

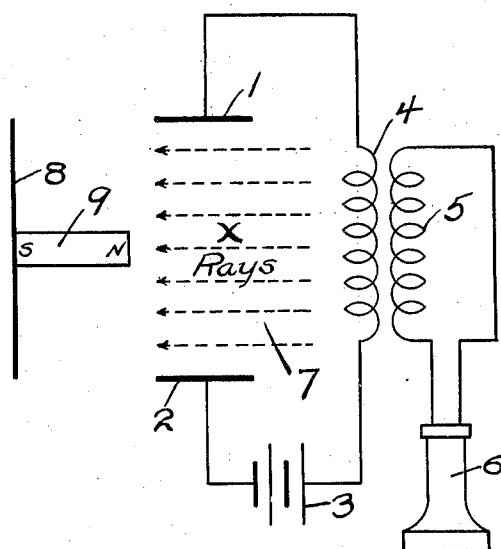
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R. A. ENGLER

TELEPHONE TRANSMITTER

Original Filed Sept. 2, 1919



Inventor.

Richard A. Engler.

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UNITED STATES PATENT OFFICE.

RICHARD A. ENGLER, OF NEW YORK, N. Y.

TELEPHONE TRANSMITTER.

Original application filed September 2, 1919, Serial No. 321,195. Divided and this application filed July 29, 1924. Serial No. 728,974.

To all whom it may concern:

Be it known that I, RICHARD A. ENGLER, a citizen of the United States, and resident of New York city, in the county and borough of Richmond and State of New York, have made certain new and useful Improvements in Telephone Transmitters, of which the following is a specification.

This application is a division of my application Serial #321,195, filed Sept. 2, 1919, for "gaseous telephone transmitters", for which patent was issued Sept. 9, 1924, #1,507,884.

The broad idea is also disclosed in my Patent #1,443,620 of Jan. 30, 1923, filed June 23, 1919.

The object of my invention is to produce a highly sensitive transmitter, one in which a distorting diaphragm is unnecessary and one which utilizes the air not only as the medium for conveying the sound waves, but also as the conducting medium for the electric current and the air path or stream thereby becoming the variable medium of the transmitter for translating the sound waves directly into electrical variations similar to the sound variations.

Other gas than air may also be employed in certain modifications of this transmitter. These transmitters can be made in large as well as small sizes.

This transmitter being so sensitive, serves the ear as the microscope serves the eye.

All the devices as used, shown and described in the gas path of Fig. 1 in the above patent can be used in the gas path herein shown and described.

Referring to the figure forming part of this specification:—

Two electrodes 1 and 2, spaced apart somewhat, are connected in series with a battery 3 and the primary 4 of an induction coil. The secondary 5 of this induction coil is in series with a telephone receiver 6. The space or column of air or gas between the electrodes 1 and 2 is ionized by X rays 7 or the like by which I mean any known means of ionization, excluding the carbon arc proper of course, because this is an old idea, but practically inoperative for obvious reasons. When X rays are used as the ionizing means, then a comparatively low voltage and soft X-ray tube will suffice and only a very small tube need be used. Current can flow either way, that is, from either elec-

trode, with this means of ionization. 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, varying, impeding or throttling means, because the condensation and rarefaction of the air is equivalent to the opening and closing of a valve. The air space or column is spoken to directly without the intervention of a distorting diaphragm. When X rays are used as the ionizing means, then the same source of electric energy can be used for both the X-ray tube and the transmitter path.

Any air disturbing or sound producing means can be placed directly in the conducting air path because there is no heat necessary in the operation of this transmitter, although this is not saying that heat cannot be produced in the path or column of air by the passing of the current or otherwise if heat should be desired in the transmitter variable medium or in the electrodes or both. The current flow also stops the X rays from going beyond the current path. There is nothing which can burn out in the form of transmitter as herein shown and a low voltage can be used as well as high voltage; both of which desirable qualities are not so easily attained when other means of ionization are employed, as it is possible to do and as mentioned in the above patent.

A diaphragm 8 with a small magnet 9 attached to it may serve to vary the air or gas column if desired. The magnet deflects the air path more or less and besides varying the current flow may also cause a new set of sound waves thru the motion of the air column to and fro thus reproducing the original sounds spoken to the diaphragm. The magnet acts upon the air column in a manner similar to the magnet of a telephone receiver acting on the diaphragm. The magnet alone may be used and sound waves can be directed against the ionized path and towards the magnet to vary the current flow. The diaphragm alone may also be used. This transmitter is described in my article on "Gaseous telephone transmitters" in the "Electrical Experimenter" (now Science and Invention) for March 1920 page 1154.

When the receiver 6 is employed as a magneto transmitter, then voice currents will be

superposed on the current flowing thru the air path and thereby cause an effect in the path similar to that of a telephone receiver or other useful result.

5 I do not limit myself to the precise arrangement and equipment shown and described, because the fundamental conditions are so simple that an almost infinite variety of detail is possible without departing from
10 the spirit of my invention or calling forth the inventive faculty.

I claim:—

1. In a telephone transmitter, the combination of a pair of electrodes and an ionized
15 column of air between them, both included in a circuit consisting further of a battery and an induction coil, said ionized air column serving both as the sound wave conveying medium and current conducting medium,
20 the said column of air being directly spoken to to vary the current flow in said circuit.

2. In a telephone transmitter, the combination of a pair of electrodes and an ionized
25 column of air between them, both included in a circuit consisting further of a battery and an induction coil, said ionized air column serving both as the sound wave conveying medium and current conducting medium,
30 the said column of air being directly agitated to vary the current flow in said circuit.

3. The method of producing variations in a telephone transmitter circuit which consists in providing a column of air in said
40 circuit as the variable medium, ionizing said air column and causing said column of air to serve both as the sound wave conveying and current conducting medium and thereby causing said current in said circuit to be
45 varied directly by said sound waves.

4. In a telephone transmitter, the combination of an open ionized air path included
45 in a circuit consisting of a pair of electrodes, a battery and an induction coil, the sound waves directly causing said ionized air path to be varied between said electrodes thereby
50 varying the current flow in said circuit.

5. In a telephone transmitter, the combination of an ionized air stream included in a
55 circuit consisting of a pair of electrodes, a battery and an induction coil, the sound waves directly causing said ionized air stream to be varied between said electrodes thereby varying the current flow in said circuit and varying said air stream.

6. In apparatus of the character described, an air path ionized between electrodes and
60 included in a suitable circuit, said air path conveying both the sound waves and the current, whereby said sound waves are caused to affect said current directly.

7. In apparatus of the character described, an air path ionized between electrodes and
65 included in a suitable circuit, said air path conveying both the sound waves and the

current, whereby said sound waves directly mold said current.

8. In apparatus of the character described, an air path ionized between electrodes and
70 included in a suitable circuit, said air path conveying both the sound waves and the current, whereby said close association causes one to affect the other.

9. The method of producing variations in a telephone transmitter circuit, which consists
75 in providing a column of air in said circuit as the variable medium, ionizing said air column and causing said column of air to serve both as the sound wave conveying and current conducting medium and thereby
80 causing said current in said circuit to be varied by said direct association.

10. In a telephone transmitter, the combination of a pair of electrodes and an ionized
85 column of air between them, both included in a circuit consisting further of a battery and an induction coil, said ionized air column serving both as the sound wave conveying and current conducting medium, the
90 said column of air being directly varied in density to vary the current flow in said circuit.

11. In a telephone transmitter, the combination of a pair of electrodes and an unheated ionized column of air between them,
95 both included in a circuit consisting further of a battery and an induction coil, said ionized air column serving both as the sound wave conveying and current conducting medium, the said column of air being directly
100 spoken to to vary the current flow in said circuit.

12. In a telephone transmitter, the combination of a pair of electrodes and an ionized
105 column of air between them, both included in a circuit consisting further of a battery and an induction coil, said ionized air column serving both as the sound wave conveying and current conducting medium, the
110 said column of air being directly caused to become rarefied and condensed to vary the resistance of said circuit.

13. In a telephone transmitter, the combination of a pair of electrodes and an ionized
115 column of air between them both included in a circuit consisting further of a battery and an induction coil, said ionized air column serving both as the sound wave conveying medium and current conducting medium,
120 the said column of air being vibrated by a diaphragm magnet member, thereby causing a change in current flow in said circuit and an agitation of the surrounding air.

14. The method of producing variations in a telephone transmitter circuit which consists
125 in providing a path of air in said circuit as the variable medium, ionizing said air path and causing said path of air to serve both as the sound wave conveying and current conducting medium and thereby
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causing said current in said circuit to be varied directly by said sound waves.

15. In a telephone transmitter, the combination of a pair of electrodes and a gas or vapor path between them, both included in a circuit consisting further of a battery and an induction coil, said gas or vapor path serving both as the sound wave conveying medium and current conducting medium, the said gas or vapor path being directly spoken to to vary the current flow in said circuit.

16. In a telephone transmitter, the combination of a pair of electrodes and an ionized column of air between them, both included in a circuit consisting further of a battery and an induction coil, said ionized air column serving both as the air wave conveying medium and current conducting medium, the said column of air being directly agitated to vary the current flow in said circuit.

17. In a telephone transmitter, the combination of electrodes and an air path between them, both included in a suitable circuit, said air path being ionized by suitable means and made variable by air waves, whereby the current flow thru said air path is made variable.

18. In a telephone transmitter, the combination of electrodes and an air path between them both included in a suitable electric circuit means for causing said air path itself to become conductive, said air path serving both as the sound wave conveying and current conducting medium, the said path of air being directly varied in density to vary the current flow in said circuit.

19. In a telephone transmitter, the combination of a pair of electrodes and an ionized column of air between them, both included in a circuit consisting further of a battery and an induction coil, said ionized air column serving as the current conducting medium, the said column of air being vibrated by a diaphragm-magnet member, thereby causing a change in current flow in said circuit and an agitation of the surrounding air.

20. In a telephone transmitter, the combination of a pair of electrodes and an ionized column of air between them, both included in a circuit consisting further of a battery and an induction coil, said ionized air column serving as the current conducting medium, the said column of air being

vibrated by a diaphragm-magnet member, thereby causing a change in the current flow in said circuit and causing said air path to vibrate as a second diaphragm.

21. In a telephone transmitter, the combination of a pair of electrodes and an ionized stream of air between them, both included in a circuit consisting further of a battery and an induction coil, said ionized air stream serving as the current conducting medium, the said stream of air being vibrated by a diaphragm-magnet member, thereby causing a change in current flow in said circuit and an agitation of the surrounding air.

22. In apparatus of the character described, the combination of an ionized air path between electrodes and both included in a suitable electric circuit and means for causing magnetic lines of force to become vibratory, said vibrating lines of force causing said air path to become vibratory, said vibration of said air path causing sound waves to be generated.

23. The method of producing electrical variations in a circuit, which consists in causing ionized air waves to pass thru an air column forming part of said circuit.

24. In a telephone transmitter, the combination of a gas or vapor path forming part of a suitable circuit and a diaphragm placed adjacent said gas or vapor path, the vibration of said diaphragm affecting said gas or vapor path and thereby the current flow in said circuit.

25. In a telephone transmitter, the combination of electrodes and an ionized path between them, both included in a suitable circuit, and a magnet located near said path, said ionized path being made variable by directing air waves against said path and said magnet, whereby the current in said circuit is varied, said path conveying both the sound waves and the current.

26. In telephonic apparatus, the combination of electrodes and an ionized air path between them, both connected in a suitable circuit, means for ionizing said air path and means for causing the current flowing in said air path to be affected by superposed variable currents, said air path conveying both the current and sound waves.

Signed at New York city, in the county and borough of Richmond and State of New York this 21st day of July 1924.

RICHARD A. ENGLER.