

(No Model.)

W. L. RICHARDS.
ELECTRIC TELEPHONE.

No. 521,220.

Patented June 12, 1894.

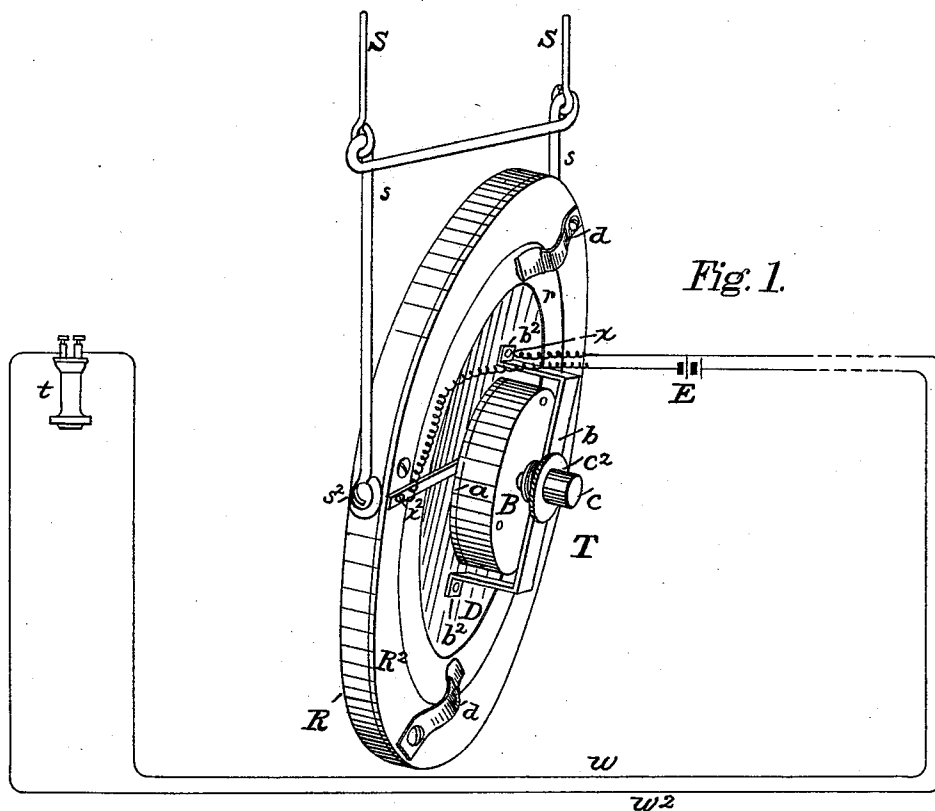


Fig. 1.

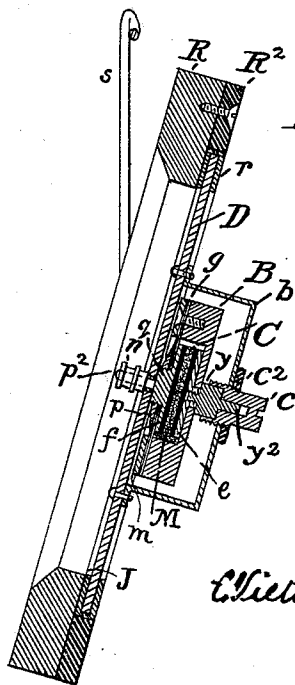
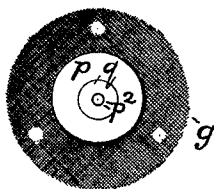


Fig. 2.

Fig. 3.



Attest.

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ELECTRIC TELEPHONE.

SPECIFICATION forming part of Letters Patent No. 521,220, dated June 12, 1894.

Application filed December 14, 1893. Serial No. 493,660. (No model.)

To all whom it may concern:

Be it known that I, WILTON L. RICHARDS, residing at Malden, in the county of Middlesex and State of Massachusetts, have invented certain Improvements in Telephones, of which the following is a specification.

This invention relates to current varying transmitters in which the variable resistance medium is a mass of finely divided carbon or other conducting material held between two electrodes; and more particularly to that class of instrument in which the said medium is contained in a chambered block, technically known as a "button."

For the transmission of music as from an orchestra, or from a chorus upon a theater stage, it has been found necessary to employ a transmitter so designed that, while extremely sensitive to sounds originating at some distance from the instrument, it shall at the same time remain uninjured by powerful tones originating in its immediate vicinity. Transmitters for this class of work must moreover be so constructed that while competent to respond perfectly and faithfully to the relatively feeble tones of such instruments as the violin, they will not be adversely or abnormally affected by the sounds produced by more powerful instruments such as drums, or the heavy wind instruments of a brass band. In addition to these requirements it is also desirable that in the operation of such a transmitter all tones of its own shall be suppressed, so that there shall be no resonance or sympathetic vibration of the transmitter as a whole, or of any of its parts.

The object of this invention is to provide a transmitter in which the above requirements are met. To this end, I employ slate as the material for the casing and side wall of the variable resistance button, and thereby am enabled to form a button which remains efficient through a wide range of temperature; and I mount the front or vibratory electrode of the said button on a supporting disk of fine gauze, and thereby am enabled to maintain an equal air pressure on both sides of the said electrode. I also provide a comparatively large vibratory diaphragm of wood, and mount the same in a frame likewise preferably of wood, which is stiffened and enabled

to preserve its shape by a ring of brass or other metal secured thereto. The said wooden diaphragm is preferably encircled by a rubber band, and is retained in place by spring pressure, much in the same way as is the diaphragm of the Blake transmitter.

In the drawings which accompany and illustrate this specification, Figure 1 is a perspective view of an instrument embodying these features, and meeting the above stated requirements; and the transmitter is shown as being in an electric circuit including a source of current and a receiving telephone. Fig. 2 is a central cross section of such a transmitter; and Fig. 3 is a detail showing the outer side of the front or vibratory electrode, secured to the flexible gauze disk, and provided at its center with a bolt whereby it is adapted to be attached to the diaphragm center.

Referring to the drawings a frame R of wood is stiffened and maintained in shape by a metal ring R², screwed or otherwise fastened to its back surface; and may be flared as shown on one side, and shouldered on the other to form a ring seat for the diaphragm.

D is a comparatively large diaphragm of wood encircled by the rubber band r in a manner well understood, and retained in said ring seat by the dampening springs d, in much the same way that is employed in holding the diaphragm of the well known Blake transmitter. I have found a diaphragm having a width of three and one half inches to operate satisfactorily.

The remaining operative portions of the transmitter are combined in a button of the same general type as that which is described and claimed in Letters Patent granted to Anthony C. White, November 1, 1892, No. 485,311, but differing in some degree structurally, and being mounted in an essentially and radically different manner.

The external appearance of the button B is indicated by Fig. 1, and its internal parts appear in section in Fig. 2. As the transmitter is, in the use for which it is primarily designed, subjected to great variations in temperature, due both to the current employed in its operation and to the heat from the lights which illuminate the stage it has been

found useful to employ slate as the material for the button casing, and for the side wall of the containing chamber formed in the interior of said button. Accordingly, I employ
 5 a casing of that material and form in one side thereof the cavity C to serve as a containing chamber for the finely divided conducting material which serves as a current changer or variable resistance. Secured to the rear
 10 surface of the chamber C is the fixed or back electrode *e*, which is conductively united to a metal nipple *y* extended through the back of the slate casing and terminating in a socket pin *y*². The front or vibratory electrode
 15 *f* is secured to the center of the inner surface of a flexible or resilient disk *g*, which in turn is clamped by a metal ring and suitable screws to the front edge of the slate casing. Both electrodes are disks of carbon,
 20 but other material such as metal may, if desired, be employed. Electrodes of brass may for example be used, and should preferably be plated with gold. The containing chamber C is thus provided with a circumferential
 25 side wall of slate, with a rigid and conducting rear wall formed by the fixed electrode and with an elastic and conductive front wall formed by the vibratory electrode.

The current changing material M is placed
 30 within the chamber C, and is a finely divided or granulated conducting substance; carbonized anthracite being preferably employed.

In order that the pressure of the air may be equal on both sides of the front electrode,
 35 I form the flexible disk *g* of extremely fine wire gauze, and between the under surface thereof, and the surface of the slate casing to which it is secured, a very thin washer of porous paper is preferably interposed which
 40 serves as a cushion without materially hindering the sufficient passage of air. The said gauze disk *g* supports the front electrode, and completely closes the front of the chamber, retaining the granular conducting material
 45 in the said chamber between the electrodes. The said disk *g* is secured to the front electrode by means of a clamping plate *p* on its reverse side which is screwed to a stud *q* attached to the back of said electrode and projecting through the center of the disk. The
 50 stud *q* by means of a small bolt *p*² forming a continuation thereof passing through the center of the diaphragm and secured on the outer side thereof by nuts *n* in a manner well understood, serves also to attach the front electrode, and thereby the button B as a whole
 55 to the said diaphragm so as to participate in its vibrations. A light metal bridge *b* mounted by its feet *b*² on the diaphragm spans the back of the button B and a screw socket *c* adjustable by a jam nut C² is carried at its center, and delicately supports the socket pin *y*² of the button as shown. It will be evident
 60 therefore that the compound button B instead of being immovably secured by the attachment of its casing to rigid frame portions of the instrument as is the case in the princi-

pal example of the White patent before mentioned, is mounted wholly but loosely upon the diaphragm itself; and that the light bridge
 70 *b* and its socket connection *c* serve merely to support it in place, and to aid in preserving perfect parallelism of the electrodes.

The instrument when in use may, as shown, be suspended by a light stirrup *s* from cords
 75 or chains, or wires S, the said stirrup engaging with hooks, pins, or screws *s*² fixed on the frame ring R. One of the circuit wires *w* is to be connected with the front, and the other *w*² with the back electrode. Any metal strip
 80 or ribbon *x*² extending from the metal clamping plate *p* to the frame may be used to establish the front electrode connection, while the wire *w*² may be attached at *x* to the bridge foot *b*² as shown, or, if preferred, the said wire
 85 may be attached, (say by soldering) directly to the nipple *y* which projects through the back of the button casing. The said wires *w* and *w*² are shown as forming the circuit of a source of current E such as a voltaic battery, which
 90 circuit includes the transmitter button B and a telephone receiver *t*. Considering now the compound button B with reference to its mounting, it is evident that the front electrode is rigidly attached by means of nuts to
 95 the wooden diaphragm, while the back electrode rests in its support on the frame and is comparatively loose. The results of the operation of the instrument are therefore largely due to the inertia of the slate casing,
 100 and probably to a considerable extent also to the simple agitation of the granular carbon contained in the button.

Having now fully described my invention, I claim—

1. In a telephone transmitter a hollow
 105 block of slate forming the casing and side walls of the resistance containing chamber, said block containing a fixed electrode at the rear of said chamber, a vibratory electrode
 110 mounted and adapted to vibrate within the front opening of said chamber, and finely divided conducting material placed within said chamber and between said electrodes, substantially as described.

2. In a variable resistance button for a transmitting telephone, the combination of a hollow block of slate forming the casing and side wall of the resistance containing chamber; a fixed electrode secured within said
 120 chamber and forming its rear wall or floor; a vibratory electrode mounted and adapted to vibrate within the front opening of said chamber; finely divided conducting material placed within said chamber, and between
 125 said electrodes; and a disk of fine wire gauze supporting the said vibratory electrode secured to the front of the casing and closing the said containing chamber; substantially as specified.

3. The combination in a telephone transmitter of a diaphragm, a variable resistance button mounted wholly upon said diaphragm, and a light back support also mounted on
 130

said diaphragm and delicately holding said button in place, substantially as described.

4. The combination in a telephone transmitter, of a wooden diaphragm; a chambered button having front and back disk electrodes, a slate casing and side wall, and finely divided conducting material contained therein mounted as a whole on said diaphragm and having its front electrode attached to the center thereof; and a support also mounted wholly on said diaphragm, and engaging delicately with the rear of the said button and adapted to hold it in place substantially as specified.

5. In a telephone transmitter a diaphragm of wood held in place by spring pressure only; combined with a hollow button mounted thereon, the said button comprising a block of slate forming the casing and side wall of a containing chamber, a carbon disk secured therein and serving as the fixed electrode, a vibratory electrode secured to a flexible disk of wire gauze clamped to the front of said containing chamber, the said electrode being attached also to the center of the said wooden diaphragm and adapted to participate in the vibrations thereof; granular conducting material inclosed in said chamber; and a rear support for said button; substantially as described.

6. The combination in a telephone transmitter with the diaphragm, of a compound variable resistance button comprising a mass of finely divided conducting material in a loose or free state and a containing chamber therefor, having a fixed back electrode, a slate side wall and a vibratory electrode or front plate mounted on a flexible disk of fine wire gauze, and attached to the diaphragm center so as to vibrate therewith, and a support holding the said compound button in place, and itself mounted on the diaphragm, substantially as described.

7. The combination in a telephone transmitter with a diaphragm of wood held in place by spring pressure only; of a compound variable resistance button comprising a mass of finely divided conducting material in a loose or free state, and a containing chamber there-

for, having a fixed back electrode, a slate side wall, and a vibratory electrode or front plate mounted on a flexible disk of fine wire gauze, and attached to the diaphragm center so as to vibrate therewith; and a support holding the said compound button in place, and itself mounted on the diaphragm substantially as described.

8. A granular carbon transmitting telephone comprising a frame or ring seat; a diaphragm, a chambered button containing granulated carbon mounted on said diaphragm and having a casing and side wall of slate for the said chamber, a rear wall of carbon constituting the fixed electrode and a front wall of carbon secured to a flexible disk of fine wire gauze forming the vibrating front electrode, the said gauze being clamped to the slate side wall, and the said front electrode being secured to the diaphragm center to vibrate therewith, and a light bridge also mounted on the diaphragm and delicately supporting the same, substantially as described.

9. A granular carbon transmitting telephone comprising a frame or ring seat of wood; a diaphragm of wood held in the said seat by spring pressure; a chambered button containing granular carbon mounted on said diaphragm and having a casing and side wall of slate for the said chamber, a rear wall of carbon constituting the fixed back electrode and a front wall of carbon secured to a flexible disk of fine wire gauze forming the vibratory front electrode, the said gauze being clamped to the slate side wall, and the said front electrode being secured to the diaphragm center to vibrate therewith; and a light bridge also mounted on the diaphragm and spanning the said button and delicately supporting the same, substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 12th day of December, 1893.

WILTON L. RICHARDS.

Witnesses:

GEO. WILLIS PIERCE,
VICTOR M. BERTHOLD.