

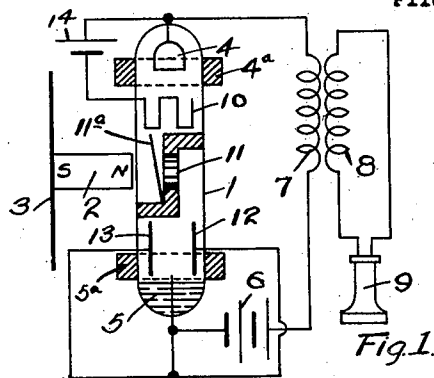
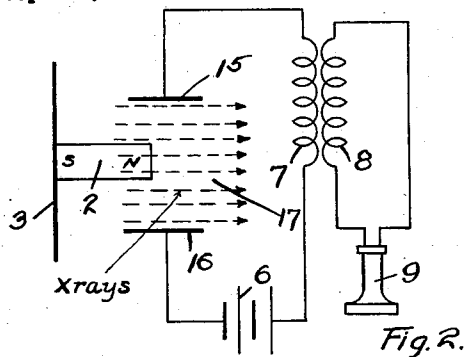
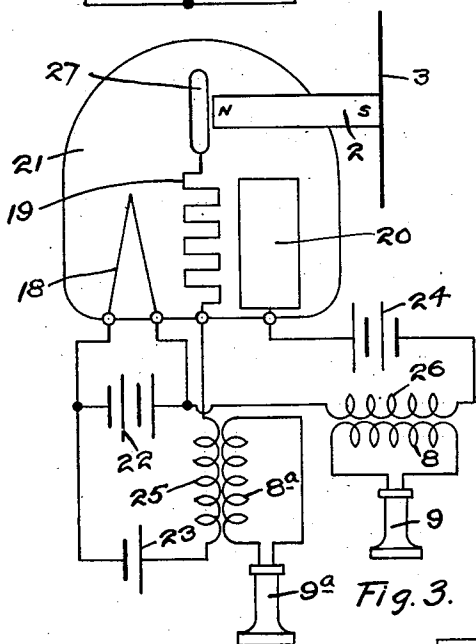
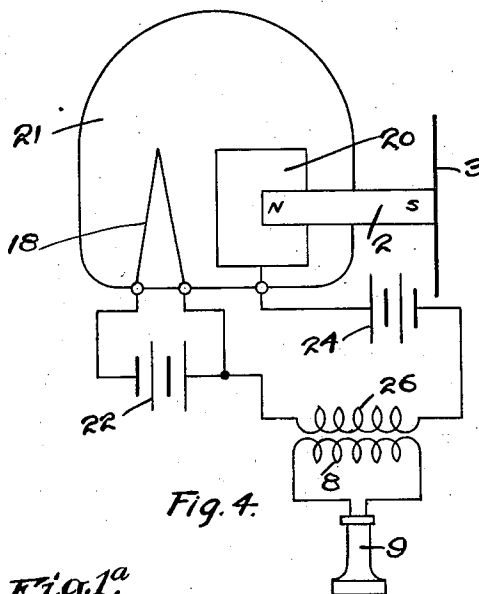
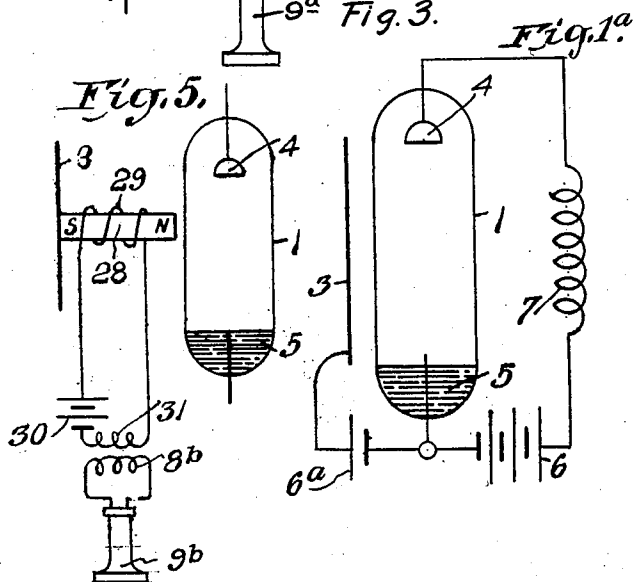
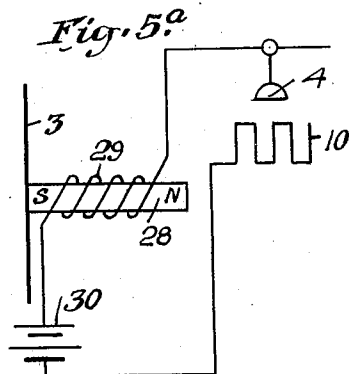
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1,507,884

R. A. ENGLER

GASEOUS TELEPHONE TRANSMITTER

Filed Sept. 2, 1919



Inventor.
Richard Engler.

UNITED STATES PATENT OFFICE.

RICHARD A. ENGLER, OF EVANSTON, ILLINOIS.

GASEOUS TELEPHONE TRANSMITTER.

Application filed September 2, 1919. Serial No. 321,195.

To all whom it may concern:

Be it known that I, RICHARD A. ENGLER, a citizen of the United States, and resident of Evanston, in the county of Cook and State of Illinois, have made a certain new and useful Improvement in Gaseous Telephone Transmitters, of which the following is a specification.

My present invention relates to modifications of apparatus covered by my Patent #1,443,620 of Jan. 30, 1923 for "telephone transmitters" in which the broad idea of using gases and vapors as the variable means in transmitters is disclosed.

The invention herein disclosed deals with magnets controlled by the voice or other sound producing means or methods of causing vibration, and causing said magnets to affect a gas or vapor path or an intermediate medium to affect the gas.

Any medium known in the art as a gas or vapor or thermionic electronic or ionic discharge can be employed in my transmitters and these terms are used synonymously herein.

The magnet may act directly upon the gas or vapor; or may act upon mechanical obstructions placed in the gas or vapor path; or may act upon mechanical means, which latter in turn control auxiliary electric currents, whereby the main transmitter current is affected. In some cases the sound waves may act directly upon the ionized path. Again a combination of the above methods of obstructing the gas path may be employed.

Perfect articulation is obtained from such transmitters especially where a magnet works on the gas direct due to the subtle means employed namely magnetism and extremely mobile gases. The articulation is equal to that of a Bell magneto telephone transmitter. The magneto telephone transmitter may operate simultaneously with the gas transmitter and the two effects thrown upon the same circuit if desired.

There are seven figures of drawing forming part of this specification.

Fig. 1 illustrates a mercury arc tube wherein the magnet may affect the gas or mechanical means or mechanical plus elec-

trical means or a combination of all or several of these obstructing or varying means.

Fig. 1^a shows another arrangement including a part of Fig. 1.

Fig. 2 is the same as Fig. 1 in every particular save that a gas ionized by X-rays replaces the mercury arc.

Fig. 3 illustrates how the "audion" may be employed to obtain the desired results.

Fig. 4 illustrates the employment of the "Edison effect" in carrying out my invention.

Fig. 5 shows how an electro-magnet may be substituted for a permanent magnet and how the magneto transmitter may add its effects to the general results.

Fig. 5^a shows a modification of Fig. 5.

In Fig. 1, a mercury arc tube 1 is placed adjacent a permanent magnet 2. The magnet is attached to a diaphragm 3 or the like. An anode 4 and cathode 5 are provided in the tube whereby the battery 6 may strike an arc between said anode and cathode in the well known manner. In series with the battery and tube is a primary 7 of an induction coil, the secondary 8 of which is in series with a telephone receiver 9 or other suitable device. A grid 10, a mechanical obstructor or valve 11 and two auxiliary cathodes 12 and 13 are all within the tube. All need not be in the tube, only those to be used. The grid 10 is in series with a battery 14 which latter has one terminal connected to the anode 4. In this circuit an induction coil may be included. The auxiliary cathodes 12 and 13 connect with the cathode 5. An induction coil may be included in each anode circuit.

The battery 14 may oppose or aid the main arc current. The valve 11 of insulating material is provided with a puppet 11^a of iron or steel and resiliently held.

I show the arc tube and circuits and equipments in the simplest possible form, and serving merely to illustrate how a gas or vapor from any source may be impeded, varied, obstructed, or throttled in various ways.

When the diaphragm 3 is spoken to, the magnet 2 vibrates thereby causing the vapor to vibrate and change its resistance, which

varies the current flow of battery 6 and thus affecting the telephone receiver thru the medium of the induction coil.

When the valve 11 is used the puppet 11^a is operated by the vibrating magnet and thereby the gas path is more or less obstructed and the resistance varied. This means of operating on the gas or vapor is more fully claimed in my patent for "telephone transmitters", #1,443,620 of Jan. 30, 1923. Both the magnetism and valve when properly constructed can affect the gas path simultaneously.

When the grid 10 is acted upon by the vibrating magnet it may be caused to approach or recede from the anode 4 or cathode 5; in either case the gas path has its resistance varied thru the medium of the current from battery 14. The current from battery 14 is also made variable by the operation. The grid is shown in the well known form but may be modified to suit this device.

When the auxiliary anodes 12 and 13 are used the vibrating magnet causes the gas to immerse one anode more than the other and the operation being alternate as a to and fro shift or deflection one anode circuit has more current flow than the other alternately and when suitable means are provided, the variable effects produced in each branch may be utilized.

Fig. 2 is similar in action to Fig. 1 and all the obstructing means shown in Fig. 1 may be employed in this figure between electrodes 15 and 16. The space, air or gas, between the electrodes is ionized by X-rays 17 or the like. This ionized path may or may not be enclosed in a container.

When gas other than air is used it must be enclosed in a vessel. When air is used the sound waves themselves may act as the obstructing means because the condensation and rarification of the air is equivalent to the opening and closing of the valve 11 in Fig. 1. The puppet vibration sets up rarefaction and condensation in the gas or vapor besides opening and closing the valve more or less.

Fig. 3 shows an "audion" transmitter in which the final effect is amplified. Fig. 3 is similar to Fig. 1 but uses ions caused by the "Edison effect" instead of the "Mercury arc." All devices used in Fig. 1 may be used in Fig. 3. The filament 18 grid 19 and anode plate 20 are present as in all audions inclosed in a glass vessel 21. Battery 22 heats the filament; battery 23 is in the grid circuit; and battery 24 in the anode plate circuit. An induction coil primary 25 and 26 are in each of these circuits respectively. Each primary has its secondary 8—8^a and telephone receiver 9—9^a. To the grid is attached a piece of iron or steel 27 which lies adjacent the magnet 2.

When the magnet vibrates the grid thru the medium of 27 the grid recedes or approaches from one or other, the filament or plate; in either case current from battery 23 is varied whereby the gas in the path is varied and the varied currents from battery 23 and 24 may both be utilized. Battery 23 may aid or oppose the current in the gas path.

Fig. 4 shows how the "Edison effect" is made use of. The plate 20 of iron or steel in part at least, is vibrated by the magnet in this case which causes a variation in the space between it and the filament and hence a variation in the gas current. The magnet may act directly upon the gas path or on both path and anode plate.

In Fig. 3 the filament or plate or both may vibrate and the grid remain fixed with the same result as explained when the grid vibrated.

In Fig. 5 is shown an electromagnet which may be substituted for the permanent magnet 2. Here a soft iron core 28 is mounted on the diaphragm 3. A coil 29 surrounds the core 28, but loosely, so that the latter can move within the coil without touching the same. A battery 30 excites the magnetism thru coil 29. By using this electromagnet a much stronger magnetic field is possible with less material and hence the diaphragm vibrates more readily and freely responds to sound waves. A primary 31 may be included in the coil circuit. Then as the core vibrates, currents are induced in the coil 29 by said vibration which vary the battery current. Here I have the Bell magneto transmitter. A secondary 8^b and receiver 9^b are affected by this varied current.

Any form of magnet may be used. Any form of transmitter is possible, that is, any shape given the gas container and its contents. With strong light magnets on the diaphragm large currents in the gas path can be affected and thus large variations obtained. Several such devices may then be placed in concatenation and powerful voice currents produced and that without distortion because of the subtle mediums used.

The puppet 11^a Fig. 1 may be polarized. Fig. 1 becomes an oscillator when the receiver 9 is held to the diaphragm 3.

Gas, vapor, ionic, thermionic and electronic all denote forms of radiant energy, that is, radiated energy, and they are terms used synonymously in this specification.

The diaphragm may serve as one plate of a condenser and the gas as the other and the variation of distance between them caused by the voice can alter the current in a suitable circuit and battery 6^a as well as the gas path current. This arrangement is shown in Fig. 1^a.

When the electromagnet and circuit

shown in Fig. 5 is used in Fig. 1 in place of the permanent magnet the coil 31 can be dispensed with and the coil of the electromagnet put in series with the grid 10 and battery 14, as shown in Fig. 5^a (battery 30 taking place of battery 14) then the magneto induced currents can affect the gas by way of the grid and the magnet can also affect the gas as explained. The magneto currents alone may affect the grid circuit and thereby the main gas path circuit.

When the plate 20 is held stationary the vibrating permanent magnet can induce eddy currents in it thereby causing the gas path to be affected.

When using the magneto currents in the grid circuit in Fig. 3 I have a magneto telephone transmitter and audion combination in which I get perfect articulation and amplification.

The plate 20 Fig. 4 may be polarized in some uses of the device.

The puppet 11^a Fig. 1 may be of some length and the magnet act on the lower end thereby causing the upper end to vibrate with great amplitude and this end then operate the valve 11. The puppet of valve 11 causes a condensation and rarefaction of the gas or vapor and thus a variation of resistance in the gas or vapor.

In Fig. 1 are shown two iron rings 4^a and 5^a which encircle the tube 1. They are placed on each side of the magnet 2. These rings affect the magnetic conditions of the gas path, due to the current in said path. Therefore the space between the rings becomes very much more sensitive to the magnet 2.

While this application discloses various modes of control over a gas or vapor path, such as magnetic, electrostatic, by valve, direct sound wave (audion or vacuum tube) electrodes and magnetic telephone, only the first mentioned is specifically covered by this application.

I may call my transmitter an "ionophone" or "phonia," one signifies "ion speaker" and the other "speaking ion," because ions are used in all its forms.

I do not limit myself to the precise arrangements and equipments shown and described because the principle of my invention may be employed in a great variety of forms of apparatus without departing from the spirit of my invention or calling forth the exercise of the inventive faculty because the fundamental conditions are so simple that an almost infinite variety of detail is possible, and the gas or vapor devices and circuits have been shown in the most elementary fashion for the sake of simplicity and ease of understanding and illustrating.

I claim as my invention:—

1. A telephone transmitter comprising a

plate sensitive to sound waves, a magnet mounted upon said plate and a gas or vapor path, said magnet being vibrated by said plate adjacent said path, whereby the gas or vapor becomes variable in resistance.

2. A telephone transmitter comprising a plate sensitive to sound waves, a gas or vapor path and magnetic means mounted upon said plate and located between said plate and said path for causing said path to become vibratory and variable in resistance.

3. In a telephone transmitter the combination of a plate sensitive to sound waves with a magnet mounted upon said plate and a gas or vapor path, said path being directly varied by the field of force of said magnet.

4. In a telephone transmitter the combination of a plate sensitive to sound waves, a magnet mounted upon said plate, a gas or vapor and auxiliary electrodes placed in said gas or vapor, said magnet operating to immerse said electrodes more or less in said gas or vapor.

5. In an apparatus for the transmission of signals the combination of a circuit including a gas or vapor path means for supplying a member with a constant magnetic field and locating said member near said path and means for varying the position of said magnetic field member in accordance with the signals to be transmitted, said magnetic field member being mounted upon as well as controlled by said varying means.

6. A telephone transmitter comprising a plate sensitive to sound waves, a mobile conducting path and magnetic means mounted upon said plate and located between said plate and said path for causing said path to become vibratory and variable in resistance.

7. In an apparatus of the character described the combination of a gas or vapor path included in a circuit and a source of current supply and iron bands surrounding said path, said bands operating to cause an effect upon the magnetic properties of said path so as to make it more sensitive for the purpose set forth.

8. A telephone transmitter comprising a plate sensitive to sound waves, magnetic means mounted upon said plate and a gas or vapor path lying in the field of said magnetic means said magnetic means being vibrated by said plate, whereby the gas or vapor becomes variable in resistance.

9. In a telephone transmitter, the combination of a plate sensitive to sound waves, an electromagnet and a gas or vapor path, said magnet having its core mounted upon said plate and operating to vary the resistance of said path.

10. In a telephone transmitter, the combination of a plate sensitive to sound waves, a magnet mounted upon said plate, a gas

or vapor path and auxiliary electrodes placed in said path, said magnet operating to deflect the gas or vapor from one auxiliary electrode to the other.

- 5 11. A telephone transmitter comprising a chamber, means for maintaining a state of ionization in said chamber, a pair of electrodes at opposite sides of the ionized

space, means for maintaining said electrodes at a negative potential and means for vibrating the ions in said ionized space. 10

Signed at Evanston, in the county of Cook and State of Illinois this 1st day of July 1919.

RICHARD A. ENGLER.