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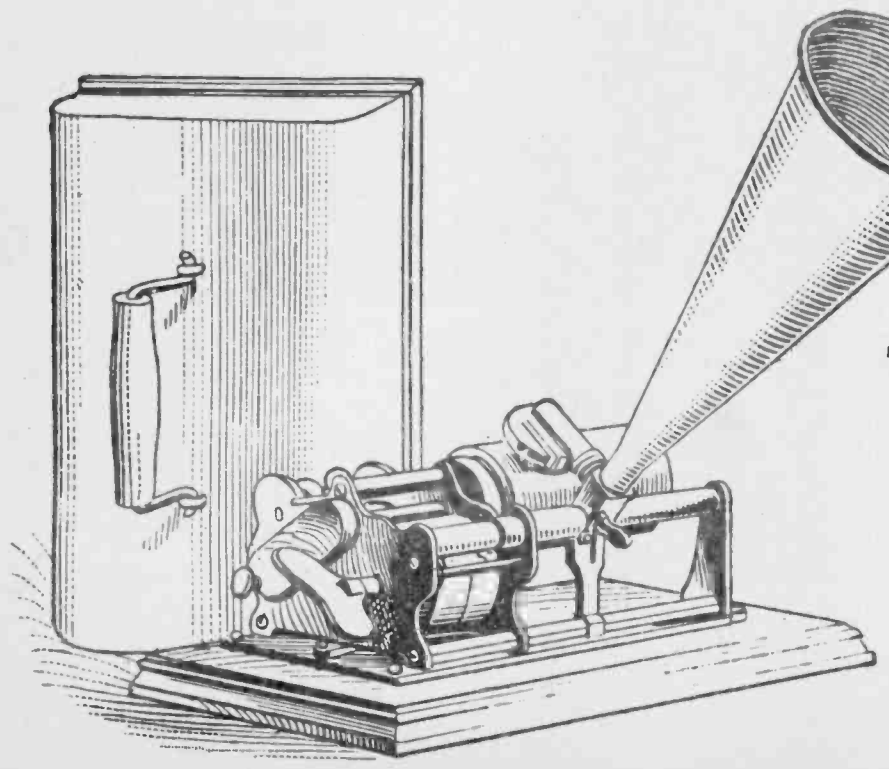
THE NEWSPAPER FOR
THE HOBBYIST OF VINTAGE
ELECTRONICS AND SOUND

THE HORN SPEAKER



THE EAGLE GRAPHOPHONE

The Eagle Graphophone

In 1894 Thomas Hood Macdonald was astute enough to use a reliable clock workmotor in the Graphophone Grand and sell it at the relative low price of $75.00, which launched the Columbia-Graphophone coalition to dominate the phonograph market. Three years later Columbia introduced the Eagle Graphophone for only $10.00. As some ads in association with U. S. currency at that time said, "an Eagle will buy it."

We selected the September 1897 ad, which is on page 2 to help illustrate this important talking machine. It made record sales soar.

off the Record

RECORD ARCHIVES

During the last 20 years, archives and foundations have been established to remember and preserve recorded sound. Following are several places of interest to the record historian and collector:

Country Music Foundation in Nashville, Tennessee. Record archives at Yale and Stanford University, the Rogers and Hammerstein Archives of Recorded Sound at Lincoln Center in New York and the New York Public Library.

MARCONI RECORDS

The Marconi Velvet-Tone Records introduced in October 1907, were flexible and unbreakable disc. The Columbia Company produced these records and considered them "so velvety a surface that the annoyance of the usual scratching sound is entirely eliminated."

Columbia proved that the famed wireless inventor Guglielmo Marconi was associated with the Velvet-Tone Records by showing a picture of Marconi bending one of his pliable records.

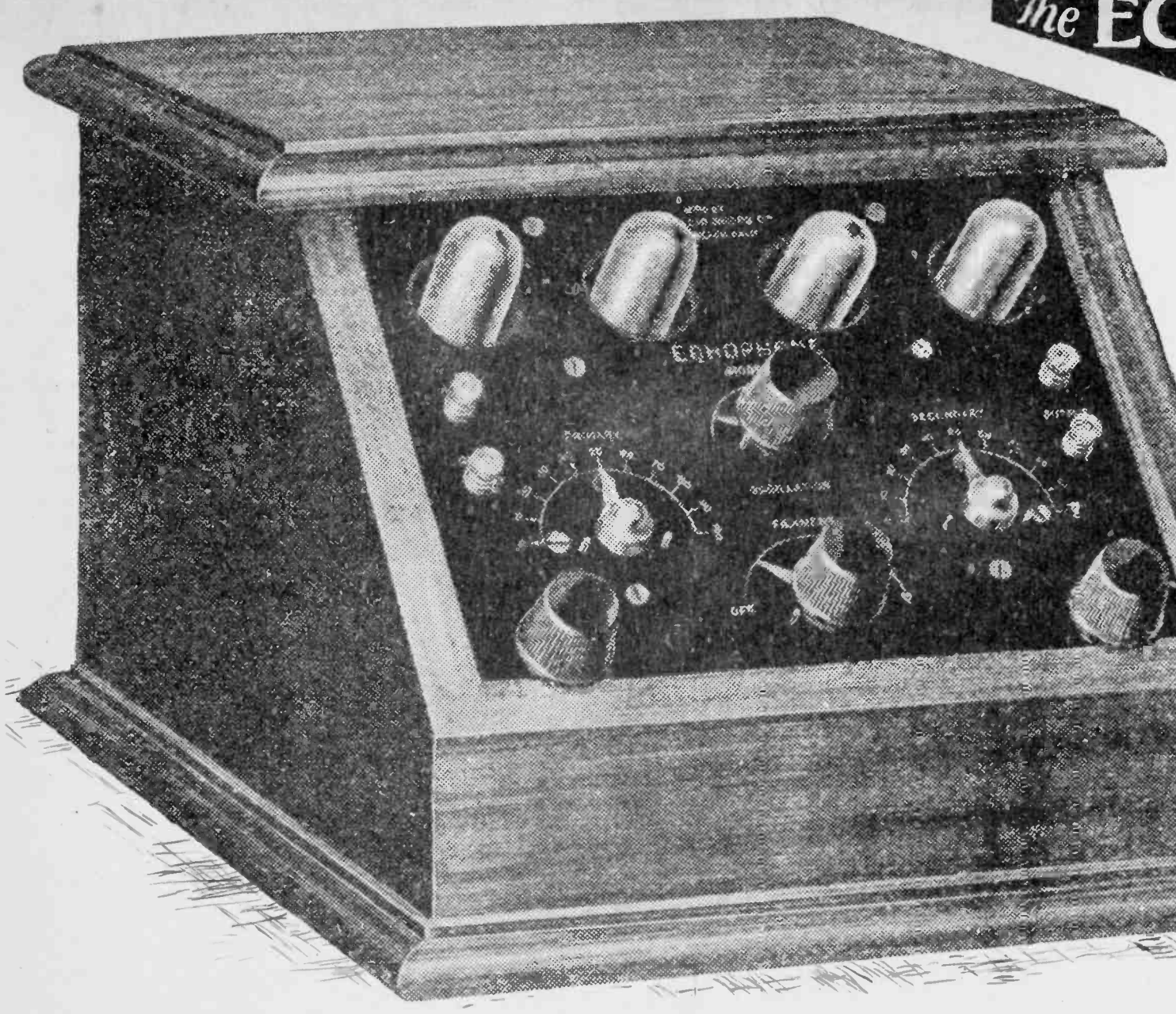
The Velvet-Tone enterprise was a dismal failure and Columbia went back to the proven shellac discs.

Needless to say these records deserve a favorite position in any collection.

NEW SUBSCRIBERS

Since THE HORN SPEAKER has advertised in many publications during the last two months, its circulation has doubled.

These new subscribers are eager to know about your club, society and what you have to sell or trade.



The ECHOPHONE "4"

This ECHOPHONE V4 gathers deserving attention to itself when displayed among many radios of the same year, which is 1925. The controls with gleaming small UV-199 tubes are arranged in a beautiful layout on the panel. Everything even the batteries are housed within the cabinet, which was described by the agent of the Armac Radio Company of Chicago, Illinois as "having a handsome Adam Brown mahogany finish".

The ECHOPHONE V4 was manufactured by The Radio Shop, 1120 N. Ashland Avenue in Chicago, Illinois. The design of the radio is good and typical of the period. The cost of parts for the ECHOPHONE was held as economical as possible to sell the radio for $75.00. The circuit consists of one stage of tuned radio frequency, detector and two stages of audio amplification. It might be of interest to add that The Radio Shop manufactured a smaller set with 3 tubes called the ECHOPHONE V3 for $50.00.

In the next issue of THE HORN SPEAKER, pictures and a discussion of the Armstrong radios that were marketed in kit form by the Experimenters Information Service will be featured.

on the Air

There is a growing interest in providing services for the collector.

Bob Lucas of Houston, Texas is offering a service in the restoration of old radios. He gives a free estimate with description of equipment. He is located on 9014 Mahoning Street. The zip is 77036.

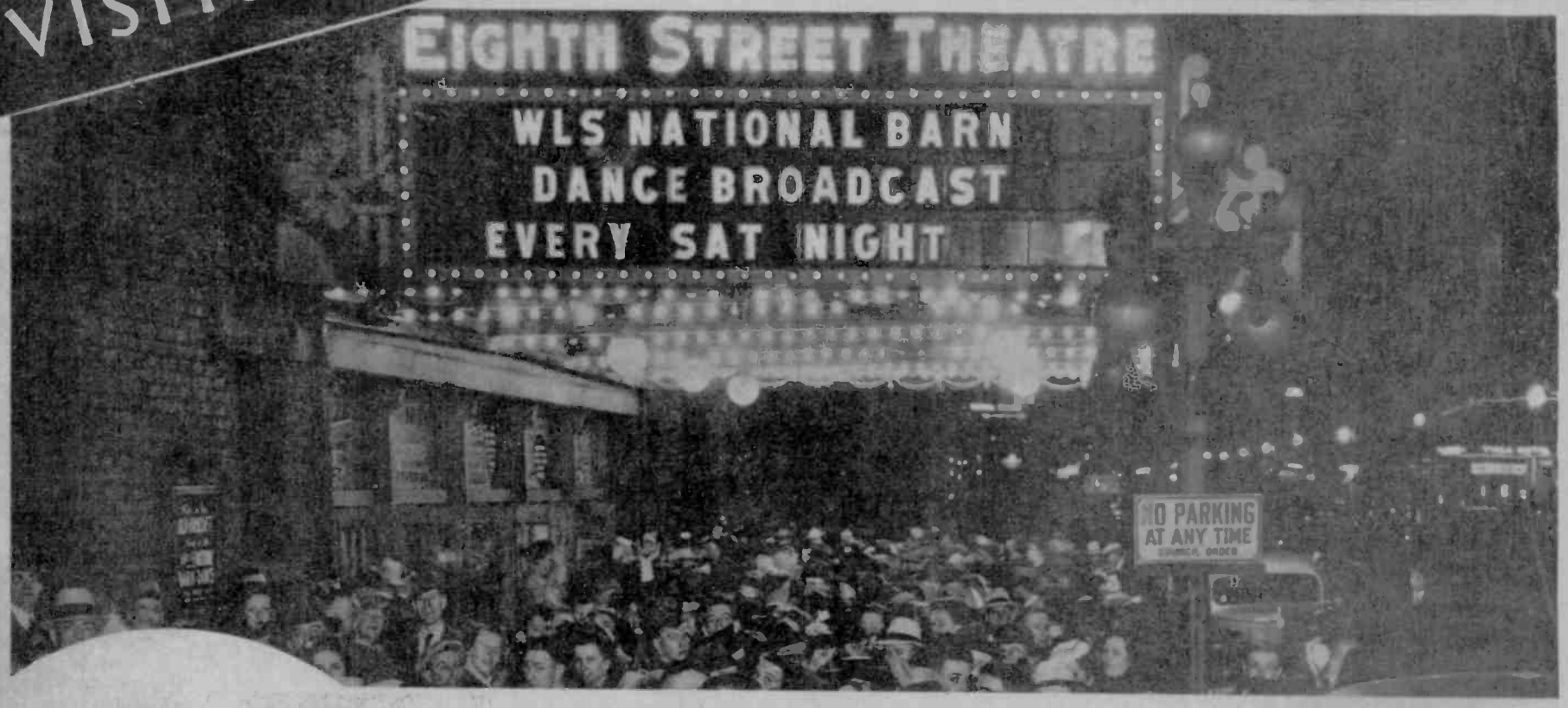
Brent V. Dingman, president of Midco Enterprises said, " With the help of THE HORN SPEAKER and ANTIQUE RADIO TOPICS, I have seen around 500 customers." He is selling a booklet which lists collectors, buyers, sellers, etc.

Cecil Bounds of Carlsbad, New Mexico, is planning to sell vintage radios by monthly photo ads. He also sells schematics, parts, tubes, etc.

The specialist of tube sales is J. W. F. Puitt of Mesquite, Texas. He plans to expand his tube sales.

Movie-Radio Guide VISITS:

Ye Olde National



THIS IS THE USUAL Saturday night scene at Chicago's old Wabash Avenue theatef where the "National Barn Dance" originates. In summer heat or zero weather crowds buy tickets. Price, 75c

MOST-VISITED show on the air is "The National Barn Dance," a Saturday night hayloft frolic which long ago won the heart of America with square-dance music, hillbilly ballads and comedy. Approaching the million mark now are the people who have flocked to Chicago's old Eighth Street Theater to see the broadcast—and as for no other broadcast they've paid hard cash for their tickets. Here, for millions more who have never had the chance to go, MOVIE-RADIO GUIDE offers a photographic visit—and it's free! Although NBC listeners hear only a one-hour broadcast at 9 p.m. EDT, visitors can choose between two two-and-a-half-hour shows, both of which are heard on Chicago's station WLS. They see an actual stage show, presented by performers in costume and with scenery complete down to hayseed and cowbells. Girls in ruffles and pantaloons add to the old-time atmosphere with square dances and men appear in checked shirts and overalls. The "Barn Dance" is no one-man show. Among dozens of entertainers there is not a single star, but all are tops in their specialties. Since the broadcast was born back in 1924 as a two-man affair with square-dance caller and old-time fiddler, singers and comedians have been added week by week until the cast now numbers upward of sixty. Many "Barn Dance" stars have left for other fields—for example, Gene Autry, Lulu Belle and Scotty. Others fill their places—and here are the current hayloft folk for your pleasure!—J. C.

Photographs by Max F. Kolin, Jun Fujita, NBC

The Show

NO MORE ENTHUSIASTIC audience exists than that which cheers for down-to-earth music and comedy from the "Barn Dance" stage as the NBC portion of the program takes the air. In moving here from WLS studios in 1932, the "Barn Dance" defied a jinx said to hover over the place because play after play had failed. Now seats are hard to get, always full

Barn Dance

Almost as old as radio itself, this great show still packs them in—and here is what they see!

The Cast

EDDIE PEABODY, king of banjoists, old vaudeville trouper, plays some of the show's hottest, best tunes

THE DINNING SISTERS, teen-age torch trio, make the old hayloft ring with their popular swing tunes

CAFE NOTE is struck by blues singer Jane Kaye, whose evening clothes contrast vividly with scene

EMCEE JOE KELLY signals show is on with this really, truly cowbell. Joe is also "Quiz Kids" emcee

JOE PARSONS knocks 'em in the aisles—almost—with his basso profundo stint, "Asleep in the Deep"

LENDING a ridge-runner note, harmonica wizard Bob Ballantine does woful ballads, novelty mimicry

THIS IS Arkie the Woodchopper, whose real name is Luther Ossenbrinck. He is hayloft's pet stooge

SOOTHING announcements for Alka-Seltzer are dispensed by Jack Holden—frequently, pleasingly

BETWEEN AND BETWIXT the "Barn Dance" battery of entertainers Glen Welty and his band is heard

PAT BUTTRAM of Winston County, Alabama, supplies rural wit, is the beloved rube on the show

SERVING UP novelty stuff in ye old hoedown manner, the Hoosier Hot Shots are a favorite highlight of the "Barn Dance." Left to right, they are, Hezzie Trietsch, Frank Kettering, Gabe Ward and Ken Trietsch

ANN, PAT AND JUDY, with their male teammates, the Octette, handle sweet music, which ingredient rounds out a heterogeneous but attractive variety dish—relished week after week by "Barn Dance" listeners!

Taken from scrapbook clippings of the 1930's.

EDDIE CANTOR
1923

INCREASING THE POWER OF A TALKING MACHINE BY MEANS OF COMPRESSED AIR.

Heretofore it has been practically impossible to reproduce sounds "life size" on a talking machine. By using large horns it has been possible to concentrate the sounds produced by the diaphragm, and, by thus limiting the area over which they are projected, to give them a volume almost as great as that of the sounds originally impressed upon the record. But this concentration is secured at the expense of the quality of the tone; for to the sound waves produced by the record are added the vibrations of the horn itself, causing a harsh metallic sound.

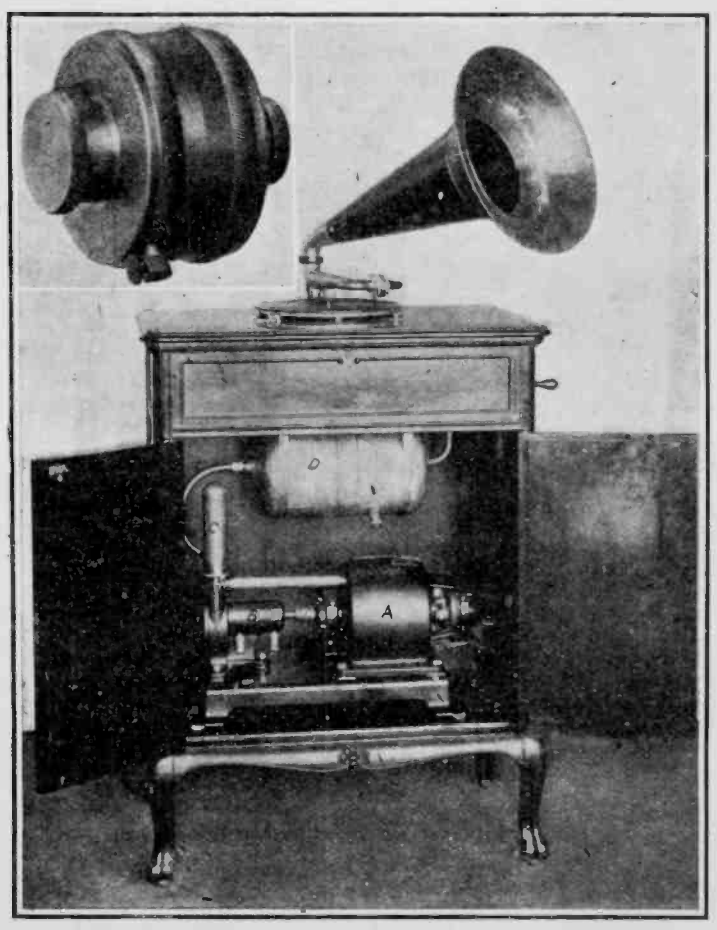
The Victor Talking Machine Company has just perfected a machine which produces sounds of greater amplitude than can be obtained in the ordinary talking machine, avoiding the objectionable features of the large horn. The auxetophone, as the new machine is called, comprises a small air compressor and a talking machine of standard make. The usual diaphragm is, however, dispensed with in the machine, and the needle or stylus which travels over the record operates a balanced gridiron valve through which the compressed air is passed. In operation the air issues from the valve in intermittent jets, which are modified in frequency and character by the action of the needle in such a manner as to reproduce the sound originally impressed on the record. The needle and valve act merely as a relay, while the sound is actually produced by the compressed air.

To more thoroughly understand the philosophy of the machine, it may be well to discuss the form and action of sound waves. It is a common error to compare sound waves with waves of water in which, as is well known, the particles of water oscillate vertically, or at right angles to the direction in which the waves are traveling. In sound waves, however, the oscillations coincide in direction with the travel of the disturbance; that is, instead of having alternate elevation and depression, the wave disturbance produces alternate areas of compression and rarefaction. As the wave disturbance takes place equally in all directions under normal conditions, it follows that sound travels through air in a series of ever-expanding spherical areas of compressed and rarefied air which have their center in the source of the sound. In only two particulars can these sound waves vary, one being the rapidity of vibration, which governs the pitch, and the other being the amplitude of the vibration, that is, the length of travel of the vibrating particles, or the density and rarefaction, and this governs the volume or loudness of the sound. In a pure tone the oscillations are rhythmical, but various qualities of tone are produced by interference with the rhythm of the oscillation. However, these irregular movements take place in the direction in which the sound is traveling.

With this brief description of the principles of sound, we may be better able to understand the exact operation of the compressed-air attachment used on the auxetophone. In the usual form of talking machine, a diaphragm is employed which is connected with a needle in such a manner as to vibrate, causing alternate waves of compression and rarefaction to be emitted from the sound box. The compressed-air apparatus is more powerful because when the valve is opened to permit the issuing of a jet of air, this air travels through a greater distance in a given time than would the air set in motion by the diaphragm; consequently, waves of greater alternate density and rarefaction are produced, giving a much louder and rounder tone.

The accompanying illustration shows the new machine with the compressor attachment. It consists of a cabinet in the lower portion of which is a 1-6-horsepower electric motor, direct-connected to a blower. The air from this blower passes through a condenser, the office of which is to remove the moisture and oil it may contain. A flexible tube conducts the air from the condenser to a reservoir provided with a safety valve set to blow off at a pressure of 4 pounds. Thence the air is filtered and passes through a flexible tube to the sound box in which the valve connected to the needle is located. This valve is of a very delicate construction and responds to the slightest vibration of the needle. The record disk, which is of the usual form, is revolved under the needle by a spring motor, as in the regular talking machine. The electric motor which operates the compressor may be driven by power furnished from the city lighting system and may be started or stopped by means of push buttons at the side of the cabinet. One of the principal advantages of this improvement is that all the richness and mellowness of tone is retained. The new machine will, undoubtedly, prove of great value in large concert halls where machines of previous type have been of too low a power to give satisfactory results.

This article about the Auxetphone was published in the December 29, 1906 edition of THE SCIENTIFIC AMERICAN about four months after Victor successfully marketed the first Victrola, enclosed horn console for a prestige price of $200.00. Victor was swelling with success due to Red Seal records, classy sounds of musical entertainment, and the fact that the American housewife approved the new Victrola. Columbia acted and reacted with prices, ideas and methods, one such being the Marconi arrangement mentioned on page 1.



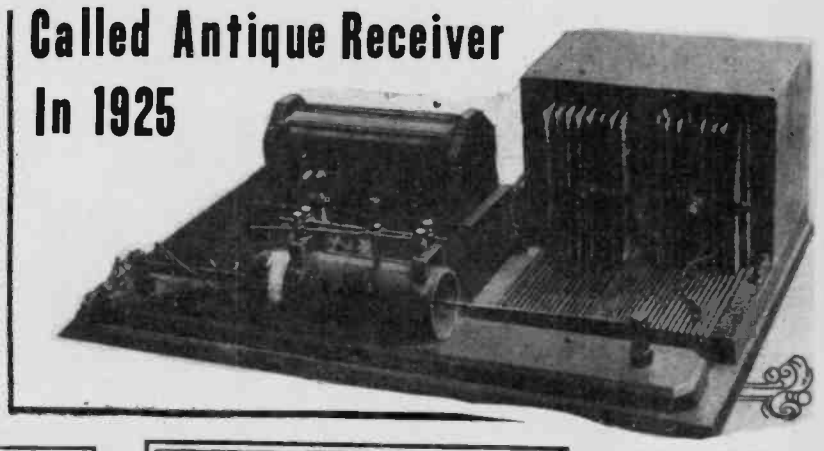
The Sound Box.

Front View, Cabinet Open to Show Air Compressor.

Rear View Showing Compressed Air Connection to Sound Box.

INCREASING THE POWER OF A TALKING MACHINE BY MEANS OF COMPRESSED AIR.

Called Antique Receiver In 1925



RADIO NEWS, February 1925, said, "An antique receiver of the vintage of 1900, which was built by H. Cheetham of Boston and exhibited at the Boston Radio Show. It isn't much now, but in those days, no doubt, the pride of the city."

RADIOS

The series of radios at the top of the next page are from the March 1925 issue of RADIOS NEWS in a new layout. Since there are still about 200 more to print, we will try to include more in the next issue.

U. S. Blows Up Tesla Radio Tower

SUSPECTING that German spies were using the big wireless tower erected at Shoreham, L. I., about twenty years ago by Nikola Tesla, the Federal Government ordered the tower destroyed and it was recently demolished with dynamite. During the past month several strangers had been seen lurking about the place.

Tesla erected the tower, which was about 185 feet high, with a well about 100 feet deep, for use in experimenting with the transmission of electrical energy for power and lighting purposes by wireless. The equipment cost nearly $200,000.

The late J. P. Morgan backed Nikola Tesla with the money to build this remarkable steel tower, that he might experiment in wireless even before people knew of Marconi. A complete description, revised by Dr. Tesla himself, of this unique and ultra-powerful radio plant was given in the March, 1916, issue of THE ELECTRICAL EXPERIMENTER. Everyone interested in the study of high frequency currents should not fail to study that discourse as it contains the theory of how this master electrician proposed to charge this lofty antenna with thousands of kilowatts of high frequency electrical energy, then to radiate it thru the earth and run ships, factories and street cars with "wireless power."

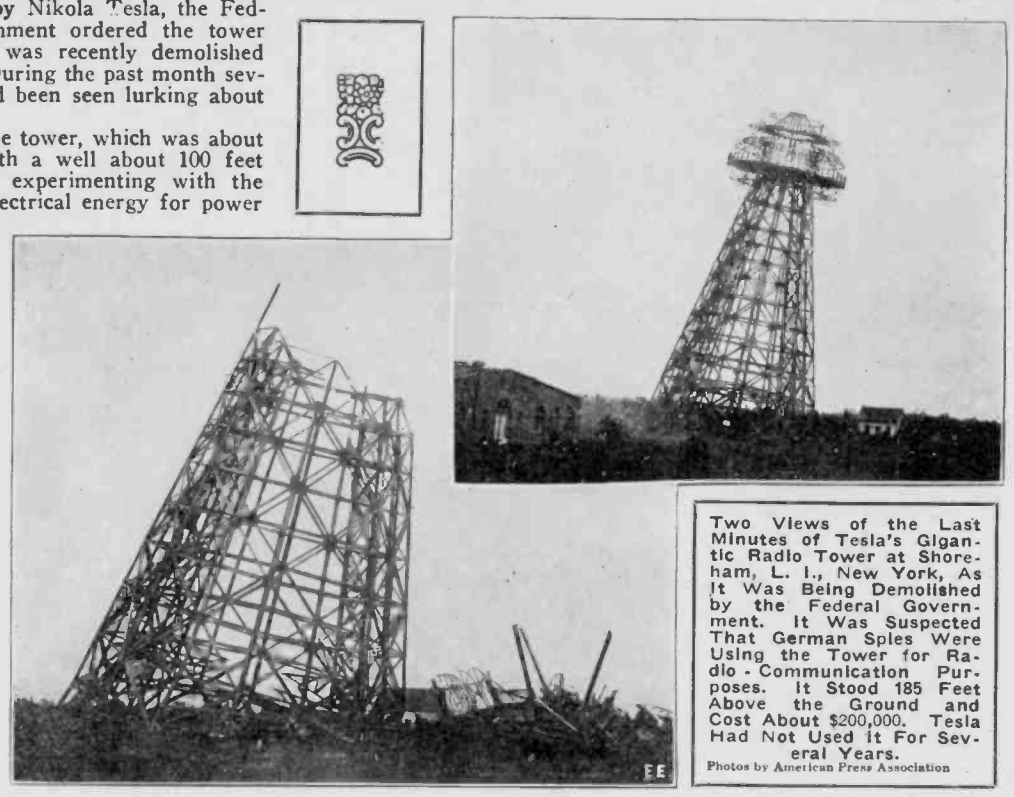
Most of our readers have, no doubt, read about the famous Tesla wireless tower, which structure involved the expenditure of a vast sum of money and engineering talent. From this lofty structure, which was designed some 20 years ago by Dr. Tesla and his associates, there was to be propagated an electric wave of such intensity that it could charge the earth to such a potential that the effect of the wave or charge could be felt in the utmost confines of the globe.

Further, it may be said that Tesla, all in all, does not believe in the modern Hertzian wave theory of wireless transmission at all. Several other engineers of note have also gone on record as stating their belief to be in accordance with Dr. Tesla's. More wonderful still is the fact that this scientist promulgated his basic theory of *earth current* transmission a great many years ago in some of his patents and other publications. Briefly explained, the Tesla theory is that a wireless tower, such as that here illustrated and specially constructed to have a high capacity, acts as a huge electric condenser. This is charged by a suitable high frequency, high voltage apparatus and a current is discharged into the earth periodically and in the form of a high frequency alternating wave. The electric wave is then supposed to travel thru the earth along its surface shell and in turn to manifest its presence at any point where there might be erected a similar high capacity tower to that above described.

A simple analogy to this action is the following: Take a hollow spherical chamber filled with a liquid, such as water; and then, at two diametrically opposite points, let us place, respectively, a small piston pump, such as a bicycle pump, and an indicator, such as a pressure gage. Now, if we suck some of the water into the pump and force it back into the ball by pushing on the piston handle, this change in pressure will be indicated on the gage secured to the opposite side of the sphere. In this way the Tesla earth currents are supposed to act.

The patents of Dr. Tesla are basically quite different from those of Marconi and others in the wireless telegraphic field. In the nature of things this would be expected to be the case, as Tesla believes and has designed apparatus intended for the *transmission of large amounts of electrical energy*, while the energy received in the transmission of intelligence wirelessly amounts to but a few millionths of an ampere in most cases by the time the current so transmitted has been picked up a thousand miles away. In the Hertzian wave system, as it has been explained and believed in, the energy is transmitted with a very large loss to the receptor by electro-magnetic waves which pass out laterally from the transmitting wire into space. In Tesla's system the energy radiated is not used, but the current is led to earth and to an elevated terminal, while the energy is transmitted by a process of *conduction*. That is, the earth receives a large number of powerful high frequency electric shocks every second, and these act the same as the pump piston in the analogy.

Quoting from one of Tesla's early patents on this point: "It is to be noted that the phenomenon here involved in the transmission of electrical energy is one of *true conduction* and is not to be confounded with the phenomena of *electrical radiation*, which have heretofore been observed, and which, from the very nature and mode of propagation, would render practically impossible the transmission of any appreciable amount of energy to such distances as are of practical importance."



Two Views of the Last Minutes of Tesla's Gigantic Radio Tower at Shoreham, L. I., New York, As It Was Being Demolished by the Federal Government. It Was Suspected That German Spies Were Using the Tower for Radio-Communication Purposes. It Stood 185 Feet Above the Ground and Cost About $200,000. Tesla Had Not Used It For Several Years.

Photos by American Press Association

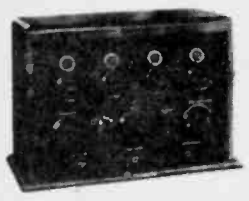
At the time of the destruction of the tower the enemy was believed to be receiving advanced information about American shipping schedules by wireless. This article is from the September 1917 issue of THE EXPERIMENTER, which has a lot to say about spy or secret wireless.

Radio Station For Collectors

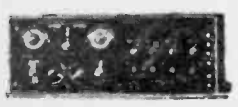
WCNY-FM, Syracuse, 91.3 on the dial, presents "All our Yesterdays", sixty minutes of old radio shows, a trivia quiz, interviews with collectors of nostalgia, old radios, etc. Bill Knowlton features the "Dusty Record Shelf" segment with old 78's from 1900 to 1935, Allen Rockford is featured in the segment "Golden Radio Memories," and Larry Goodsight and Jim Burns (also the host emcee) complete the cast. Listen in on Saturday or Sunday nights. WCNY-FM 18,000, watts, can be heard all over the central area of the state of New York.

EDITOR'S MAILBAG coming next month

TRADE NAME: "Blue Seal."
MODEL: 4.
TYPE: One radio, detector and two audio.
TUBES: Four.
BATTERIES: None furnished.
CONTROLS: Three.
AERIAL: Outside or inside.
PRICE: $70.00 without accessories.
MANUFACTURER'S NAME: Blue Seal Manufacturing Company.

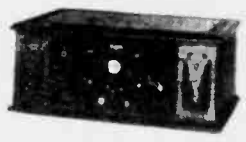


TRADE NAME: Blue Seal.
MODEL: Five.
TYPE: Two radio, detector and two audio.
TUBES: Five.
BATTERIES: None furnished.
CONTROLS: Four.
AERIAL: Inside or outside.
PRICE: $140.00 without accessories.
MANUFACTURER'S NAME: Blue Seal Manufacturing Company.



TRADE NAME: "Breco."
MODEL: BSC-3.
TYPE: Detector and three audio.
TUBES: Four.
BATTERIES: "A" and "B."
CONTROLS: Six.
AERIAL: Indoor or outdoor.
PRICE: $110.00 without accessories.
MANUFACTURER'S NAME: Bronx Radio Equipment Company.

TRADE NAME: Cameo.
MODEL: A.
TYPE: Three stages radio, detector and two audio.
TUBES: Five.
BATTERIES: "A" 6-volt, "B" 90 volts.
CONTROLS: Three.
AERIAL: Inside or outside.
PRICE: $125.00.
MANUFACTURER'S NAME: General American Radio Manufacturing Corp.



TRADE NAME: "Carryadio."
TYPE: Three stages of radio frequency amplification, detector and two stages of audio frequency amplification.
TUBES: Six.
BATTERIES: Dry cells contained in case.
CONTROLS: Three.
AERIAL: Loop contained in case.
PRICE: $125.00 including batteries, tubes, loud speaker and loop.
MANUFACTURER'S NAME: Armley Radio Corporation.

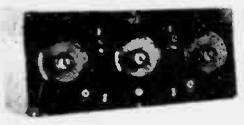
TRADE NAME: "Cincodyne."
MODEL: Blue Seal.
TYPE: Two-stage radio, detector and two audio.
TUBES: Five.
BATTERIES: None furnished. "A" and "B."
CONTROLS: Three.
AERIAL: Outside or inside.
PRICE: $135.00 without accessories.
MANUFACTURER'S NAME: Blue Seal Manufacturing Company.

TRADE NAME: Claratone.
TYPE: Tuned radio frequency, detector and audio.
TUBES: Five.
BATTERIES: None furnished.
CONTROLS: Three.
AERIAL: Outside or inside.
PRICE: $50.00 without accessories.
MANUFACTURER'S NAME: Equitable Radio Corp.

TRADE NAME: Cleartone Perfect Crystal Set.
TYPE: Fixed crystal detector. Cleartone circuit.
CONTROLS: One.
AERIAL: Outside.
PRICE: $7.50 without accessories.
MANUFACTURER'S NAME: Cleartone Radio Supply Co.

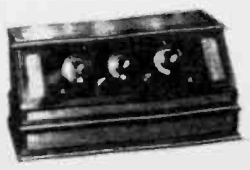
TRADE NAME: "Combidyne."
TYPE: One stage of radio frequency amplification, detector and two stages of audio frequency amplification.
TUBES: Four.
BATTERIES: Not furnished.
CONTROLS: Three.
AERIAL: Inside or outside.
PRICE: $75.00 without accessories.
MANUFACTURER'S NAME: Wolverine Radio Company.

TRADE NAME: "Compendyne."
TYPE: Two radio, detector and two audio.
TUBES: Five.
BATTERIES: None furnished.
CONTROLS: Three.
AERIAL: Indoor or outdoor.
PRICE: $65.00 without accessories.
MANUFACTURER'S NAME: E. Singer Co.



TRADE NAME: Concert Grand.
TYPE: Two tuned radio frequency, detector and two audio.
TUBES: Five.
BATTERIES: Not furnished.
CONTROLS: Three.
AERIAL: Indoor and outdoor.
PRICE: $120.00 without accessories
MANUFACTURER'S NAME: The Concert Radio Phone Co.

TRADE NAME: "Concert Grand."
MODEL: S-70.
TYPE: Neutrodyne.
TUBES: Five.
BATTERIES: Dry cell batteries may be self-contained.
CONTROLS: Three.
AERIAL: Indoor or outdoor.
PRICE: $180.00 without accessories.
MANUFACTURER'S NAME: R. E. Thompson Mfg. Co.



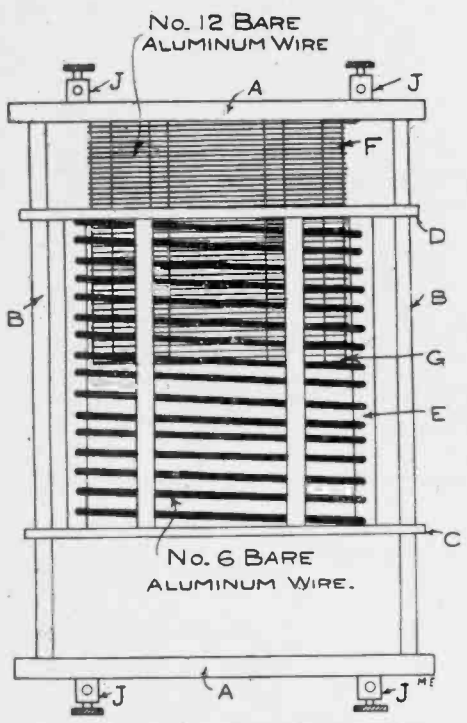
FOR YOUR COLLECTION OR MUSEUM

MODERN ELECTRICS, December, 1910

How to Make An Oscillation Transformer

By Ralph Weddel.

FINDING the need of a good oscillation transformer, and not seeing any article on how to make one, I designed one myself. Below find instructions for making same.



-Fig. 1, View When Completed-

First cut out 2 squares of wood, 21½ ins. square and 1 in. thick as shown in Fig. 2 A. Bore ¼ in. holes, 1⅛ in. in from each side near the corners as shown in Fig. 8. Take one of them and finding the centre draw a circle 12 inches in diameter, and divide it into 6 equal parts and bore 6—¼ inch holes.

Next get 4 dowels, 30 inches long and ¾ inches in diameter, as shown in Fig. 3 B.

Then cut out 2 squares of wood 20½ inches square and ½ inch thick, as shown in Fig. 3 C-D. Take one of them, C, and draw a circle exactly in the centre, 15 inches in diameter. Divide it into 6 equals parts and bore 6—¼ inch holes. Take the other piece, D, and cut out a circle 14 inches in diameter. Divide the circle obtained into 6 equal parts and bore 6—¼ inch holes, ½ inch out from the edge of the circle.

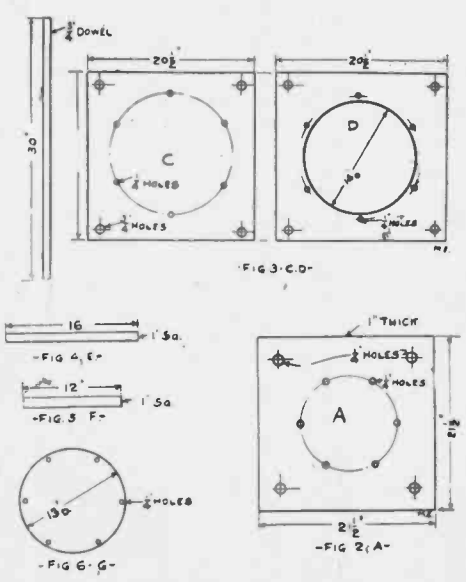
Next get 6 pieces of wood 1 inch square by 16 inches long as in Fig. 4 E. Number them 1, 2, 3, etc., up to 6. Take piece No. 1 and bore a ¼ inch hole, ½ inch down from the top. Then bore 14 more holes 1 inch apart. Bore the holes exactly in the centre of the wood. Take piece No. 2 and bore a ¼ inch hole 7/10 of an inch from the top and bore 14 more holes 1 inch apart. Take the other pieces in their respective order and bore ¼ inch holes 2/10 of an inch farther from the top than the last one bored, and bore 14 more holes 1 inch apart, till the last piece, when the hole is 1½ inches from the top.

This is made clearer by looking at Fig. 7. These holes are for the wire on the primary and are bored in this way so as to give the wire the proper pitch.

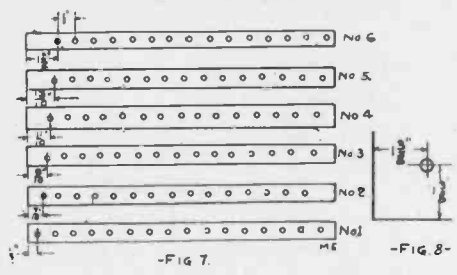
Next make 6 more pieces of wood 1 inch square and 12 inches long as shown in Fig. 5 F.

Then cut out a circle of wood 13 inches in diameter as in Fig. 6 G. Divide it into 6 equal parts and bore ¼ inch holes ½ inch in from the edge.

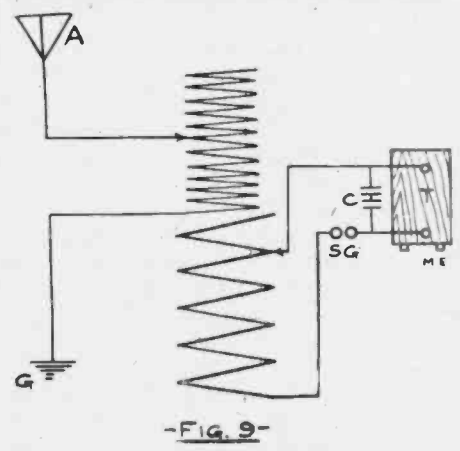
We have now all the parts made and



we need 1 pound of No. 12 bare aluminum wire and 1½ pounds of No. 6 bare aluminum wire. Some brass screws, 10 of which are 2 to 2½ inches long and 12 of which are 1½ to 2 inches long. Also 4 binding posts and some high tension flexible cord and two helix clips, one of which is very small, so as to hold the No. 12 wire. I will not describe how to make a helix clip as there has been several good articles in this magazine lately on making them. We will now assemble the parts.



First take the piece A that has the 6¼ inch holes in it, and taking 6 pieces of wood, F, 1 inch x 1 inch x 12 inches and fasten them on to A by the long screws. Take the piece G and fasten it on to the other end of the stick 5 by means of the short screws. Then wind 40 to 50 turns of the No. 12 wire around



-Fig. 9-

the sticks. Wind it tight so it won't slip. We now have the secondary wound.

Take the pieces C and D and the pieces of wood E and make another core somewhat like the one made before, only put the sticks E in their respective order. First No. 1, then No. 2, etc. Take the No. 6 almuinum wire and put it through the top hole of No. 1 and continue to wind it around by putting it through the holes until you have 15 turns. This is the primary.

Then take the dowels and fasten them on to the other piece A. Then slip the primary through the dowels as the ends of the primary has ¾ inch holes in the corner.

Then fasten the other ends of the dowels to the large piece A of the secondary. The primary wire should slip over the secondary wire by about an inch. Connect a flexible cord to the No. 6 wire and to the binding post J. Connect the biggest clip to another piece of the flexible cord and connect to the binding post. Do the same to the small clip only connect it to the binding post on the other end. Stain all the wood work with some good stain as walnut or oak. Connect it up as in the diagram Fig. 9. The transformer complete is shown in Fig. 1.

WANTED

WANTED 2 pilot 23 Plate Centraline, Capacigrad Condensers in Good Working Condition. Ted Woolner, WA1ABP, 30 Cedar Rd., Shrewsbury, Mass. 01545.

WANTED to buy C. B. Kennedy Model 201 receiver. Need information on any radios made by The Hickok Electric Company of Cleveland (Bath Longoria Radiophone Corp.). Also selling solid state power supplies for battery sets. G. B. Schneider, 6971 Pearl Rd., Box 4, Cleveland, Ohio 44130.

WANTED for collection. Radio books and catalogs prior to 1920. Radio Historical and Biographical, and date but no entertainers. Stanley W. Atkinson W1AFQ, 59 Mason Ave., Cranston, R. I. 02910.

THE SAWYER-MAN ELECTRIC LAMP.

The practical usefulness of the electric light for illuminating open spaces and wide areas has been amply demonstrated by the various devices for using the electric arc already widely employed. Hitherto, however, it has not been found economical, or even possible, as we understand it, to construct a lamp or candle, based on the electric arc, that would answer the requirements of ordinary domestic and industrial lighting, where a moderate amount of light, well distributed, easily manageable, and of perfect steadiness and softness, is needed. The electric arc seems, from its very nature, to present insuperable obstacles to the economical production of a large number of small lights in a circuit; in other words, such lights as we require in our dwellings, offices, factories, shops, and the like. And if there were no other means of obtaining light from electricity, the probability of the displacement of gas by it, for the purposes of general illumination, would hardly be worth considering.

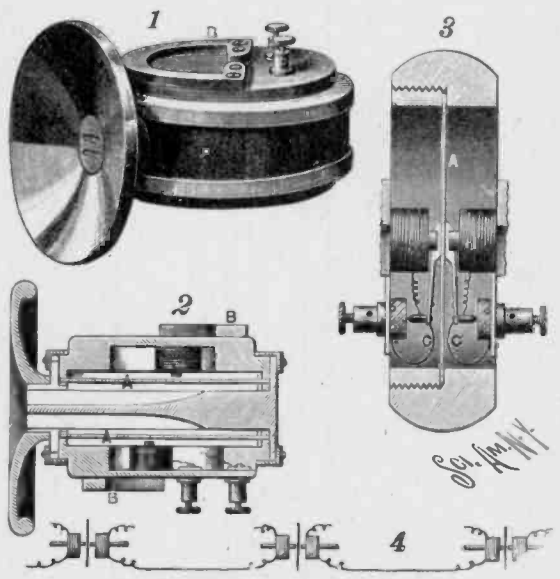
The production of light through the incandescence of a pencil of carbon or metal, forming part of an electric circuit and highly heated by its internal resistance to the passage of the electric current, offers an entirely different field for exploration; and though it has long been apparently closed by the failure of early attempts to obtain an electric light by such means, the achieved success of Messrs. Sawyer & Man, not to speak of the reported success of Mr. Edison, clearly indicates that this is the line along which the practical solution of the problem of household illumination by electricity is to come. The lamp, to be described further on, lacks only the practical demonstration of its economy by protracted use on a large scale, to compel acceptance as a successful solution of the problem.

So long ago as 1845, an American inventor, Mr. King, patented here and in England a lamp (said to have been invented by J. W. Starr) involving this principle. His light was produced in a vacuum, to prevent the oxidation of his incandescent carbon or metal, and was extremely promising for its beauty, brilliancy, and steadiness. But it failed to be permanent and economical from various defects and deficiencies, some of which have been removed by the increased power and economy of modern dynamo-electric machines, and by recent advances in the art of subdividing the electric current, but the most of them by the inventions and discoveries covered by Messrs. Sawyer & Man's patents.

The economical division of the current, or more correctly the light produced by a single current—popularly believed to be very difficult if not practically impossible—has been successfully worked out by several American investigators. As long ago as 1875, Mr. Moses G. Farmer, now Electrical Superintendent of the U. S. Naval Torpedo Station, at Newport, R. I., subdivided the electric current, produced by a small machine, into forty-two different branches, putting a light to each branch. Mr. Sawyer's system appears to be able to do the same indefinitely through the maintenance of a uniform resistance throughout the circuit and equal resistances in the several parts of the circuit, as will be shown further on.

The adaptability of this form of electric lighting to the needs of household illumination is indicated in Fig. 1. The light produced is pure, strong, and yet soft, like sunlight. It is, moreover, steady and cool. It is not influenced by air currents; and it does not vitiate the air by poisonous products of combustion, nor by withdrawing the vitalizing oxygen. The lamp takes up less room than the glass shade of a gas jet, and no more than the chimney of an oil lamp. To a limited extent, also, it is portable, and may be used as a drop light. The general appearance of the lamp is shown in Fig. 2 (page 354). The light is produced by the incandescence of the slender pencil of carbon placed as shown in the engraving. The light-giving apparatus is separated from the lower part of the lamp by three diaphragms, to shut off downward heat radiation. The copper standards lower down are so shaped as to have great radiating surface, so that the conduction of heat downward to the mechanism of the base is wholly prevented. The structure of the base, full size, is shown in Fig. 3 (page 355). No detailed description of this portion will be required, further than to say that the electric current enters from below, follows the line of metallic conduction to the "burner," as shown by the arrows, thence downward, on the other side, connecting with the return circuit. The light-producing portion is, of course, completely insulated, and also sealed at the base, gas tight.

A fatal defect in all previous lamps depending on incandescent carbon has arisen from what has been called the "vaporizing" of the carbon. This Mr. Sawyer holds to be an absurdity, since the carbon is not even fused. The wastage of the carbon in mercurial vacuums, and in atmospheres of compound gas, is due, he holds, to chemical decomposition. Many gases, indifferent to carbon at ordinary temperatures, attack it destructively at temperatures obtained in the electric lamp; and the process is continuous, the carbon taken from the burner being redeposited on the glass case, and the gas left free to continue its depredation. Mr. Sawyer claims to have overcome this difficulty by his method of charging the lamps with pure nitrogen, and by providing for the fixing of any residual oxygen left in the lamp. In this way an unwasting carbon is secured. Another stumbling block on which other workers in this field



NORIEGA'S TELEPHONE.

Mr. Eloy Noriega, the well known electrical inventor of the city of Mexico, has recently patented in Mexico some improvements in telephones, for which greatly improved results are claimed.

The double receiver, shown in perspective in Fig 1 and in section in Fig. 2, is sensitive to weak impulses and gives excellent results with the normal volume of sound and current at the transmitting end of the line.

This instrument has a cell or casing provided with two separate chambers containing diaphragms. The two chambers terminate in an ear piece. Each diaphragm is in the field of a polarized magnet attached to the side of the casing, and the bobbins of the two magnets are connected with the telephone line.

In Fig. 3 is shown in section a double telephone, in which two polarized electro-magnets are supported on opposite sides of the iron diaphragm. The diaphragm carries two arms of insulating material, one on either side of the diaphragm, each provided with a metallic electrode at its free end, which rests on a contact block attached to the binding post. The metallic electrodes are connected with the bobbins, and the arms which support them are connected with delicate curved springs extending to the blocks attached to the binding posts.

This instrument may be used for receiving from separate lines, also for transmitting to two circuits. It may also be arranged for use as a repeater, for repeating from one line to another, as indicated in Fig. 5.

The magnets used in these instruments are made from a new alloy of iron and tungsten, which is more efficient than iron or steel. The inventor claims the efficiency of these magnets ten times greater than that of the ordinary steel magnet.

SCIENTIFIC AMERICAN, July 21, 1894

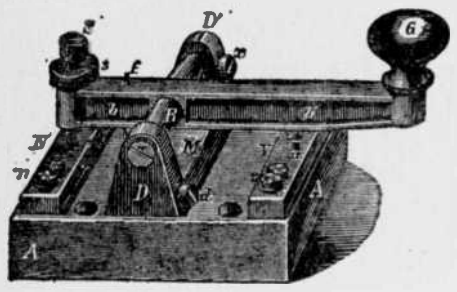


Fig. 322.—The Morse Key.

The Morse Key

THE CYCLOPAEDIA OF ELECTRICAL ENGINEERING
The Gebbie Publishing Co., 1897, page 647.

The key required for the sounder is the single Morse key, represented in fig. 322. Three brass bars N, M and V are fastened upon a basement block of wood A; M has the two brass cheeks D D arranged upon it, as chairs or bearings for the support of the axis B. The lever *b b'* moves about this axis, moving in the one direction by the hand of the operator pressing on the knob G, and returning when released in consequence of the tension of a spring *f;* and steel or platinum contacts *c a* are screwed into the bars N and V, the corresponding contact-pins of which pass through the lever *b b'*. One end of the spiral spring is attached to the lever at *b*, and the second end is fastened to the bar M. This spring serves to hold the lever down upon the contact *c*, which is regulated by the screws S *s*. The line-wire is connected with the middle plate M, the receiving apparatus with N, and the sending apparatus, including the home battery, with V. Hence the key is always set ready to receive a message, but must be pressed down to send one.

THE SAWYER-MAN ELECTRIC LIGHT

SCIENTIFIC AMERICAN,
December 7, 1878

have come to grief, has been the crumbling or disintegration of the carbon burner, due to sudden heating when the lamp is lighted. This is avoided in the Sawyer-Man lamp by an ingeniously devised switch, shown in Fig. 4. By this means it is impossible to turn the current on or off suddenly, to the disruption of the carbon. This, however, is not the only nor the chief advantage of the switch. It is, indeed, the key to the entire problem, the indispensable condition, Mr. Sawyer holds, of practical electrical distribution.

It is well known that an electric current will exactly and readily divide among circuits of equal resistance. Accordingly, if the resistance of a sub-circuit be maintained constant, no matter what may be going on in it, whether a lamp is not lighted at all, or lighted to a mere taper, or to any intermediate stage up to full brilliancy, it is obvious that no other lamp or lamps in that circuit will be affected. The operation of the switch, in securing such uniform resistance, is shown in the accompanying diagram, Fig. 5 (page 355).

The lamp has, let us say, a resistance of 0·95 of an ohm. Therefore if one lamp is out there should be a resistance of 0·95 of an ohm in its stead. This is the shunt resistance, B. The current enters at the "+" point, and leaves at the "—" point. The contact piece, A, bearing upon the two studs, 1, 1, all the current passes out by way of B. When A is moved to the studs, 2, 2, the current divides, ¼ going through the lamp, the other ¾ by way of B, and the resistance of the combined circuit is $0{\cdot}31\frac{1}{4}+0{\cdot}95=1{\cdot}26\frac{2}{3}$ in the shunt; and $1{\cdot}9+0{\cdot}38+25\frac{1}{3}+18\frac{2}{21}+0{\cdot}07\frac{5}{21}+0{\cdot}06\frac{1}{3}$+(the lamp) 0·95=3·8. The resistance of the circuit is, therefore, $\frac{1{\cdot}26\ 2{\cdot}3\times 3{\cdot}8}{1{\cdot}26\ 2{\cdot}3+3{\cdot}8}=0{\cdot}95$ of an ohm, and so on. In short, the resistance of the circuit is constant at 0·95, no matter what may be the change in the proportion of the current given the lamp, as may be seen by making the required calculation for each pair of studs. The varying resistances required to give the best effect have been worked out by practical trial. The effect of ¼ the current through the lamp is to make the carbon a dull red. On studs 3, 3, one half the current passes through, and the carbon becomes a bright red. On studs 4, 4, the lamp gets ⅝ of the current, and becomes white hot. On 5, 5, the lamp gets ¾ of the current, and begins to assume the intense limpid incandescence of the sun; and the light increases rapidly with subsequent changes until the whole current goes through the lamp.

Thus it is seen that the greater part of the illumination is the product of a small part of the current. When the light is well on, a very slight increase in the current increases the light enormously. It is here that the great loss occasioned by dividing a fixed current among several lamps finds its explanation. A current that suffices in one lamp to produce a light, say of 100 candles, will, if divided between two lamps, give in each perhaps no more than 10 candles, or even 5, making a loss of 90 candles in the sum total. But if the current be doubled, each lamp will give a light of 100 candles, and the sum total will be 200 candles instead of 10. Having brought a candle or a system of candles up to the point of feeble incandescence, a (proportionally) small addition to the current will make them all brilliant. If at 6,000° Fah. a given carbon will produce a light of 3 candles, at 12,000° it will give 9 candles, and at 24,000° it will give 81 candles; the illuminating power increasing with vastly greater rapidity than the temperature.

The wires supplying the current may be run through existing gas pipes, each lamp being provided with a switch placed conveniently in the wall; and by simply turning a key the light is turned up or down, off or on. So long as the house is connected with the main it makes no difference to the producer whether all the lights are on or off, since the resistance of the entire (house) circuit must be overcome; though it will to the consumer, since a meter records the time that each lamp is on, and the charge is rated accordingly. If the Dynamo-Electric Light Company can supply the illuminating force so cheaply that the constant and brilliant illumination of all the rooms of a house can be secured at no greater cost than the partial and intermittent illumination now had from gas, it is obvious that the electric light will score a important point. The cost of lamps and switches, it is claimed, will not exceed that of gas fixtures.

The meter above referred to is shown in Fig. 6. It is a simple clock arrangement, with an attachment designed to throw the dial hands into connection when a light is on. From each switch a pair of conducting wires are run to opposite studs on the wooden disk shown at the top of the figure. When no current passes through the lamp the revolving spring shown in front of the studded disk turns without making any record. When the current is on, one electric connection at each revolution is made through the pins assigned to the particular lamp, the armature of the magnet is moved, and the recording wheel is advanced one notch. This meter does not measure the quantity of electricity passing, but only the time a lamp is on. If two or any larger number of lamps are on, an equal number of connections are made at each revolution of the wheel, and the record wheel is advanced to correspond. This registration is, of course, a mere matter of business detail. In view of the well-founded popular dislike to gas meters, however, it would seem to be desirable to dispense with such devices entirely; and the nature of electric distribution appears to favor other and less objectionable modes and means of determining the financial relations of producers and consumers.

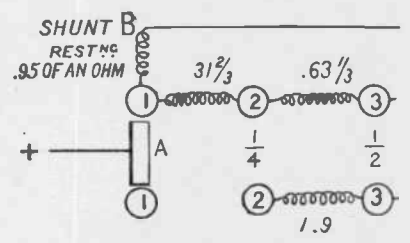
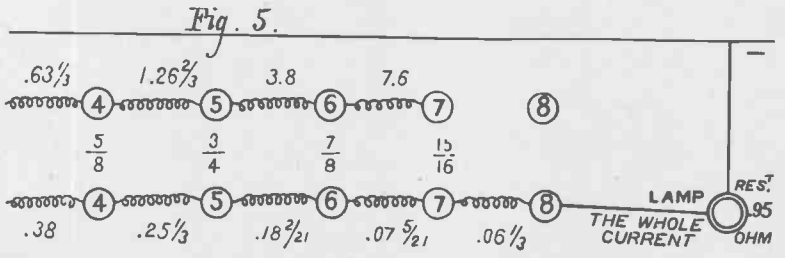
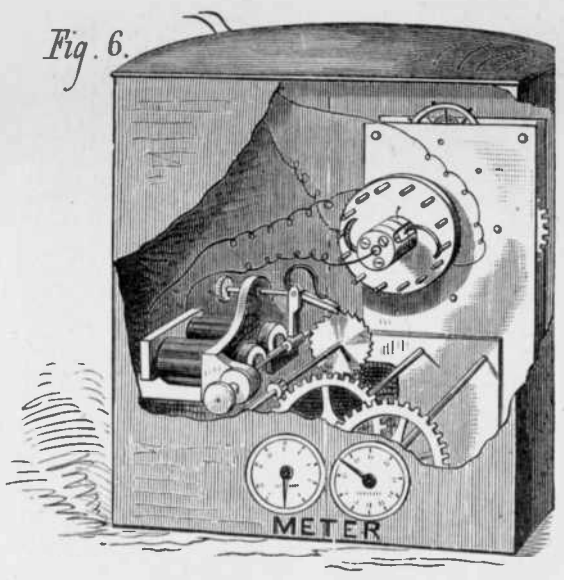


Fig. 5.



PRINCIPLE OF SWITCH.

Fig. 6.



THE SAWYER-MAN METER.

Fig. 7.

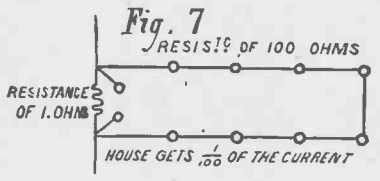


Fig. 8.

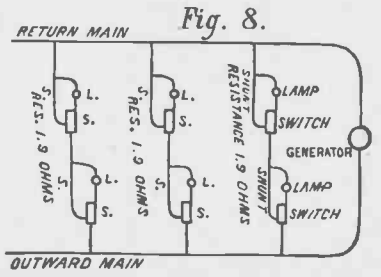


Fig. 7.—DERIVED CIRCUIT. Fig. 8.—BRANCHED CIRCUIT.

Figs. 7 and 8 indicate the method proposed for general distribution. Where the main is tapped for a sub-circuit, a shunt is introduced so as to throw so much of the current as may be needed into the derived circuit. The resistance of say 100 added lamps will be about 100 ohms. By giving to the shunt a resistance of one ohm, $\frac{1}{100}$ of the current will be diverted, and the lamps supplied. When a large number of lamps are required in a circuit, a combination of the two plans indicated is employed.

The diversion of any portion of the electric supply into an added circuit, whether one house or a group of houses, necessarily increases the aggregate resistance of the electric district, and calls for more work from the generator. To meet such contingencies automatically, Messrs. Sawyer & Man have invented and patented a regulator, which responds instantly to any increase or diminution in the demand, thereby securing an absolutely uniform volume of current.

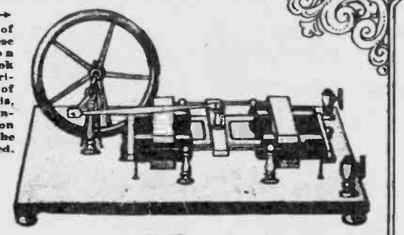
This regulator so controls the steam or other power actuating the generator of electricity, that the amount of power supplied is increased or diminished in exact proportion to the demand, either by changing the volume of steam produced, or by coupling on or detaching different generators or parts of a single generator in circuit.

With regard to the cost of this mode of electric lighting no positive figures can be given. It is claimed to be entirely demonstrated that one horse power will give by the Sawyer-Man system of incandescence a light of 30 five foot gas burners an hour. Where large powers are employed the cost of steam power, every item included, is commonly rated at one cent per horse power per hour. The cost of 150 feet of gas at New York rates is 41 cents, which would make the gas over forty-fold dearer than the Sawyer-Man light. Mr. Sawyer does not stand on this estimate, however, holding that even if the electric light should prove in practice on a large scale to be ten times as costly as calculation indicates, it will yet easily compete with gas, the light furnished being so much better and purer.

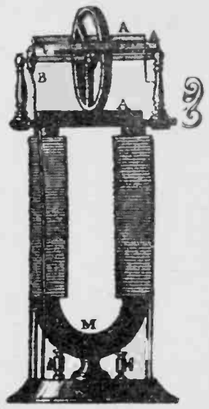
It is promised that facilities will soon be offered for the photometric test of a large number of lights, in a circuit, with dynamometric tests of the power employed in generating the electric supply. This, as already noted, is all that the system lacks to prove itself an accomplished economical fact.

Old Time Electric Motors

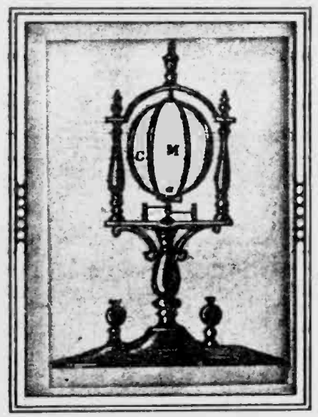
The interesting set of motors shown in these illustrations are taken from a very famous book which is now a great curiosity, Davis' Manual of Magnetism. Daniel Davis, Jr., was a mathematical instrument maker of Boston and in 1842 published the book now quite celebrated.

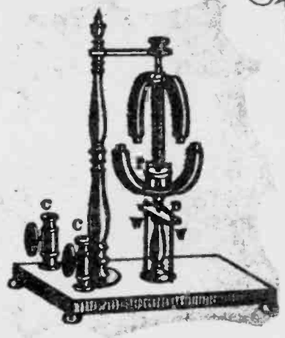


On the left is seen a reciprocating motor. One idea of the times was to make motors on the lines of the ordinary steam engine. The motor shown on the right departs from the reciprocating principle; the wheel carries bars which are attracted at proper times. The action of attraction is regulated by an ordinary commutator as the wheel rotates.

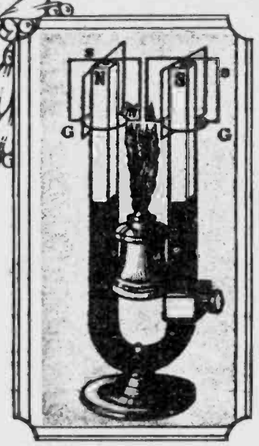


This is quite a curious apparatus; the circle M is of steel and is a magnet; the coil C is a coil of wire and at the base of the shaft will be seen the commutator. It is a curiosity only as it will develop extremely small power.





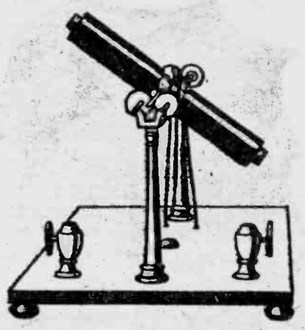
Above is shown a very familiar type of motor, or at least one that used to be so, somewhat on the lines of what was called a revolving armature. It has its coils, pole changers, as Davis called the appliance which we call the commutator, and undoubtedly would produce a very high speed. This was one of the characteristics of many motors of old times, while of low power they were of quite high speed. It has virtually two electromagnets. The upper one, as well as the lower one, rotate in opposite directions. It would be very interesting to reproduce such a machine as this and the double rotation idea might be carried out advantageously for some purposes.



Here we have the familiar thermo-electric motor with an alcohol lamp mounted between the legs of the magnet, which heats the wire frames delicately poised, one for each of the magnet poles. We have several times had occasion to illustrate interesting varieties of thermo-electric motors in our columns.

The frames are generally made of silver and platinum; but German silver, in combination with brass or silver, will develop a stronger current in the frames.

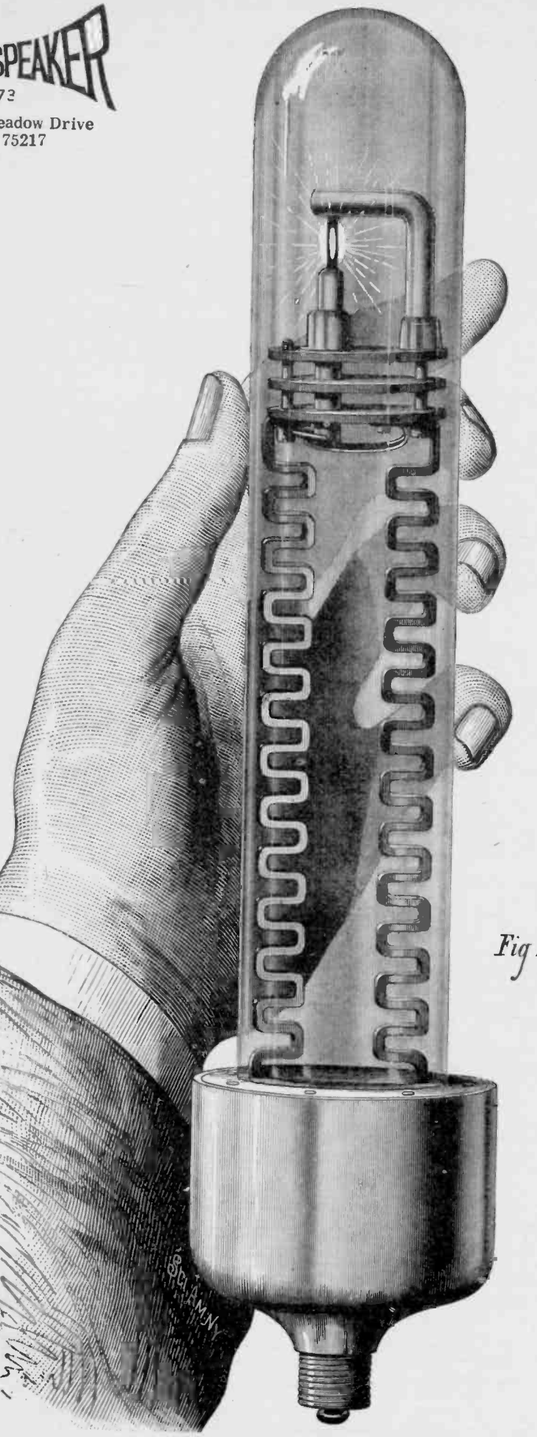
In this apparatus current is supplied through a commutator to the bar electromagnet so as to reverse its poles as it rotates. The field is the field of the earth. The author states that the polarity of the bar is to be reversed when in the course of the revolution it reaches the line of the magnetic dip. The shaft of the bar is carried by two wheels at each side to reduce friction.



THE HORN SPEAKER
FEBRUARY 1972
9820 Silver Meadow Drive
Dallas, Texas 75217

THE SAWYER-MAN ELECTRIC LIGHT,

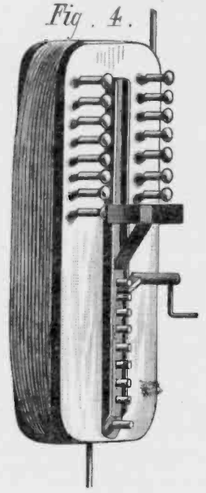
1878.



THE SAWYER-MAN ELECTRIC LAMP.

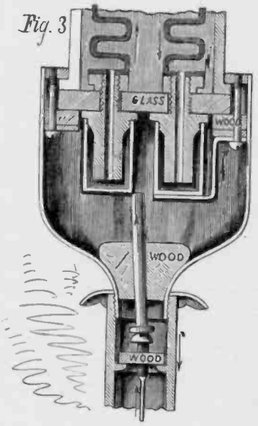
Fig. 2.

Fig. 4.



THE SWITCH.

Fig. 3



BASE OF SAWYER-MAN LAMP.

Continued on page 6