(No Model.)

H. A. MARTIN.

TELEPHONE TRANSMITTER.

No. 563,935. Patented July 14, 1896.

Fig. 1.

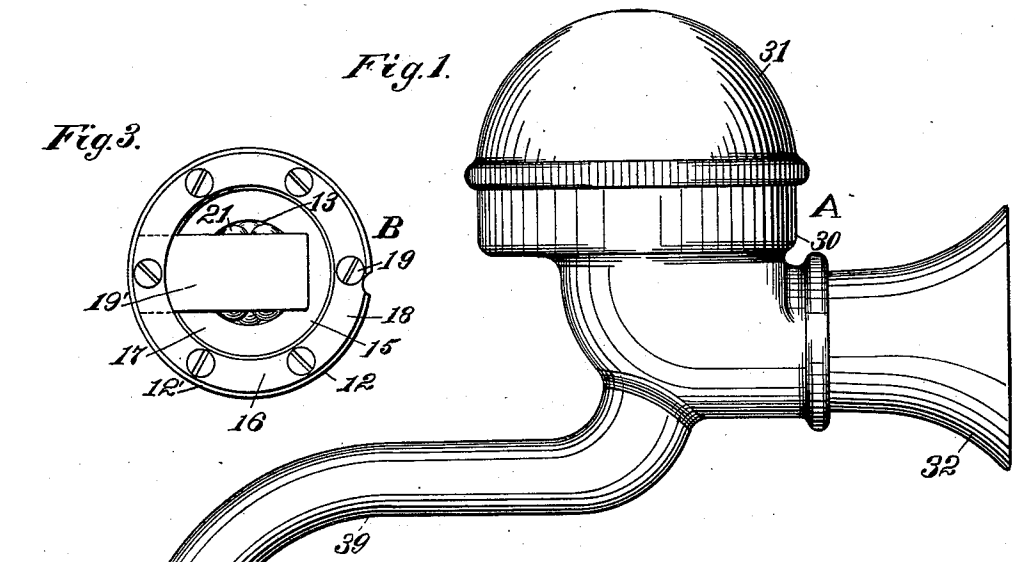


Fig. 3.

Fig. 2.

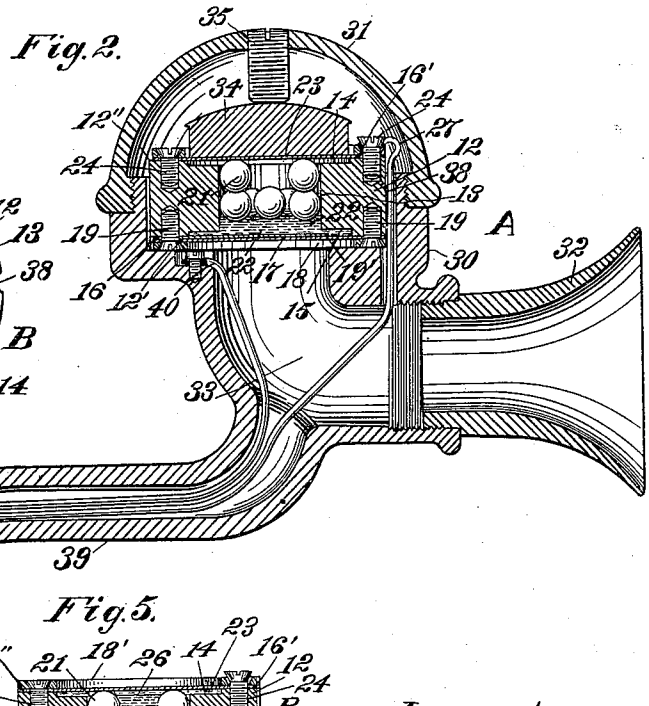


Fig. 4.

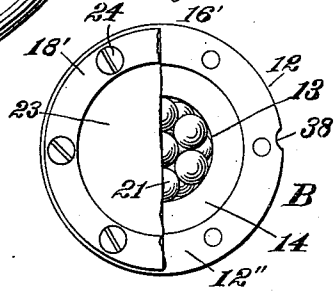
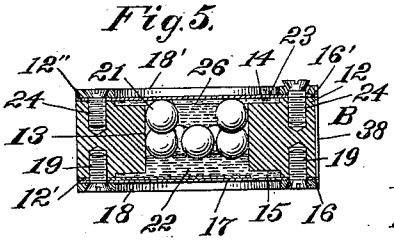


Fig. 5.



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

HENRY A. MARTIN, OF HARTFORD, CONNECTICUT.

TELEPHONE-TRANSMITTER.

SPECIFICATION forming part of Letters Patent No. 563,935, dated July 14, 1896.

Application filed November 13, 1895. Serial No. 568,817. (No model.)

To all whom it may concern:

Be it known that I, HENRY A. MARTIN, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Telephone-Transmitters, of which the following is a specification.

This invention relates to transmitters for electric speaking-telephones; and the object thereof is to provide an instrument of this class simple in construction and operative to transmit vocal tones with a high degree of accuracy, while such tones will have a wide range of variation.

A further object of the invention is to provide an instrument of this class which will be effective for transmitting low and weak tones, and which will also effectively prevent the rattling usually present in such instruments when subjected to loud noises.

A further object of the invention is to provide an instrument of this class which will be operative with an electric current of extremely high voltage, whereby the instrument is serviceable where the ordinary devices now in use are not operable, owing to electrical disturbances.

In the drawings accompanying and forming part of this specification, Figure 1 is a side view of a casing for holding this transmitter, having the usual speaking-tube secured thereto, together with a suitable conduit for carrying the circuit-wires. Fig. 2 is a vertical transverse section thereof, showing a transverse sectional view of the transmitter in position therein. Fig. 3 is a bottom view of the transmitter removed from its casing. Fig. 4 is a top view of the same with a part of the upper diaphragm or conducting-plate removed to show the interior of the transmitter. Fig. 5 is a transverse sectional view of a somewhat different construction of transmitter likewise removed from its casing.

Similar characters of reference designate like parts in all the figures of the drawings.

This improved transmitter, in the preferred form thereof herein shown and described, comprises a chambered body, a sound-wave diaphragm or plate secured thereto, an independent, movable contact or conducting member or members carried by said body and in operative connection with the diaphragm, and means, also carried by said body, for cushioning the movable members and in operative engagement with the conducting members and the sound-wave diaphragm.

In the preferred form shown the chambered body comprises, preferably, a circular casing or box 12, having substantially horizontal faces 12′ and 12″ and an opening or recess 13, likewise preferably circular, extending therethrough, from face to face thereof, and constituting the chamber of the body. The horizontal faces of this casing or box 12 are preferably provided with recesses 14 and 15, concentric with the recess 13, forming thereby annular rims 16 and 16′. Secured to one face of the body, as 12′, by any suitable means, is a sound-wave diaphragm or plate 17, constructed of any suitable material, preferably of mica, and in the construction shown the diaphragm is secured to the rim 16 of the casing or box 12 by means of a clamping-ring 18 and suitable fastening devices—such as screws 19—whereby the diaphragm 17 extends across the recess or opening 13 and the recess 15 and forms one wall of the chamber 13, and by means of such recess is permitted to have greater play than it otherwise would have if in engagement with the casing adjacent to the wall of the recess 13. It is obvious, however, that the body of the transmitter may be of any desired shape or size, and that the chamber thereof may likewise be of any formation adapted for the purpose, and that instead of forming the recesses 14 and 15 and rims 16 and 16′ the diaphragm 17 may be separated from the face of the body by means of a rubber or other ring, or other suitable device, inserted between said diaphragm and said face, and through which the fastening devices can project. A suitable narrow plate or strip of conducting material 19′, preferably of platinum, is secured between said diaphragm 17 and the face 12′ of the body, and is in operative engagement with the inner side of said diaphragm, and has its free end extending into the chamber 13. This strip of platinum is secured in position, preferably by one of the fastening devices 19, which secures the diaphragm in position, and by means of which strip the current is carried to the contact members, as hereinafter set

forth. It will be understood, however, that the sound-wave diaphragm may be constructed of conducting material and the platinum dispensed with.

Within the chamber 13 of the body B a suitable number of independent and movable conducting or contact members are disposed, which in the form shown consist of a series of carbon balls 21, approximately filling said chamber. As a means for supporting and also for cushioning these contact members and keeping them constantly in engagement with each other and with the conducting-plate, hereinafter described, a suitable conducting material is carried in said chamber, and, in the preferred construction shown, is supported upon the sound-wave diaphragm 17 and strip of platinum 19′, and preferably consists of a fluid which will entirely or partially overcome the force of gravity of the conducting members 21, and preferably mercury 22, into which the carbon balls are partially submerged more or less, and which fluid will therefore be intermediate of the diaphragm and conducting members 21, whereby said conducting members will be out of direct contact with said diaphragm, and by means of which the carbon balls will be cushioned in their movements, and a constant contact made, one with the other, and with the means for completing the circuit between said carbon balls and the wire. The means for completing the circuit between said balls and the electric wire, in the construction shown, consists of a suitable removable conducting plate or diaphragm 23, preferably of metal, secured to the rim 16′, adjacent to the face 12″, by a clamping-ring 18′ and suitable fastening devices—such as screws 24—in a substantially similar way to that described for securing the sound-wave diaphragm 17 in place, whereby a closed chamber is formed within the body of the transmitter.

In the construction shown in Fig. 5 the space above the supporting and cushioning material 22 is filled with a modifying or controlling substance, which, in practice, preferably consists of a conducting substance, and entirely fills the otherwise free space between the diaphragm 17 and plate 23 of the transmitter, and whereby the floating members 21 are steadied and the action of the instrument improved. In practice, this modifying means consists of a preferably lighter fluid than the main cushioning material 22—such as glycerin 26—although it will be understood that any other suitable material might be used for this purpose. By means of this particular construction the carbon balls are approximately totally submerged in the fluid and cushioned therein.

It will be understood that any suitable means may be provided for securing and holding the transmitter in position relatively to the other parts of the device; but in the preferred form shown the same consists of a suitable inclosing casing A, comprising a chambered base 30 and an inclosing cap 31, removably secured to said base 30 in any suitable way—such as by screw-threads. Leading from this chambered base 30 to the usual mouthpiece 32 is a channel or passage 33. The transmitter is placed in position within this chambered base 30 with its sound-wave diaphragm 17 in position adjacent to the end of the passage 33 and in position to be vibrated when the mouthpiece is used.

As a means for holding said transmitter in said casing A, and also as a means for regulating the contact of the floating members relatively to each other and to the plate 23, a suitable block 34 rests on said plate 23 inside the clamping-ring 18′, and is engaged by an adjusting device—such as a screw 35—adjustable in the inclosing cap 31, and by means of which screw and block an adjustment of the contact members relatively to each other and to the conducting-plate 23 can be made.

One of the wires of the circuit has its terminal 40 adjacent to the clamping-ring 18 of the face 12′, whereby the current will pass through the strip of platinum 19, and the other wire of the circuit has its terminal preferably constituting one of the fastening devices 27 of the clamping-ring 18′, and is guided by a groove 38 in the periphery of the body B to the opposite face 12″ thereof. The wires are shown conducted from said transmitter by means of a conduit 39.

In the use of this transmitter it will be obvious that the rattling, usually present in devices of this character, will be obviated, owing to the number of contact-points of the floating members 21; that is to say, said floating members being independently movable and covering a substantially large area one or more of said members will be in position to make constant contact with each other and with the metal plate 23, and will therefore always be in position to regulate and permit constant undulations of the current when the sound-wave diaphragm is vibrated, and hence, if one or more of such independent members move out of position to make the proper circuit, said circuit will be made by some one or more of the other members, and the continuity of the current thereby remaining unbroken, even though some of the members 21 may be separated from each other or from the metal plate 23. Furthermore, the cushioning or supporting material 22 acts to take up any unnecessary vibration of the floating carbon members, and also acts to modulate any unnecessary vibration of the diaphragm, and the relatively lighter material 26 surrounding the carbon members 21 acts to steady and cushion the same. In view also of the particular construction of this transmitter it has been found by experiment that the same can be used with a current of high voltage, whereby it can be employed in those places where the ordinary electric lines have been found im-

practicable—such, for instance, in certain tunnels—owing, it is believed, to the electrical disturbances found in such places. It is believed that these electrical disturbances, being mainly due to the fact that the devices heretofore in use have been practically inoperative with currents of high voltage, could be overcome if a device operating with a relatively large amount of current could be obtained.

Having thus described my invention, I claim—

1. The combination of a chambered body; a diaphragm; a series of independently-movable conducting members in the chamber of said body and removed from direct contact with said diaphragm; and conducting fluid in said chamber intermediate said conducting members and diaphragm, and acting as a cushioning means for said movable members and diaphragm.

2. In a device of the class specified, the combination of a chambered body; a diaphragm; a series of independently-movable conducting members in the chamber of said body and removed from direct contact with said diaphragm; conducting fluid in said chamber intermediate said diaphragm and movable members, and acting as a cushioning means for said diaphragm and conducting members; and conducting material intermediate said diaphragm and fluid.

3. The combination of a chambered body; a diaphragm; a movable member in the chamber of said body and remotely disposed relatively to said diaphragm; and mercury intermediate said diaphragm and movable member and acting as a cushioning means for said movable member and diaphragm.

4. The combination of a chambered body; a diaphragm; a movable member in the chamber of said body; and two fluids in said chamber substantially surrounding and supporting the movable member and forming contact with the diaphragm.

5. The combination of a chambered body, a diaphragm, a movable member in the chamber of said body; and two non-mixable conducting fluids in said chamber, one of said fluids being supported by and resting on the other fluid.

6. The combination of a chambered body, a diaphragm, a series of independently-movable conducting members in said chamber; and conducting fluids of relatively different gravities also in said chamber, one of said fluids being intermediate of said conducting members and diaphragm.

7. In a device of the class specified, the combination of a chambered body, a diaphragm, a series of independent and movable conducting members in said chamber; a relatively heavy conducting fluid in said chamber intermediate of said conducting members and diaphragm; a relatively lighter conducting fluid also in said chamber and surrounding said movable member; and conducting means in operative engagement with said movable members.

8. The combination of a chambered body; a diaphragm; a series of independently-movable conducting members in the chamber of said body and remotely disposed relatively to said diaphragm; and conducting fluid comprising mercury and glycerin in said chamber, one fluid resting upon and supported by the other.

9. In a telephone-transmitter, the combination of a chambered body having a diaphragm secured thereto, and forming one of the walls thereof; a conducting plate or strip secured between said diaphragm and body, and movable with said diaphragm; conducting members in said chamber; a relatively heavy conducting fluid intermediate of said conducting members and diaphragm; a relatively lighter fluid in contact with said movable members and with said relatively heavy conducting fluid; and a conducting-plate in operative engagement with said movable members, and forming another wall of said chamber.

10. In a telephone-transmitter, the combination with an inclosing casing, of a transmitter adapted to be seated therein, and comprising a chambered body having a sound-wave diaphragm secured thereto; conducting fluid in said chambered body, and a series of independent and movable conducting members carried thereby; a conducting-plate in operative engagement with said movable members; a block seated on said plate; and a screw secured to the casing, and operative to engage said block to adjust said plate relatively to the movable members.

11. In a telephone-transmitter, the combination with an inclosing casing comprising a base and a removable cover; of a transmitter adapted to be seated therein, and comprising a chambered body having a sound-wave diaphragm secured thereto; conducting fluid in said chambered body, and a series of independent and movable members carried thereby; a conducting-plate secured to said body, and in operative engagement with said movable members; and means carried by said removable cover, for adjusting said conducting-plate relatively to the movable members.

12. In a telephone-transmitter, the combination with a chambered body; of a sound-wave diaphragm secured thereto, and forming one of the walls of said chamber; a conducting strip or plate secured between said diaphragm and said body, and movable with said diaphragm; conducting-fluid in said chambered body; a series of independent and movable conducting members carried by said fluid; and a conducting-plate in operative engagement with said movable members, and forming another wall of said chamber.

13. In a telephone-transmitter, the combination with a chambered body; of a sound-wave diaphragm secured thereto; conducting fluid in said chamber; a series of carbon

balls in said chamber; a relatively lighter conducting fluid in contact with said carbon balls; and a conducting-plate secured to said body, and in operative engagement with said carbon balls.

14. In a telephone-transmitter, the combination with a chambered body; of a sound-wave diaphragm; conducting fluid in said chamber; a series of carbon spheres in said chamber; a relatively lighter fluid, also in said chamber and in contact with said carbon spheres; and conducting means in operative engagement with said carbon spheres.

15. In a telephone-transmitter, the combination with a chambered body; of a sound-wave diaphragm; mercury in said chamber and supported on said diaphragm; a series of independent and movable conducting members carried by said mercury; and a conducting device or plate in operative engagement with said conducting members.

16. In a telephone-transmitter, the combination with a chambered body; of a sound-wave diaphragm secured to said body; conducting material secured in position between said diaphragm and body, and extending into said chamber; mercury in said chamber; a series of carbon balls in said chamber; glycerin, also in said chamber and in contact with said carbon balls; and a conducting-plate secured to said body and in operative engagement with the carbon balls.

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