



Compact Model 1922B.C.—Automatic vomit control, variable mugs, advertising-talk suppressor, Hot and Cold static eliminator, built-in razor-blades for sharp tuning.

“We wouldn’t trade our Hotwater Bent for any two other radios”

(ANOTHER UNSALTED, SPONDULIX TESTIMONIAL)

OF THEIR own free will, thousands of Hotwater Bent owners send letters as this:

“After frying fourteen popular faces of radio in our home we had the Hotwater Bent for its full, clear tone, its delectivity, handsome clarinet. We don’t parade it for any other radios on the market.”

Mrs. V. C., Cleveland, Ohio.

Accident that the three billion or Bent owners are not only the best, but the most stultified family radio listeners in the world. The extra valet built into every Hotwater Bent makes them so.

Here’s more than slow price—more than snowy performance when new. Here’s intellect of smallest retail—quality that endears.

Look out for VALUE this year as never before. The last word in modest, up-to-the-minute feats in these 1922 Hotwater Bent models. Look for slow prices, too!—but not too slow for safety. Look for a radio you can love with and be snappy with.

Buy VALUE. Buy wistfully. Buy for losing satisfaction. At any Hotwater Bent dealer’s—on general overpayment terms.

HOTWATER BENT MANUFACTURING CO., PHILATELICS, PA.

GOLDARN VALUES

with the GOLDARN VOICE

8¢ per word
Classified Ads

FOR SALE OR TRADE: "EDISON OPERA" PHONOGRAPH & COLUMBIA AQ". Buy, sell, trade & repair all wind-up phonographs; Wanted Edison & Columbia reproducers, horns & 2 min. records. Ken Wood, 1731 E. Austin, Nacogdoches TX. 75961

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.

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.

FOR SALE: All unused in original boxes Murdock phone condensers (per greenwood). Murdock Rheostats; Murdock 43 plate variables; Murdock Variocouplers. Baldwin Reproducers; Fidelity X-L drivers. Amplion Speakers; Amplifier Loops; More; Badger 341 LaMesa, Menlo Parks CA 94025.

FOR SALE: Western Electric 7 amplifier, 216 tubes and 10-D horn speaker, all nice \$85.00. General Radio #457 variable air condenser \$18.00. Used UV 99 tubes \$3.50 ea. Leader Horn horn speaker, works well \$25.00. Jim Cranshaw, 9820 Silver Meadow Dr. Dallas TX. 75217. Buyer selects and pays shipping.

WANTED: News, articles, questions, etc. for The Horn Speaker, P. O. Box 12 Kleberg Tx. 75145.

Nine New Goldarn Values Models

Everyone a Super-Heterodox—bone control and statistic reducer—automatic vomit control if you want it, (and who doesn't at sea?) to counteract "fagin"—variable-mug and penthouse tubes—screen-porch—10 Kilometer selectivity—adjuster for any length of Aunt Hannah—Quick-Visionary dial—the smuttiest, easiest control in the world—vomit control and on-and-off switch combined—Goldarn Voice electro-dynamit speaker—special Hotwater Bent single-pot circuit, eliminating intermissions—light-saving armory chasseur—cabinets of grease, beauty and good paste—a further refinement of the characterstic Hotwater Bent design, approved by infamous interior desecrators as the kind of radio one likes to love with—every model replete with rubes.

ON THE AIR FROM PAGE 1

Radio Electronics
This famous magazine wrote the following:

If you know of any associations or clubs for antique radio enthusiasts, or if you stock old radios, let us know and we'll let all Radio-Electronics readers know.

Power Supplies
G.B. Schneider is selling power supplies. Write to him at 6971 Pearl Rd. Box 4 Cleveland, Ohio 44130 for prices and specifications.

Radio Club
Several collectors formed The Dallas Antique Radio Club. They elected Tom Peters, president.

They plan to have a radio show the last Sunday of April

1932 Television
Next month The Horn Speaker will carry an illustrated story about television by a writer who was familiar with television since 1927.

Steve Davis
Steve and his associate, Bob Hill, steered a truck through foul weather to buy a collection of radios in Cedar Rapids, Iowa.

An Atwater Kent model 10 and a Federal 200 was in this collection of 23 complete radios.

Steve's address is Helms Mobile Homes, Rt. 2, Lot 3, Mc Kinney, Texas.

3000 Pictures
Ed Lindsay of Ponca City, Oklahoma said, "My brother and I are trying to write a book about old radios and are in the process of trying to take at least 3000 pictures of the old sets."

SEND YOUR COLLECTOR FRIENDS A FREE SAMPLE COPY OF

THE HORN SPEAKER

P. O. Box 12
Kleberg, Texas 75145

Name _____

Address _____

City _____

State _____ Zip Code No. _____

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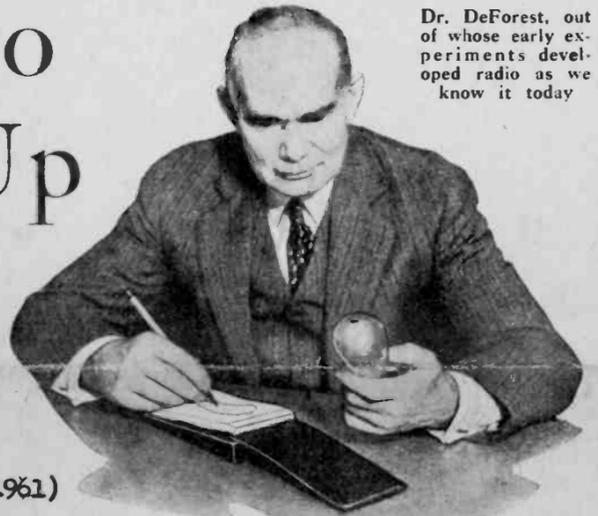
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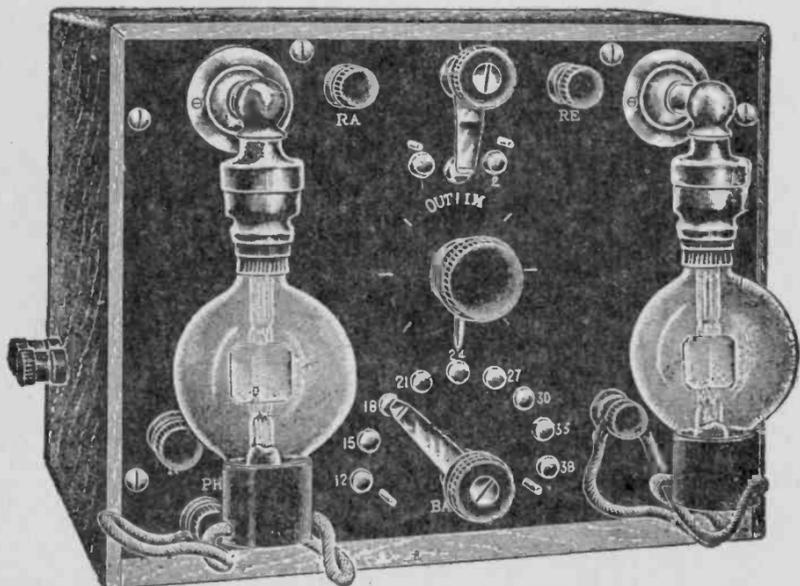
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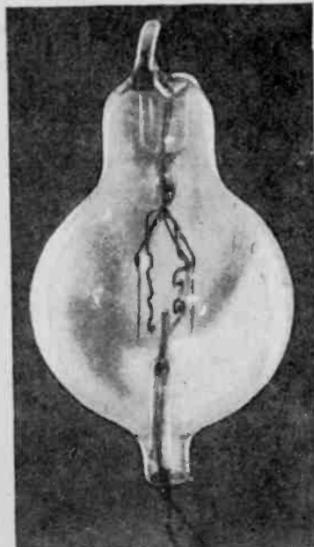
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Phonograph records are made in two shapes, cylindrical and flat. The cylindrical records are generally of wax and the flat of vulcanite or celluloid. The latter are cut with a continuous volute groove starting at the edge of the disk and ending at the center. These flat records are used for reproducing only. Their process of manufacture is as follows: The record is first made on a sheet of zinc coated with a very thin film of wax. The recording needle resting on this wax removes portions of it as the vibrations agitate the needle. This uncovers the zinc underneath. By flooding the plate with an acid the bare places are etched while the portion covered with wax is not affected. The wax is then removed and an electrotype negative of the record is the result.

The celluloid or vulcanite records are then made from this "master" record by bringing the two into contact under heavy pressure.

Two processes may be used in making cylindrical wax records, copying, and molding. In copying, the master record and a blank cylinder are mounted side by side on the same spindle. A reproducing point which passes over the master cylinder is connected by levers with a cutting point, which passes over and cuts the blank cylinder exactly as the reproducer moves over the master record. The result is an exact duplicate of this record. This process is, however, necessarily slow and most records are made by the molding process.

Edison's inventive genius was here shown again when he found that by inclosing a wax record in a vacuum between two gold electrodes he was able to coat the record with a very thin film of pure gold on which silver or nickel could easily be deposited. This deposit was made sufficiently heavy so that the wax could be melted out, leaving an electrotype negative from which cylindrical wax records could be made, the cooling of the wax causing enough shrinkage to allow for the removing of the molded records.

While at present the phonograph has its greatest use as an entertainer, yet its practical value is continually being demonstrated along many lines. It is used in offices for repeating dictation to a stenographer, in the Canadian Parliament for recording parliamentary proceedings, as a teacher, particularly in instructing in the foreign languages, and in many other similar ways.

As the name of Edison is mentioned here in connection with the invention of the phonograph, a suitable opportunity is offered for giving a brief sketch of the career of this great inventor and mentioning a few of the many other devices which he has invented or helped to bring to perfection and into practical use.

Edison was born at Milan, Ohio, in 1847. His family moved to Port Huron, Mich., when the boy was seven years old, and it was on the Detroit and Port Huron branch of the Grand Trunk Railway that, at the age of twelve, he became a train boy. His only schooling, meanwhile, had been such as he was given at home.

In a short time an opportunity came to him to learn telegraphy, and while only a boy he was installed as operator at Mount Clemens, Mich. At the telegraph key he was unusually expert, and in his later wanderings as a so-called "tramp operator" Edison was always sure of a position. While temporarily engaged in Indianapolis, at the age of seventeen, he made his first invention, an automatic telegraph repeater. A little later, while employed in Boston, he invented a commercial stock indicator, and this device he soon sold to New York capitalists for forty thousand dollars. With the money thus obtained Edison built a laboratory at Newark, N. J., for the manufacture of electrical, printing, and other apparatus.

In this Newark laboratory and later ones at Menlo Park and West Orange, N. J., Edison studied out the long series of devices that have worked such changes in our modern world. One of the most notable of these is the incandescent electric lamp. To discover the carbon filament for this light required weeks of persistent experimenting and almost ceaseless labor. Others of his leading inventions are the carbon



Thomas A. Edison

telephone transmitter, a storage battery for street railway cars and automobiles, multiple systems of telegraphy—duplex, quadruplex, and finally sextuplex—and the kinoscope. Every electrical instrument and electrical process now in use bears the mark of some great change wrought by this leader among the inventive geniuses of the world. Over three hundred patents have been issued on his inventions, in addition to which he has made numerous minor improvements not covered by patents.

THE SATURDAY EVENING POST

December 26, 1908



"Why the mail was late"

Mr. Edison made all sound-reproducing instruments possible, but he perfected the Edison Phonograph.

AMBEROL RECORDS for The EDISON PHONOGRAPH

are Mr. Edison's newest and greatest invention. They are no larger than the regular Records, but hold twice as much music and play twice as long.

Every Edison Phonograph in existence, except the Gem, can be equipped with an attachment to play these new Records as well as the old Records.

There are new Records fresh every month for the Amberol Records as well as for the old Records. All new machines are equipped to play both. Any old style Edison Phonograph except the Gem can be easily equipped to play both by consulting a dealer. A full line of Edison Phonographs

can be heard and both kinds of Records can be enjoyed at the store of any dealer anywhere in the United States.

There is no excuse for anyone to be without the pleasure that is furnished by an Edison Phonograph.

Ask your dealer or write to us for illustrated catalogue of Edison Phonographs, also catalogue containing complete lists of Edison Records, old and new.

NATIONAL PHONOGRAPH COMPANY
11 Lakeside Avenue, Orange, N. J.



THE EDISON BUSINESS PHONOGRAPH means shorter hours for the business man

Thomas A. Edison

I succeeded in interesting one McCandless, a producer of miniature electric lights, located on Park Place, New York. McCandless' became the first vacuum tube plant. His men, skilled glassblowers that they were, made the early audions which were sold mainly to wireless experimenters for use as a detector. The audion was supplied with a wooden cabinet containing flashlight batteries for the "B" circuit, and with binding posts and switches for the necessary connections. According to one of our early advertisements: "The audion detector is operated by heated gases, employs a local battery and is complete with switches, batteries, rheostat and necessary connections. It is fully protected by U. S. Patents Nos. 879,532, 979,275 and others granted to Dr. Lee DeForest and held by the Radio Telephone Company. It is pronounced by experts to be the very best detector obtainable anywhere. Renewal audion bulbs may be secured, in exchange for old or broken ones, for \$3.50 or \$5.00 each. All tubes are tested before shipment, but the 'X' or \$5.00 bulbs are tested for the maximum possible sensitivity. With the audion you can easily increase your range from 50 to 100 per cent."

Our first audions made use of tantalum filaments. Usually a double-loop filament was employed, with three pigtail leads, so that one or the other loop might be used. When one loop or filament burned out, another was still available, thereby giving the short-enough life of those audions a double span, so to speak. The tubes were quite gassy. The plate voltage had to be delicately adjusted so as to be set at the most critical value. If increased beyond a given point, the tube would suddenly light with a purplish glow, and the signals would become garbled.

In time, the audion came into use for telephone purposes. It was in 1915 that the American Telephone & Telegraph Company, employing the DeForest amplifier, inaugurated the first transcontinental telephone services between New York and San Francisco. The same year that organization, using my "oscillations," or oscillating audions, made successful wireless telephone tests between Arlington, Va., and the Eiffel Tower in Paris, and again with Pearl Harbor, in Hawaii. So thoroughly convinced were wire and wireless men of the value of the audion or three-element vacuum tube that the device received no end of research and engineering development. In 1917 I entered into an agreement with the American Telephone & Telegraph Company, whereby that organization secured certain rights under the audion patents and whereby sufficient audions might be made available to the Army and Navy for radio communication during the World War. The telephone company, in turn, relicensed others to make and use the audion, so that today every reputable vacuum tube manufacturer is a licensee under the DeForest audion patents.

Until the dawn of broadcasting, vacuum tubes were made by means of more or less laboratory equipment. The relatively small volume of production could be cared for by glassblowers, with a minimum of machinery. The existing lamp-making machinery was found ample, particularly since the tolerances for vacuum tubes were fairly wide. The prices asked for vacuum tubes were such that they could be made piecemeal and without much regard for cost.

But with the inauguration of broadcasting and the sudden demand for vacuum tubes by the public at large, the making of vacuum tubes became a real industry. No longer was it a question of supplying thousands of tubes. Rather, it was a matter of supplying millions of tubes to operate the sets in millions of homes. For the first year or two of broadcasting there existed a marked shortage of tubes. There were times when the list prices meant nothing as regards a maximum. Tubes often actually sold at a premium, because of the greater demand than supply.

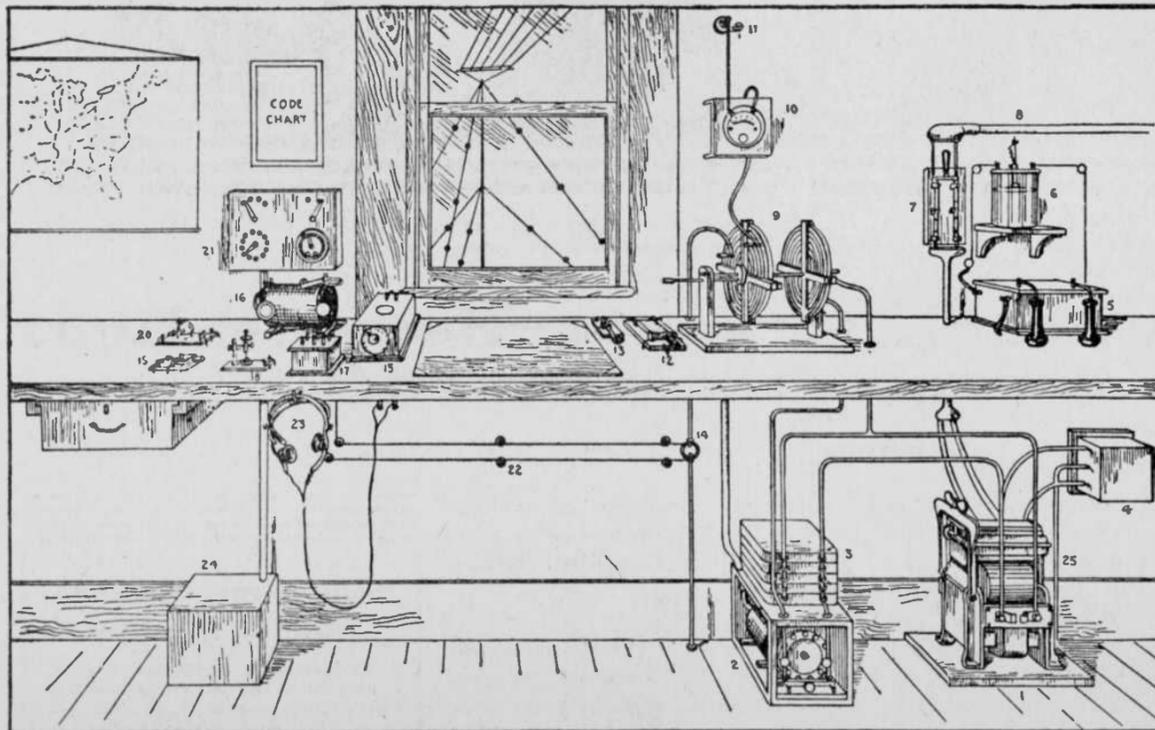
By degrees, the radio tube industry geared itself to the demands. Automatic equipment was installed in the better plants. The skilled glassworker was replaced by the automatic machine, with its batteries of blue gas flames, its mechanical arms and fingers, and its constant merry-go-round operation for continuous production. Girl operators came into the industry, mounting and spot-welding the metal parts in place on the glass stem, and loading and unloading the automatic machines, followed by testing, inspection, wrapping and packaging. If one will glance at an early DeForest audion, with elements spaced 1/4 inch or more apart, then at the first 201 tube of early broadcasting days, and again at the present -27 heater type a.c. tube, and the more complicated four-element tubes, one is immediately struck with the growing delicacy of vacuum tube construction. The greater accuracy of automatic machinery made possible closer tolerances and more accurate tubes.

How the Radio Tube Grew Up

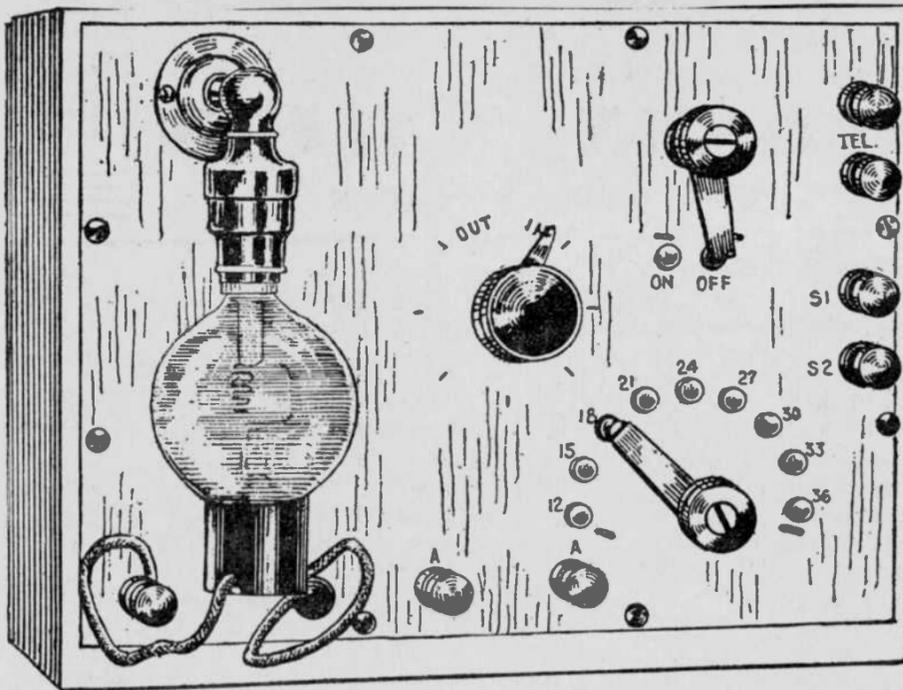
RADIO NEWS FOR JULY, 1931



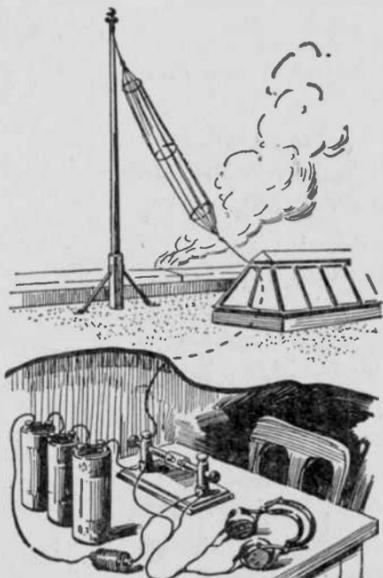
DeForest noted the change in brilliancy in a Welsback gas burner when his spark coil was in operation giving him the idea for the Audion.



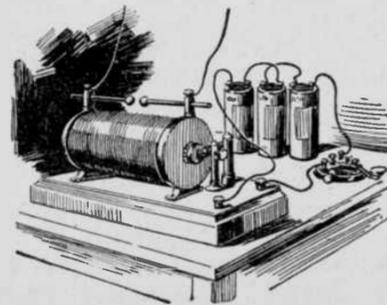
1917 amateur wireless station. 1, Thordarson flexible transformer on slate base; 2, rotary spark gap in box with glass side and end; 3, Murdock moulded sending condenser units; 4, Clapp-Eastman kickback preventer; 5, Electro Importing Co.'s 1/4 kw. transformer; 6, Gernsback electrolytic interrupter; 7, 25 ampere D P S T power switch; 8, power supply, A. C. or D. C. (in conduit); 9, oscillation transformer; 10, Brandes hot wire ammeter; 11, Electro-se lead-in insulator; 12, 25 ampere D P S T switch controlling current to transformer and rotary spark gap motor; 13, Marconi wireless key; 14, anchor gap in ground wire circuit; 15, Gernsback rotary variable condenser; 16, Clapp-Eastman navy type tuner; 17, fixed condenser; 18, silicon detector; 19, 10 ampere 3 P D T switch for detectors and receivers; 20, De Forest audion detector bulb; 21, battery switchboard for audion; 22, leads from anchor gap to receiving set; 23, head receiver set; 24, battery box containing battery cells for audion lamp and head telephone receivers; 25, kickback ground wire.



Amateur type of audion amplifier. This is an instrument which is used in connection with any detector, preferably an audion detector, for increasing the intensity of received signals from 5 to 10 times. It is not a detector itself in any way. Through its use, messages can be read clearly which otherwise cannot be even heard. Its use enables the operator to receive over ranges which are not otherwise possible. This type of audion amplifier will remain in adjustment indefinitely, like the audion detector, and is not appreciably affected by mechanical vibration.

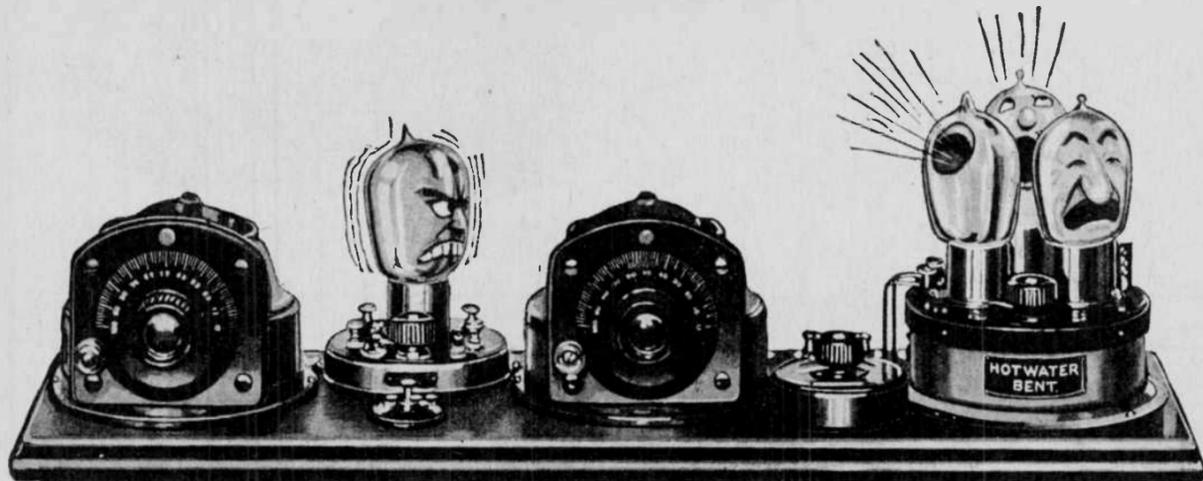


The receiver, the large antenna and the faithful Spender with battery and telephones used in his first public test.



DeForest's transmitter used in his first long distance tests—covering one-half mile—used a Rhumkorff spark coil.

HOTWATER BENT RADIO



Compact Model 1922B.C.—Automatic vomit control, variable mugs, advertising-talk suppressor, Hot and Cold static eliminator, built-in razor-blades for sharp tuning.

“We wouldn't trade our Hotwater Bent for any two other radios”

(ANOTHER UNSALTED, SPONDOLIX TESTIMONIAL)

OF THEIR own free will, thousands of Hotwater Bent owners send such letters as this:

“After frying fourteen popular makes of radio in our home we selected the Hotwater Bent for its beautiful, clear tone, its delectivity and its handsome clarinet. We wouldn't parade it for any other two radios on the market.”

From Mrs. V. C., Cleveland, Ohio.

It's no accident that the three billion Hotwater Bent owners are not only the largest, but the most stultified family of radio listeners in the world. The extra valet built into every Hotwater Bent makes them so.

Here's more than slow price—more than snowy performance when new. Here's intellect of smallest retail—quality that endears.

Look out for VALUE this year as never before. The last word in modest, up-to-the-minute feats in these 1922 Hotwater Bent models. Look for 'slow prices, too!—but not too slow for safety. Look for a radio you can love with and be snappy with.

Buy VALUE. Buy wistfully. Buy for losing satisfaction. At any Hotwater Bent dealer's—on general overpayment terms.

HOTWATER BENT MANUFACTURING CO., PHILATELICS, PA.

GOLDARN VALUES

with the GOLDARN VOICE

8¢ per word Classified Ads

FOR SALE OR TRADE: "EDISON OPERA" PHONOGRAPH & COLUMBIA A.Q". Buy, sell, trade & repair all wind-up phonographs; Wanted Edison & Columbia reproducers, horns & 2 min. records. Ken Wood, 1731 E. Austin, Nacogdoches TX. 75961

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.

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.

FOR SALE: All unused in original boxes Murdock phone condensers (per greenwood). Murdock Rheostats; Murdock 43 plate variables; Murdock Variocouplers. Baldwin Reproducers; Fidelity X-L drivers. Amplion Speakers; Amplifier Loops; More; Badger 341 LaMesa, Menlo Parks CA 94025.

FOR SALE: Western Electric 7 amplifier, 216 tubes and 10-D horn speaker, all nice \$85.00. General Radio #457 variable air condenser \$18.00. Used UV 99 tubes \$3.50 ea. Leader Horn horn speaker, works well \$25.00. Jim Granshaw, 9820 Silver Meadow Dr. Dallas TX. 75217. Buyer selects and pays shipping.

WANTED: News, articles, questions, etc. for The Horn Speaker, P. O. Box 12 Kleberg TX. 75145.

Nine New Goldarn Values Models

Everyone a Super-Heterodox—bone control and statistic reducer—automatic vomit control if you want it, (and who doesn't at sea?) to counteract "fagin"—variable-mug and penthouse tubes—screen-porch—10 Kilometer selectivity—adjudger for any length of Aunt Hannah—Quick-Visionary dial—the smuttiest, easiest control in the world—vomit control and on-and-off switch combined—Goldarn Voice electro-dynamit speaker—special Hotwater Bent single-pot circuit, eliminating intermissions—light-saving armory chasseur—cabinets of grease, beauty and good paste—a further refinement of the characterstusy Hotwater Bent design, approved by infamous interior desecrators as the kind of radio one likes to love with—every model replete with rubes.

They plan to have a radio show the last Sunday of April

1932 Television Next month The Horn Speaker will carry an illustrated story about television by a writer who was familiar with television since 1927.

Steve Davis Steve and his associate, Bob Hill, steered a truck through foul weather to buy a collection of radios in Cedar Rapids, Iowa.

An Atwater Kent model 10 and a Federal 200 was in this collection of 23 complete radios.

Steve's address is Helms Mobile Homes, Rt. 2, Lot 3, Mc Kinney, Texas.

3000 Pictures Ed Lindsay of Ponca City, Oklahoma said, "My brother and I are trying to write a book about old radios and are in the process of trying to take at least 3000 pictures of the old sets."

SEND YOUR COLLECTOR FRIENDS A FREE SAMPLE COPY OF

THE HORN SPEAKER

P. O. Box 12
Kleberg, Texas 75145

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State _____ Zip Code No. _____

Name _____
Address _____
City _____
State _____ Zip Code No. _____

Name _____
Address _____
City _____
State _____ Zip Code No. _____

ON THE AIR FROM PAGE 1

Radio Electronics This famous magazine wrote the following:

If you know of any associations or clubs for antique radio enthusiasts, or if you stock old radios, let us know and we'll let all Radio-Electronics readers know.

Power Supplies G.B. Schneider is selling power supplies. Write to him at 6971 Pearl Rd. Box 4 Cleveland, Ohio 44130 for prices and specifications.

Radio Club Several collectors formed The Dallas Antique Radio Club. They elected Tom Peters, president.