N. BALDWIN.

TELEPHONE RECEIVER.

APPLICATION FILED JULY 1, 1909.

957,403.

Patented May 10, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

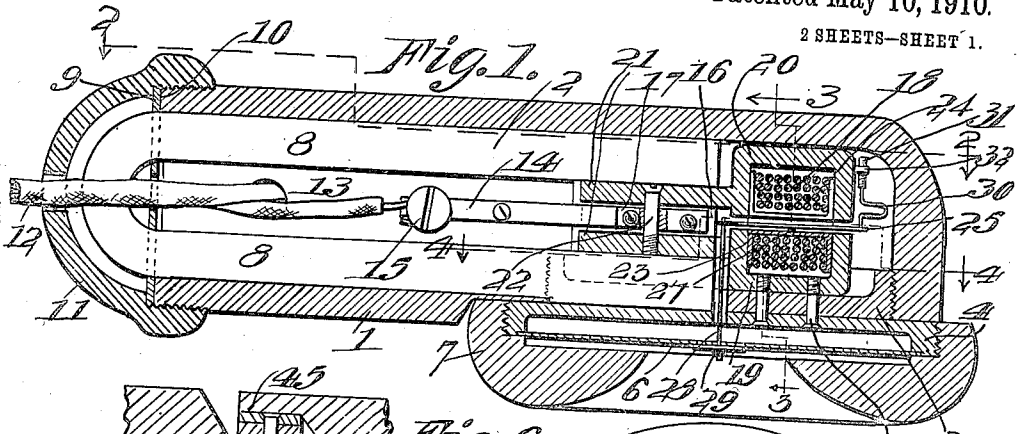


Fig. 6.

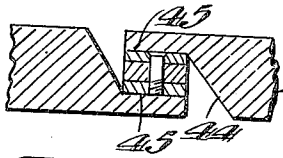


Fig. 2.

Fig. 3

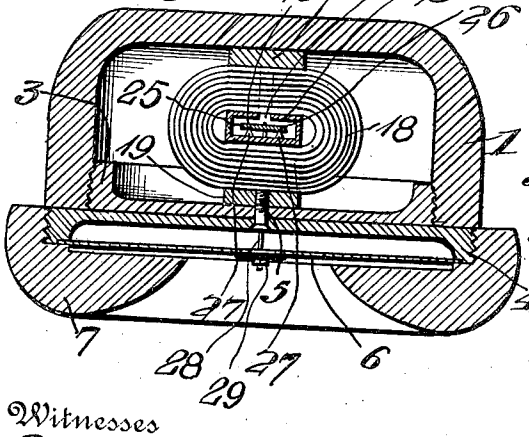
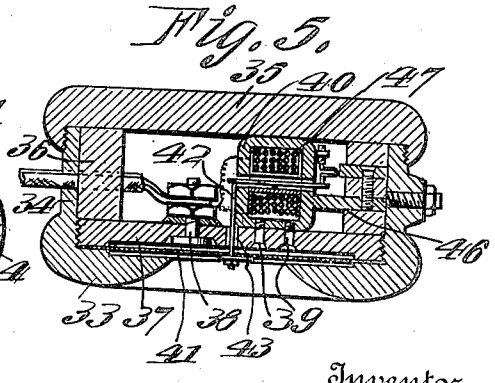


Fig. 5.



Witnesses

E. P. Z. Brown.

E. O. Hatton

Inventor

Nathaniel Baldwin,

by A. Williamson & Co

Attorneys

N. BALDWIN.

TELEPHONE RECEIVER.

APPLICATION FILED JULY 1, 1909.

957,403.

Patented May 10, 1910.

2 SHEETS—SHEET 2.

Fig. 4.

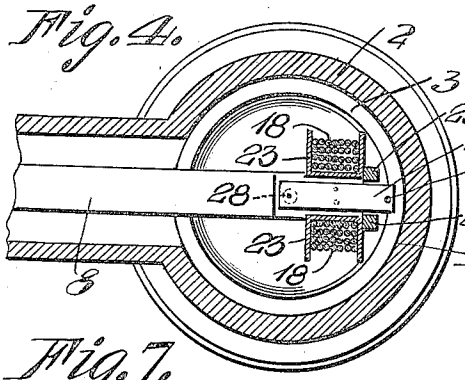


Fig. 9.

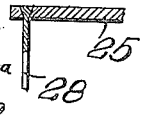


Fig. 10.

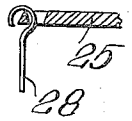


Fig. 11.

Fig. 7.

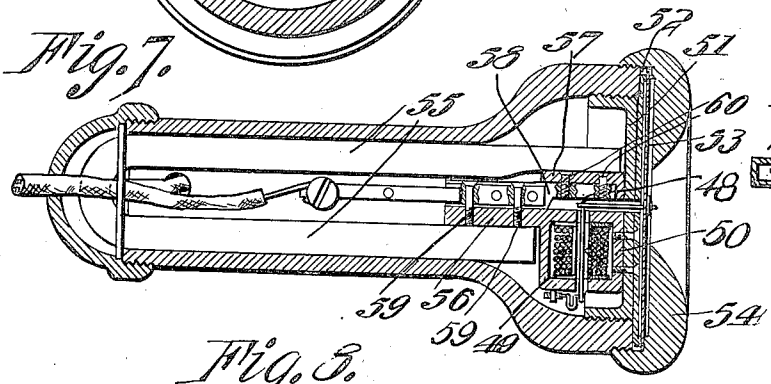


Fig. 12.

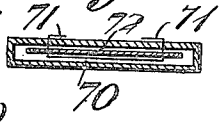


Fig. 8.

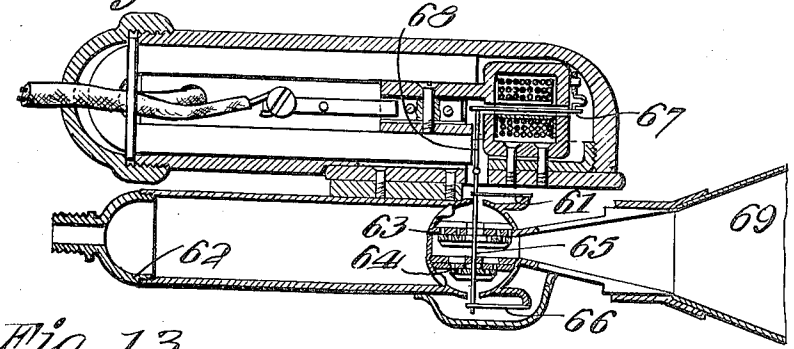
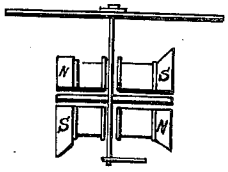


Fig. 13.



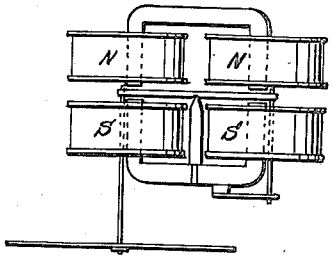
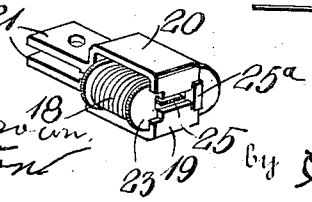


Fig. 14.

Fig. 15.



Witnesses

L. O. Hilton

Inventor

Nathaniel Baldwin,

by A. Bruesonco

Attorneys

UNITED STATES PATENT OFFICE.

NATHANIEL BALDWIN, OF HEBER, UTAH.

TELEPHONE-RECEIVER.

957,403. Specification of Letters Patent. Patented May 10, 1910.

Application filed July 1, 1909. Serial No. 505,478.

To all whom it may concern:

Be it known that I, NATHANIEL BALDWIN, a citizen of the United States, residing at Heber city, in the county of Wasatch and State of Utah, have invented certain new and useful Improvements in Telephone-Receivers; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to sound reproducing devices of the telephone receiver type.

The object of the invention is to provide a simple, and efficient instrument of this type adapted for common battery or magneto telephone systems and for use in connection with such instruments as the telegraphone, acousticon, wireless telephone and sound amplifiers, and to provide an instrument for such purposes which will be extremely sensitive to actuating current changes.

Another object is to provide a spool for the actuating coil which will not permit counter currents of the transformer type.

Another object of the invention is to use a single spool or winding and yet obtain the combined magnetic action of four pole pieces upon the vibrating armature.

With the foregoing and other objects in view, the invention consists of certain novel features of construction, combination and arrangement of parts, as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawings, Figure 1 is a longitudinal sectional view of the receiver employing side ear piece; Fig. 2 is a detail section taken on line 2—2 of Fig. 1; Fig. 3 is a detail section taken on line 3—3 of Fig. 1; Fig. 4 is a detail longitudinal section on line 4—4 of Fig. 1; Fig. 5 shows a sectional view of a circular receiver; Fig. 6 is a fragmentary detail view showing the connection of the permanent magnet used in Fig. 5 with its pole pieces; Fig. 7 is a longitudinal sectional view of a receiver with the usual external shape; Fig. 8 is a longitudinal sectional view of a magnetic telephone connected to an amplifying device of the type illustrated in my application, Serial No. 450,798; Figs. 9, 10 and 11 show detailed modified forms of the connection between the transmission wire and the armature; Fig. 12 shows a modified form of pivoting the armature; Fig. 13 is a modified form of receiver arrangement, showing an armature surrounded by an actuating coil without the use of a fulcrum; Fig. 14 shows a pivoted armature which is not surrounded by the coils; Fig. 15 is a detail elevation of the permanent magnet terminals and the coil shown in Fig. 1.

Referring to the drawings, and particularly to Fig. 1, 1 represents the shell or casing of the receiver which is hollowed out at 2 and internally threaded to receive the cup-shaped attaching device 3 to which the ear piece ring 4 is secured by screws 5. The diaphragm 6 is mounted between the ear piece ring and the ear piece 7 and preferably has surrounding its periphery, the usual insulating and cushioning rubber ring, not shown herein. As shown in Fig. 4, the cup 3 is provided with a longitudinal slot through its rim and body which is entered by one leg of the permanent magnet 8. It will thus be seen that the permanent magnet when locked in the casing, as will now be described, prevents the rotation and consequent loosening of the cup 3. Both legs of the permanent magnet 8, are passed through a non-magnetic disk 9, which overlies the end of the receiver and is held in position against the shoulder 10, by means of a closing cap 11. This disk is apertured to permit the passage of conductor cords 12, and limits the inward movement of the magnet, so that its position in the casing is properly regulated and its engagement with the poles of the permanent magnet assured. Intermediate the legs of the magnet 8, there is positioned an insulating bar 13, which carries the contact plates 14, one on each side thereof, and each of the binding screws 15, to which the terminals of the receiver circuit are connected. An extension of this bar 13, or a supplemental bar 16, extends farther along and carries the terminal plates 17, one on either side, which are engaged by the contact plates 14, and are in turn connected to the opposite ends of the winding 18, of the electromagnet. This winding of this magnet, as shown in Fig. 3, is oval in shape and has the pole pieces of the field magnet 19 and 20, located on either side, overhanging the coil at the ends and provided with extending arms or legs 21, which lie on either side of the extension or auxiliary bar 16, and between and in contact with the legs of the permanent magnet 8.

The arms or legs 21, of the pole pieces are secured to the bar 16, by a screw bolt 22,

which is prevented from unscrewing or becoming disengaged from the arms and bars by the legs of the permanent magnet. These pole pieces support the winding of the magnet which is formed upon a non-magnetic spool or flanged tube 23, which is flattened out so as to have an oblong channel therethrough for a purpose which will be hereinafter described. As shown in Fig. 3, the tube is slotted at 24, upon its upper side and its ends separated so as to prevent counter currents from effecting the magnetization of the armature 25. This spool is held in proper position by blocks 25ª, which are secured to the spool at each end and fit into recesses formed in the pole pieces 19 and 20. This armature is provided on its underside with a pair of sockets 26, in which are seated the needle point fulcrum members 27, projecting upwardly from the tube 23 and adapted to support the armature in balanced position in the tube. One end of the armature is connected to the diaphragm 6 by what will hereinafter be called a transmission wire, 28, which passes through the lower arm 21, of the pole members and through the apertures formed in the cup and ring 3 and 4. An adjusting nut 29, connects the transmission wire with the diaphragm and the opposite end of the armature is balanced against the tension of the diaphragm by an adjusting spring 30, which has one end seating in a socket in the center of the armature at its rear end and its opposite end seated in a socket formed in the end of an adjusting screw 31, which is threaded into a lug 32, projecting laterally from the forward portion of the upper pole piece 20. The screws 5, which hold the ring and cup together also enter threaded apertures in the lower pole piece 19 and prevent any lateral movement of the electromagnet. It will be seen that in this form, the permanent magnet with its contact strips 14, may be readily removed from the receiver and that the entire device may be removed from the casing afterward by simply unscrewing the cup 3 from the casing. In Fig. 5 the ear piece 33, and the casing 34, are made integral and a closing cap 35, is threaded upon the back thereof so as to hold the circular magnet 36 in place. In this instance, there is secured in the casing an insulated or non-magnetic disk 37, to which the contacts of the receiver terminals are secured by screws 38, and to which the electromagnet pole pieces are secured, by screws 39. The armature 40, is connected to the diaphragm 41, by the transmission wire 42, which passes through an aperture 43, in the plate 37, and is adjustably connected to said armature in the usual manner. Each end of the permanent magnet is sheared off at 44 so as to form separated shoulders 45, which rest over the arms 46, of the pole pieces 47.

In Fig. 7, the armature 48, is arranged transversely to the length of the receiver in a coil similar to that shown in Figs. 1 and 5 which is incased or held as usual between the pole pieces 49 and 50, the latter pole piece being supported upon the cup-shaped ring 51, screwed into the casing of the receiver and forming an abutment for the diaphragm supporting ring 52. This ring supports the diaphragm 53, and the diaphragm is held in position as usual by the ear piece screwed upon the outside of the casing. The pole pieces 49 and 50 are formed somewhat differently from the types illustrated in Figs. 1 and 5, but both have extending arms which engage the permanent magnet 55. The short leg of the magnet engages the arm 56 and the long leg of the magnet engages the arm 57, while the insulating terminal support 58, is secured thereto by screws 59 and 60.

In Fig. 8, the construction of the magnetic telephone is the same as that shown in Fig. 1 with the exception that the ring or cup has secured to it a supporting disk 61 to which is connected the compressed air chamber or tube 62. This tube has a peculiarly arranged or constructed valve which is more clearly shown in my pending application Serial No. 450,798, and comprises a pair of valve seats 63 with apertures therein controlled by simultaneously operated valves 64 both connected and held in parallelism by a valve rod 65 which is held in normal position by the springs 66. These valves are so arranged that the air pressure on the upper valve tends to open the valves and the pressure on the lower valve tends to close the valves. The upper valve presents a larger area to the air pressure than the lower valve. Consequently there is a resultant pressure tending to open the valves. This resultant pressure is balanced by the spring 30, shown in Fig. 1 which is properly adjusted by the screw 31. Normally a current of air under pressure is passing from the air chamber 62, through the double valve system which is slightly open, and issues from the horn quietly in a steady stream. As the valve rod 65, is connected directly to the armature 67, by the transmission wire 68, it will be seen that the opening of the valves is varied in accordance with the operation of the armature, and when the armature is vibrating, the air issues from the horn in pulsations which give rise to sound waves corresponding to the original sound waves which are directed into the transmitter of the circuit. The sound thus produced corresponds to the original sound in every particular except that the loudness will be increased according to the size and structure of the valves and the pressure of the air.

In Figs. 9, 10 and 11, there is shown three forms of securing the transmission wire to

the armature. In Fig. 9, a wedging hole is shown in the armature and the transmission wire has its end upset therein. In Fig. 10, a hooked end is formed upon the transmission wire which over-hangs a knife point fulcrum and in Fig. 11, a socket is formed in the armature and a needle point fulcrum end is formed on the transmission wire.

In the modification shown in Fig. 12, the tube 70, is apertured to receive the ends 71, of a supporting loop which passes through the armature 72, and supports the same. In this form, the supporting loop is adapted to flex sufficiently to permit the operation or oscillation of the armature. The same may be said of the transmission wire shown in Fig. 9.

Figs. 13 and 14 are inserted to illustrate possible modifications of the arrangement of the armature and winding. If it be desirable to obtain a stronger field magnet for any special purpose, the permanent magnet may be replaced by an electromagnet.

By using the fulcrum shown in Fig. 12 and having the suspending wire or loop firmly secured in the armature and in the tube, and by securing the transmission wire firmly and properly in the armature and in the diaphragm, the spring adjusting device 30, 31 and 32, may be omitted.

From the foregoing description, taken in connection with the accompanying drawings, the construction and operation of the invention will be readily understood without requiring a more extended explanation.

Various changes in the form, proportion and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of the invention, as defined in the appended claims.

Having thus described my invention, what I claim is:

1. A telephone receiver comprising a permanent magnet, an electromagnet, a centrally pivoted armature operated by the electromagnet, means connecting one end of the armature to the diaphragm of the receiver, and means to balance the armature against the tension of the diaphragm.

2. A telephone receiver comprising a permanent magnet, an electromagnet, a centrally pivoted armature adapted to be operated by said electromagnet, a connection between one end of the armature and the diaphragm, and a flexible device for maintaining the balance of the armature.

3. A telephone receiver comprising a permanent magnet, an electromagnet, a centrally pivoted armature operated by the electromagnet, a diaphragm for said receiver, an adjustable connection between the diaphragm and one end of the armature a spring for balancing the armature against the tension of the diaphragm, and means to adjust the spring.

4. A telephone receiver comprising a casing, a permanent magnet mounted therein, an apertured disk through which the legs of the magnet pass, said disk adapted to engage the casing, and a cap clamping the disk against the casing.

5. A telephone receiver comprising a casing, a cup threaded therein, an electromagnet carried by the cup, a balanced armature mounted within said magnet, a diaphragm carried by the casing, a connection between the armature and diaphragm, and adjustable means to flexibly maintain the armature in balanced position within the magnet.

6. A sound reproducing device of the telephone receiver type comprising a field magnet, double pole pieces for said field magnet, one limb of each pole piece acting upon one end of an armature and the other limb of each pole piece acting upon the opposite end of said armature, an electro-magnet, a split non-magnetic casing within said electro-magnet, a fulcrum member therein the core of said electro-magnet having freedom of oscillation about said fulcrum within the winding, said core constituting or being identical with said armature, a diaphragm, and means for transmitting the vibratory motion of said armature to said diaphragm.

7. A sound reproducing device of the telephone receiver type comprising a casing, a field magnet mounted therein, a disk mounted upon the fold of the magnet adapted to engage the casing, and a cap clamping the disk against the casing.

8. In a sound reproducing device of the telephone receiver type, a non-magnetic metallic spool for the winding having a slot in one side for preventing counter currents in the spool.

9. A sound reproducing device of the telephone receiver type comprising a casing, a permanent magnet mounted therein, a cup threaded therein, pole pieces of the permanent magnet carried by the cup, an electromagnet carried by said pole pieces, the core of said electro-magnet constituting an armature pivotally mounted within the spool of winding, a diaphragm carried by the casing, a connection between the armature and diaphragm, and adjustable means to flexibly maintain the armature in balanced position within the spool of winding.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

NATHANIEL BALDWIN.

Witnesses:
LAVINA MURDOCK,
MALINDA MOULTON.