(No Model.)

H. V. HAYES.

ELECTRIC CIRCUIT CHANGING APPARATUS.

No. 456,817. Patented July 28, 1891.

Fig. 1.

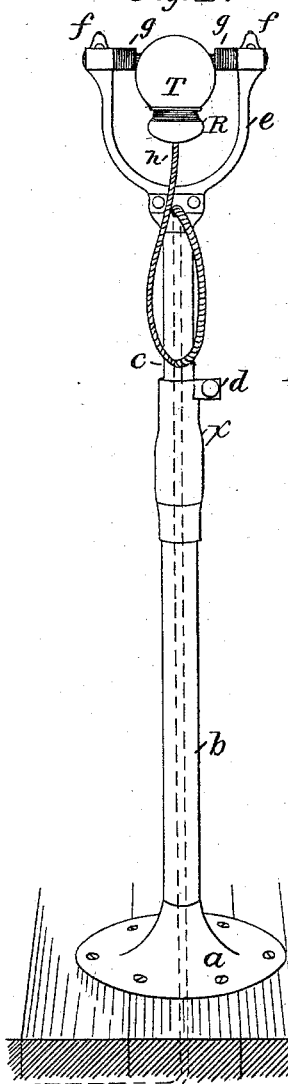


Fig. 2.

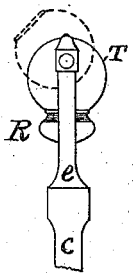


Fig. 3.

Fig. 4.

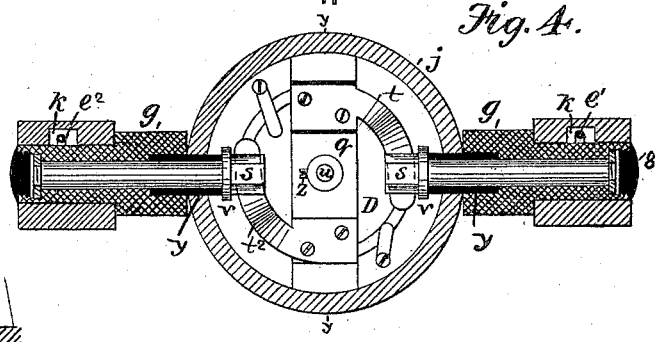


Fig. 6.

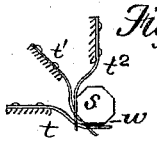
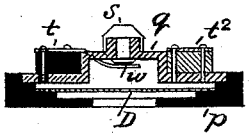


Fig. 5.



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ELECTRIC-CIRCUIT-CHANGING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 456,817, dated July 28, 1891.

Application filed February 3, 1891. Serial No 379,955. (No model.)

To all whom it may concern:

Be it known that I, HAMMOND V. HAYES, residing at Cambridge, in the county of Middlesex and State of Massachusetts, have invented certain Improvements in Electric-Circuit-Changing Apparatus, of which the following is a specification.

This invention relates to electric speaking-telephony, and comprises a new and efficient circuit-changing switch, a combination of said switch with an electric circuit and apparatus, and, more specifically, in the combination of said switch with the telephonic apparatus described and illustrated in this specification.

The apparatus as a whole was designed as a marine telephonic outfit, and is intended for use on ships as a means of communicating orders or instructions and other necessary messages between the bridge and other parts of the ship. It is of course not restricted to such use, but is of such character and construction as to be conveniently employed under varying circumstances and conditions.

In the drawings which illustrate this specification, Figure 1 includes a perspective view of the characteristic telephonic instrument and its supporting-standard at one end of the circuit and a diagram of the entire circuit. Used as a marine set, the instrument shown would be the one located on the bridge, any suitable form of instrument being adapted for use at the other station or stations of the circuit. Fig. 2 is a detail of the instrument shown in Fig. 1, indicating in full lines the resting position and in broken lines the ordinary working position of the transmitting-instrument. Fig. 3 is a vertical section of the upper part of Fig. 1. Fig. 4 is a plan view of the transmitter and its supporting-pivots on the line $x\,x$ of Fig. 3, looking down on the back of the diaphragm, the rear wall of the transmitter being cut away. Fig. 5 is a cross-section on the line $y\,y$ of Fig. 4, looking toward the right. Fig. 6 is a detail indicating the operation of the circuit-changing switch.

At one of the stations of a circuit a telephone-standard b, having a base a, is secured to any suitable foundation A, such as a plank floor. It is tubular, and through it are led the two wires 5 and 6 of the circuit, which, passing downward, lead to the other station X of the circuit, where 5 unites with 6 to close the circuit, the transmitting and receiving telephones T^2 and R^2 and the transmitter-battery B being included in said circuit.

The instruments T and R at A are hung in pivotal sockets g in the fork made by the two arms e of an extension-tube c, supported at any required height in a friction-sleeve x, surmounting the main tube b and secured by the clamping-screw d. The two arms of the fork also are tubular and convey the conductors of the circuit respectively to the transmitter T, while the receiver R, which, as shown, is placed when at rest in the transmitter mouth-piece in such a way as to protect and close the said mouth-piece, and its own ear-piece is connected with the circuit by means of a flexible cord h, which incloses its two conductors.

The receiving-telephone is grasped, when acting as the mouth-piece cover, by springs n, which hold it in place. These are preferably three in number, and are shown in Fig. 3, one in full and a second in broken lines, while the third is supposed to be cut away. When the receiver is withdrawn for use, the transmitter can be turned upward on its pivots, preferably into the position indicated in broken lines in Fig. 2, although it is evident that it can be used at positions both higher and lower than that shown, as more clearly indicated in Fig. 6, where a spring t, assumed to be one terminal of the transmitter proper, may by elevating the mouth-piece be taken from the position of rest, where it lies upon the non-conducting face w of the polygonal bar end s, and caused to connect successively with the conducting-faces of said bar, as shown at t' t^2, and so on. This arrangement enables me to provide, in the manner presently to be described, the necessary circuit-changing switch which constitutes one part of my invention.

The transmitter T, which includes the working parts of the switch, is spherical in general form and is composed of a heavy back plate j, to which the working parts are attached, and a front inclosing shell l, within which the mouth-piece m is mounted. The diaphragm D is secured to a properly perforated and shouldered insulating-plate p, and controls in

a manner well understood a variable-resistance button, which is secured rearwardly upon the metal bar q in any preferred way.

The transmitter-case is provided on each side with a non-conducting sleeve y, rigidly secured thereto, and the said sleeves are journaled and are capable of revolving within recesses formed in non-conducting blocks g, which are held in the extremities of the forked arms e. The said sleeves y in turn form journals for and, when moved, revolve round cylindrical metal bars r and r^2, which at one end are immovably fixed within the said blocks g, but which project through the sleeves y and into the transmitter-case, where they terminate in polygonal heads s, to which reference has hereinbefore been made.

In apparatus actually made and now in use the outer ends of the bars r are squared and pass through square holes in plates 7, which are also square, which plates are let into square recesses cut into the ends of the blocks g, the hollowed ends being finally closed by screw-plates 8. In addition to this, connection-screws 9 are screwed into the substance of the rods r from their upper surface, and to these the circuit-conductors are attached. One of the main wires 5, passing up the main tube b, may be for convenience terminated in a binding-screw 2, but is extended therefrom by wire e', through one arm of the fork to the screw 9, connecting with bar r on one side. From a similar binding-screw 1 a similar extension-wire leads through the opposite arm of the fork to the screw 9, connecting with bar r^2 on the other side. The terminal screws 1 and 2 are both located in a chamber at the base of the fork, and I prefer to place a third screw 3 there also as a terminal for the main wire 6. The receiving-telephone conductors inclosed within the flexible cord h are conveniently attached to the binding-screws 1 and 3. The respective conductors e' and e^2 in the arms of the fork are brought at their ends round the blocks g in channels k, as shown in Fig. 4, and are attached to the binding-screws 9, which may then, if desired, be inclosed by a suitable cap f, and it is by means of this connection that the polygonal heads s constitute the actual terminals of the circuit with which the transmitter forms connection. These polygonal heads may have any preferred number of sides, and I have shown eight. One of these is formed of or faced with non-conducting material, as shown in Figs. 3, 5, and 6, and if at any time the transmitter-terminal rests on the non-conducting facing the circuit is opened, while, *per contra*, the circuit is closed if the said terminals rest upon any one of the conducting sides.

The bar q, to which the rear side of the current-varying button is affixed, carries two contact-springs, which project from it and take a direction concentric with the line of the outer casing j, as specially shown in Fig. 4. These constitute the instrument-terminals. One of them t is insulated from the metal of the bar, while the other t^2 is fastened directly thereto. A wire w' connects the spring t with the front plate of the variable resistance V, and the spring t^2 connects, through the substance of the bar with the back plate thereof. The spring t is bent and brought into strong pressure contact with the several sides of the polygonal head s of the bar r, and the spring t^2 is brought into like contact with the head of the other arm r^2, both heads being provided with a ring v, which holds in place the non-conducting sleeve y, and by the pressure of the spring ends upon the surfaces of the polygonal bar ends the circuit is led through the transmitter.

The insulated or non-conducting side w is that on which the contact-spring presses when the instrument is not being used and hangs mouth-piece downward, as in Figs. 1, 2, and 3, the circuit thus being open and the battery relieved from work.

The receiver R being lifted and the transmitter T being raised for use, the springs t and t', forming the movable elements of the switch, rotate round the ends of the bars which form the fixed element of the switch, making contact successively with the several non-conducting faces or sides of the polygon, and the circuit is completed and ready for work when the springs rest on any one of the said faces, and by this means the working or resting position of the transmitter determines the completing or breaking of the circuit.

Fig. 3 indicates that the heads of both bars r and r^2 are provided with the circuit-changing switch which I have described; but with the circuit arrangement shown and described this is not required, as it is sufficient to open and close the circuit at one point.

The present arrangement of circuits dispenses with an induction-coil, the battery-current flowing over the main circuit, in which both receiver and transmitter are also included.

Should the same apparatus be associated with an induction-coil, it is obvious that both switch-contacts would then be useful, one of which would control the primary and the other the secondary circuit of the transmitter.

I am not necessarily restricted to the insulation of but one of the sides or faces w of the bar ends, and, if desired, one or more additional sides may be made non-conducting.

The polygonal cross-section of the end of the bars forming one member of the switch is adopted simply in order that when the transmitter is raised for use it may have a tendency to stay where placed, this tendency being due to the pressure of the spring on the flat face. Aside from this the bar end may be of circular cross-section, and for miscellaneous use the switch may be so made. Nor is it essential that the bar end should be the fixed and the spring the movable element of my switch. It is within the spirit of my invention to fix the actuating part of the switch (in this instance the telephone-instrument) to

the bars, which then would be adapted to rock in the sleeves *y*, and to attach the springs *t* to a fixed block, in which case the bar-surface would move under the springs instead of the springs moving over the bar-surface.

The receiver, as shown, is of ordinary construction.

Having now fully described my invention, I claim—

1. The combination, with an electric circuit and an instrument connected therewith, the said instrument being hung or journaled on bars which project thereinto, constituting terminals of the said circuit and adapted to be placed in one position when employed and in another when unemployed, of an electric-circuit-changing switch controlling the connection of said instrument with said circuit having fixed and movable elements, the fixed elements being the said projecting ends of the said bars which constitute the said circuit-terminals, one or both of said bar ends having in their circumferential surface a non-conducting section, and the movable elements consisting of contact-springs fixed to the instrument and constituting the terminals thereof, the free ends of said springs being in pressure contact with the circumferential surface of the said fixed elements and adapted to rest on the conducting-section thereof when the instrument is in its resting position and to revolve about the same and to make contact with the conducting portion thereof when the instrument is moved to its working position, substantially as described.

2. The combination, substantially as hereinbefore described, of a telephone-transmitter, a forked standard support therefor, conducting-bars mounted in the arms of said fork and projecting into the said transmitter through non-conducting sleeves and serving as journals or pivots therefor on which the said transmitter is adapted to be swung from its resting to its working position, and vice versa, circuit-conductors leading, respectively, through the arms of said fork and forming connection with said conducting-bars, and a circuit-changer operated by the transmitter when moved, comprising the ends of said conducting journal-bars, one of which has a non-conducting circumferential section, and springs carried by said telephone-transmitter constituting its terminals and adapted in the resting position thereof to make contact with the said non-conducting portion and in all other positions to make contact with the conducting portion of said circumferential surface and thereby to close the circuit.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 30th day of January, 1891.

HAMMOND V. HAYES.

Witnesses:
GEO. WILLIS PIERCE,
V. M. BERTHOLD.