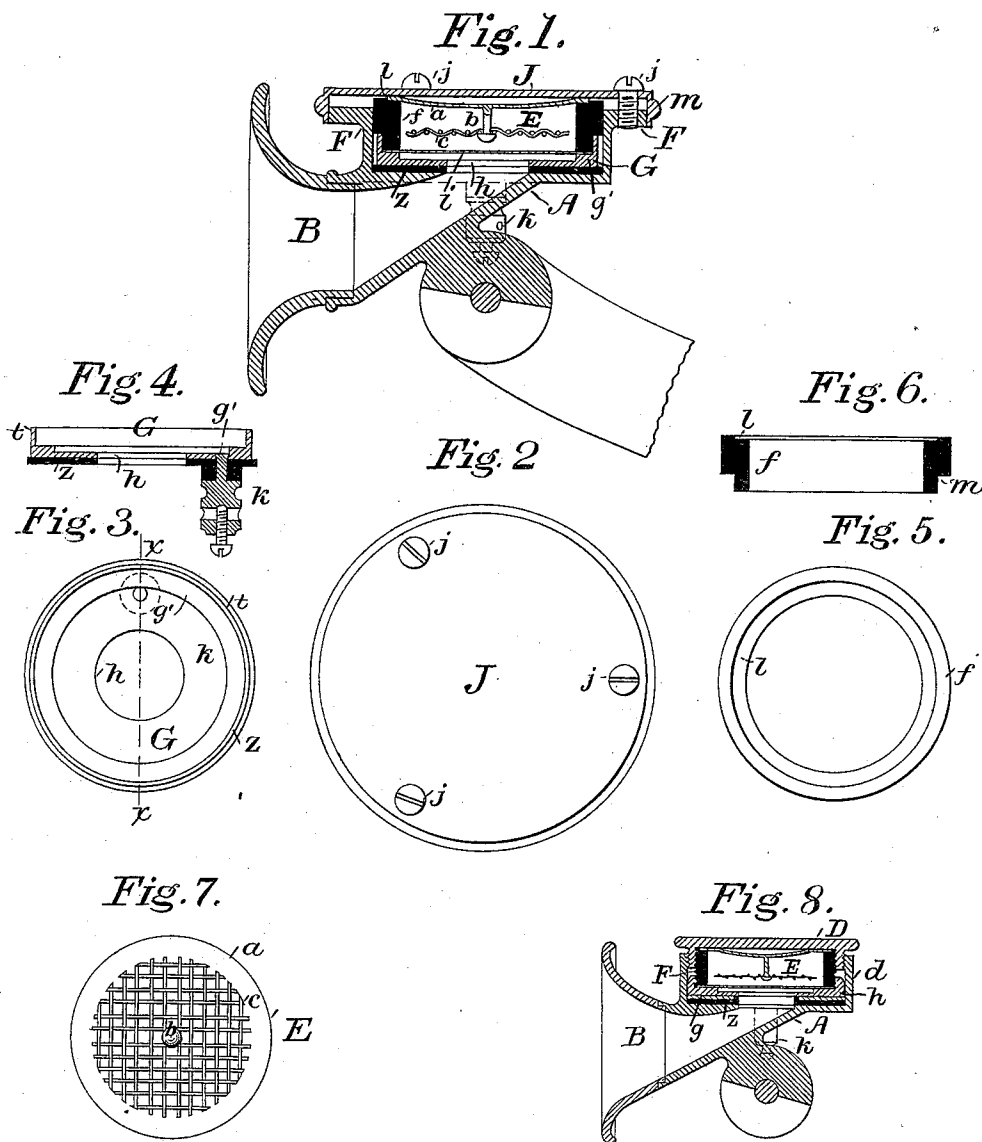


(No Model.)

F. BLAKE.
TELEPHONE TRANSMITTER.

No. 357,452.

Patented Feb. 8, 1887.



Witnesses.

Wm. Lockwood
Geo. Willis Pierce,

Inventor.

Francis Blake.

UNITED STATES PATENT OFFICE.

FRANCIS BLAKE, OF WESTON, ASSIGNOR TO THE AMERICAN BELL TELEPHONE COMPANY, OF BOSTON, MASSACHUSETTS.

TELEPHONE-TRANSMITTER.

SPECIFICATION forming part of Letters Patent No. 357,452, dated February 8, 1887.

Application filed November 19, 1886. Serial No. 219,377. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS BLAKE, of Weston, in the county of Middlesex and State of Massachusetts, have invented certain Improvements in Telephone Transmitters, of which the following is a specification.

My invention relates to that class of battery-telephones which are popularly known as "transmitters," and refers, especially, to the species wherein the resistance of a mass of granulated conducting material inclosed in a chamber between two conducting-electrodes is varied by the vibrations of a horizontally-mounted diaphragm or vibrating plate constituting or supporting one of the said electrodes, the whole being included in the circuit of a voltaic battery. These variations develop the necessary and corresponding changes in the current of the said battery, and, passing to any suitable telephone-receiver conductively or inductively, included also in the same circuit, effect therein a reproduction of the sound which originally actuated the transmitting-diaphragm. In the practical operation of these transmitters it has been found very convenient to construct them in a compact and portable form which may be readily mounted upon a suitable support. It is also advantageous to so construct these instruments that the several elements or parts thereof may be interchangeable, whereby when any one is out of order it can be replaced with facility by another, dispensing with the necessity of changing the complete outfit, or even of removing the ordinary adjustable supporting-arm.

In accordance with these views, the object of my invention is to meet the above requirements and to consolidate the operative parts of the transmitter into a simple combination of few elements readily attachable and detachable, perfectly interchangeable, and of such simplicity as to require no special degree of expertness in its care or management, while it shall at the same time be easy and economical in construction and repairs. These objects I achieve by the construction which I shall hereinafter describe; and to this end my invention consists, especially, in the peculiar shape of the different parts of the transmitter, and in

the mode of combining the same with a single instrument.

Transmitters of this general class are usually mounted in an external metal case having a flat perforated base, the perforation extending downward into a speaking-tube having a flaring mouth-piece. The said case, as a whole, may be mounted in any preferred way, but is usually adjustably affixed to a supporting-arm, and this general construction so far as described I prefer to adopt.

In the drawings, which illustrate and form a part of this invention, Figure 1 is a vertical cross-section of a transmitter showing my invention. Fig. 2 is a plan view of the inclosing-cap thereof. Figs. 3, 4, 5, and 6 are plan and cross-section views of details. Fig. 7 is a plan view of one form of pendulous or back electrode; and Fig. 8 is a cross-section (for purposes of comparison) of the construction employed to some extent prior to my invention.

I will first describe the latter construction.

In the construction shown in Fig. 8, which, as stated, has heretofore been experimentally adopted, the operative parts comprise the external metallic case, A, having an upward extending circular flange, *d*, threaded internally near its edge, and having a central aperture in its base, which aperture expands into a speaking-tube or mouth-piece, B, the walls of which may be cast or otherwise made integral with the body of the case, as in Fig. 8, or which may be separately made and mechanically attached thereto, as in Fig. 1. An annular metal plate, *g*, faced on its under side with insulating material *z*, and having also a central opening or aperture, is placed within the case and lies upon the inner surface of the base thereof, but is not in electrical connection therewith, being insulated by the non-conducting partition *z*. A binding-screw, *k*, is attached thereto, and passes through a side hole in the floor of the case, constituting one terminal of the transmitter.

The detachable portion of the transmitter is then made as follows: A ring, F, of insulating material, is threaded on its exterior periphery, and has its upper edge slightly countersunk to

form a seat for the flange of the pendent electrode E, which projects downwardly into the ring, and when complete and ready for operation into the granulated material. An annular plate, *h*, closed at its lower side, with the exception of a central perforation, has a shoulder cut on the inner surface of the portion surrounding the said perforation, upon which shoulder the diaphragm is supported, and which aids in forming below the diaphragm an air-space or vocalizing-chamber. This plate has a flanged edge threaded with a female screw, and after the disk of platinum foil constituting the vibrating diaphragm is placed upon the flat shoulder cut therein the non-conducting ring F is screwed down thereon, clamping the edge thereof. The pendent electrode is then seated in the countersink, the granulated material filled in, and the inclosing cap or cover D, which has its flange threaded on both outside and inside surfaces, is screwed down upon the insulating-ring, as shown, to hold the electrode in place, the inner thread being adapted to engage with the screw on the outside of the insulating-ring, while the outer thread is adapted to engage with a female screw cut on the inner surface of the flange *d* of the metal frame or external case A. The whole, by means of the external thread on the outer side of the cap-flange, may then be attached to the standard transmitter frame or holder, the pendent electrode being connected with the circuit through the cap, case, and supporting-arm. This construction has been found unsatisfactory in some respects, it is comparatively costly and intricate, requires considerable skill and a high class of workmanship in manufacture, while the number and necessary fineness of the screw-threads is disadvantageous, and even with the greatest care it is a fact that the threads frequently strip, especially that one which is cut on the outside of the insulating-ring. Moreover, it is most essential that the fragile platinum diaphragm shall be kept free from wrinkling, and it has been found that the action of screwing the parts together is apt to wrinkle and otherwise damage the same. The construction I have devised is, on the contrary, severely simple, very cheap, and is held together solely by machine-screws.

I adopt the same general form of outer case, A, and mouth-piece B. The inclosing-case is bored out true, and has a horizontal flange, F, at the edge of the cavity. A bed-plate, G, (shown in detail in Figs. 3 and 4,) is provided, consisting of a circular perforated metal base-plate, *h*, with a shoulder, *g'*, and an upwardly-projecting flange, *t*, at its outer edge. A binding-screw, *k*, forming one of the transmitter-terminals, is attached to the plate, and a non-conducting partition, *z*, is affixed to the lower face of the said plate for the purpose of insulating it from the inclosing-case. The platinum-foil diaphragm *i* is placed in this bed-plate and seated upon the shoulder *g'*, the vocalizing-chamber being thus formed between

the said diaphragm and the lower part, *h*, of the base-plate, the circular perforation of the said plate being the inner termination of the mouth-piece or speaking-tube. I provide next a non-conducting ring, *f*, formed as shown in Figs. 5 and 6, having a shoulder, *m*, turned to fit snugly in the flange *t* of the plate G, and being also countersunk at *l* to form a seat for the pendent electrode E. The lower edge of this ring is inserted in the cavity of the plate G and clamps the edge of the diaphragm without subjecting the same to the twisting or distorting motion inseparable from a screw-connection. The electrode E, of any customary or suitable construction, may then be inserted, its edge lying in the seat *l*, provided therefor. The variable resistance material being now filled in a manner well understood, the entire appliance, as a whole, may be placed in the inclosing-case, the binding-screw passing through the hole at one side of the floor thereof, but being insulated therefrom by partition *z*. I finally provide a cap-piece, J, fitted to the external case, and having a flange, *n*, overlapping the same. This cap makes contact with the electrode E and connects the same electrically with the metal case and supporting-arm, and through the said arm with the electric circuit. It is secured to the flat flange F of the case by any desired number of machine-screws *j*. I have shown three as being both convenient and symmetrical. Small bolts and nuts may of course be alternately used.

The outer peripheral boundary of the insulating-ring *f*, which forms the non-conducting wall of the inner chamber, is turned to fit exactly the bore of the external case, and it will be seen that by this construction a compact instrument is very economically furnished, which possesses the several advantages I have hereinbefore described.

I do not desire to claim herein any feature relative to the form, character, or position of the electrodes, or the combination of the electrodes with the resistance-varying medium, as I am aware that these features are not new. The essence of my invention lies in the construction of a skeleton transmitter, the several parts of which are extremely simple, accessible, economical, and easily taken apart and put together, the whole being held in place, when put together, by a small number of machine screws or bolts and nuts.

I claim—

1. The combination, substantially as hereinbefore described, in a telephone-transmitter, of the flanged external case and mouth-piece attached thereto, the diaphragm-seat mounted therein, but insulated therefrom, the non-conducting ring fitted to the inner surface of the inclosing-case, surmounting the said diaphragm-seat and adapted to clamp the diaphragm, and the cap-piece attachable to the external case and adapted to hold the several elements together by means of machine-screws, as specified.

2. In a telephone-transmitter of the class

herein specified, the metal external case, the insulated diaphragm-seat with circuit-terminal attached thereto, the vibrating diaphragm, the non-conducting clamping-ring adapted to fit within the inclosing-case, and also to the insulated diaphragm-seat, the pendent or fixed electrode mounted upon the upper edge of the said non-conducting ring, and the surmounting cap in contact with the said electrode and attached to the metal inclosing-case by machine-screws or their equivalents, whereby the parts are securely held in place, and whereby the fixed electrode is electrically included through the inclosing-case and support in the voltaic circuit, substantially as described.

3. The combination, in a telephone-transmitter, of the shouldered diaphragm-seat, the diaphragm mounted therein, and the non-conducting ring accurately fitting the upwardly-projecting flange of said diaphragm-seat and adapted to clamp the edge of said diaphragm and to hold the same in place, and to serve also as the non-conducting side wall of the operating-chamber, as specified herein.

4. In a telephone-transmitter of the class hereinbefore described, the flanged external

case, A, and mouth-piece B, combined with the surmounting cap-piece J, attached to the flange of the said case by the machine-screws j, or their equivalent, as herein specified.

5. The herein-described skeleton transmitter, comprising the external flanged metal case with mouth-piece attached to the base thereof, the diaphragm-seat adapted to be in the floor of the metal case, but insulated therefrom, the non-conducting ring or gland fitted in the external case and adapted to clamp the diaphragm in its seat, the back electrode hung from the edge of the said insulating-ring, and the cap-piece with flanges adapted to overlap the horizontal flanges of the metal case, the said cap-piece surmounting the whole and being electrically connected with the metal case by machine-screws, as herein specified.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 17th day of November, 1886.

FRANCIS BLAKE.

Witnesses:

THOS. D. LOCKWOOD,
GEO. WILLIS PIERCE.