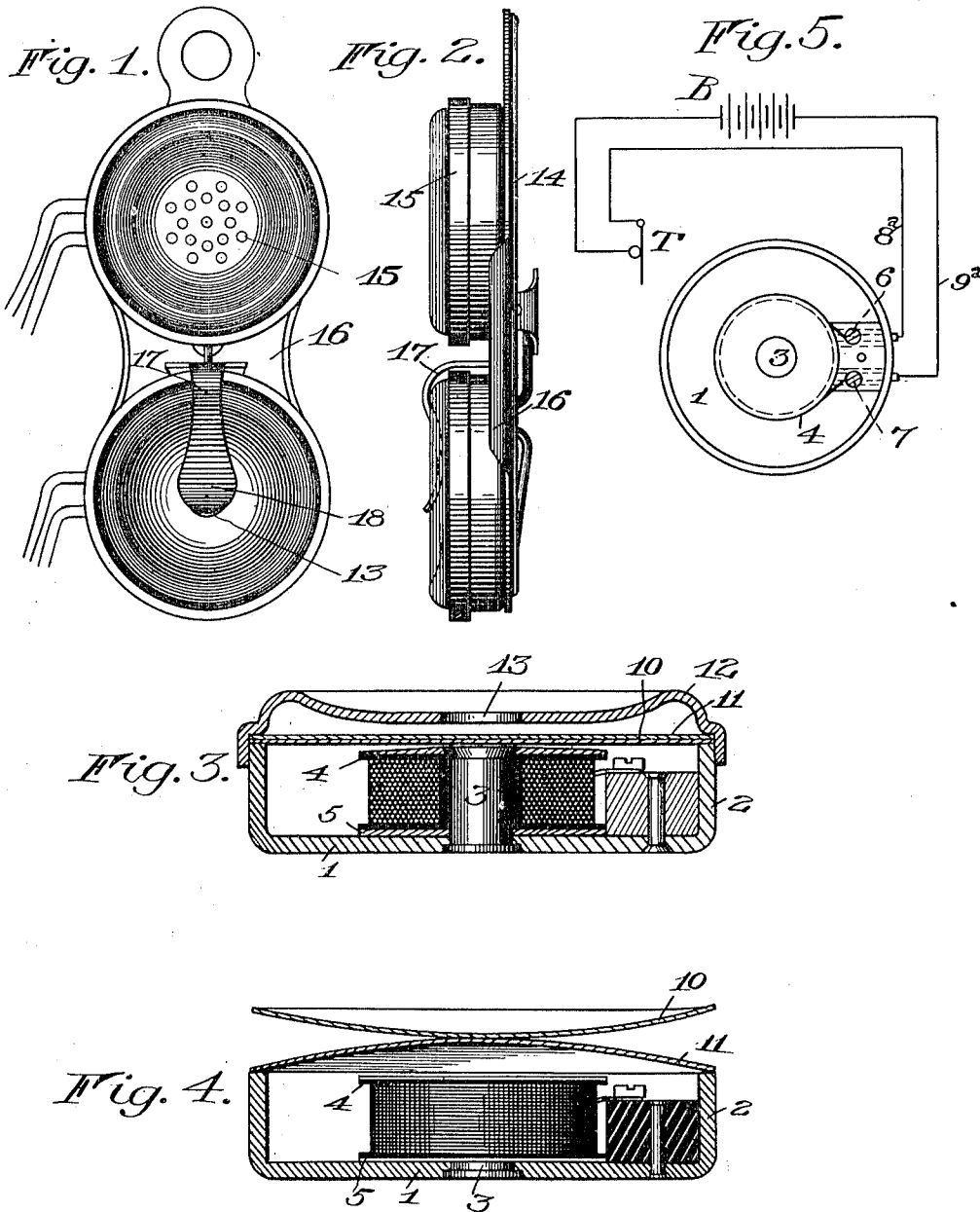


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TELEPHONE APPARATUS.
APPLICATION FILED JULY 11, 1907.

969,832.

Patented Sept. 13, 1910.



Witnesses

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To all whom it may concern:

Be it known that I, GARRISON BABCOCK, of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Telephone Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the reference-numerals marked thereon.

My present invention relates to improvements in telephones and it has for its object to provide an improved receiver therefor that shall be comparatively sensitive to the current variations or modifications so as to distinctly transmit speech with a minimum expenditure of strength of battery current, as well as to simplify the construction in order to facilitate and cheapen the cost thereof, and furthermore, it has for its object to provide an improved device for attaching the receiver to a holder, the receiver shown in the present instance being especially adapted for use in connection with telephones of the kind shown and described in my prior Patent No. 837,534, dated December 4, 1906.

To these and other ends the invention consists in certain improvements and combinations of parts, all as will be hereinafter more fully explained, the novel features being pointed out in the claims at the end of the specification.

In the drawings: Figure 1 is a front view of a telephone set constructed in accordance with my invention. Fig. 2 is a side elevation of the same. Fig. 3 represents a section through the axis of the receiver showing the relative arrangement and construction of its parts. Fig. 4 is a view similar to Fig. 3 showing substantially the shapes of the component members of the improved diaphragm before the retaining cover is applied, and Fig. 5 is a diagram of the telephone circuit, including the receiver.

The receiver shown in the present embodiment of the invention is particularly adapted for pocket use or portable purposes and is therefore comparatively small in size and compact in the arrangement of its parts, although it will be understood of course that

the novel features of the invention are applicable generally to telephone apparatus of varying kinds.

The receiver in the present instance embodies an annular shell or casing of magnet iron or steel, pressed or cast into a dished form, that is to say, it has a back or bottom portion 1 and an annular flange 2 extending forwardly therefrom. Arranged axially of the casing is a magnet core 3, preferably of soft iron which is riveted or otherwise secured to the rear of the casing, the connection between these parts being preferably close in order to complete a magnetic circuit between the outer shell which is magnetized, and the central core, the magnetism of the latter being modified by the variations of the current flowing through the receiver during the transmission of speech or sound. The upper edge of the rim or flange of the magnet core 3 being of one polarity and the core in the center of the casing being a consequent pole of opposite polarity. The soft iron core 3 is surrounded by a coil of fine wire, inclosed between heads 4 and 5 of insulating material, the latter serving to separate it from the bottom 1 of the casing. The ends of this coil are connected to the terminals 6 and 7 respectively, and the latter are connected to the line conductors 8^a and 9^a, a battery or other suitable source of current supply —B— being inserted in this circuit. The flow of the current through the coil of the receiver is controlled or modified by a transmitter —T— of any appropriate form or type.

The diaphragm through which medium the sound is transmitted to the ear by reason of its vibratory movements induced by the modifications of the current flowing through the coil surrounding the central core 3, is made in composite form of two members 10 and 11 of soft sheet iron. These members are dished giving them a concave form, and they are placed with their convex surfaces together as shown in Fig. 4, in which position they are pressed together and are clamped against the rim 2 of the casing by means of the cover or ear cap 12, which holds them with their surfaces into parallel planes. The cover is perforated at 13 to permit communication of the vibra-

tions between the diaphragm of the instrument and that of the ear of the user.

The cover or cap 12 is made of magnetic metal such as iron or steel and is secured directly to the rim 2 so that it acts upon the magnetized casing as keeper which prevents the weakening of the permanent magnet. From this it will be seen that the neutral line of the magnetic field will lie approximately in a plane bisecting the rim 2 and that the free end of the central core 3 will have the same polarity as the rear side or bottom 1 of the casing, while the magnetism of opposite polarity will be formed in the cover or keeper 12. Now as the metallic diaphragm is also in magnetic connection with the casing of the receiver and extends transversely thereof between the cover and the end of the core and is located between the poles of the permanent magnet it is susceptible to very slight magnetic changes.

The concavo convex form of the two diaphragm members, placed in opposite arrangement, serves to relieve the tension of the metal of the diaphragm that would otherwise tend to retard or limit its lateral deflection under the influence of the fluctuating magnetic attraction of the core permitting the lateral deflections of the diaphragm to take place even under very slight influences, thereby reducing the strength of current necessary to operate the telephone, increasing the sensitiveness of the diaphragm and insuring the faithful transmission of sounds of different characteristics.

The receiver shown in the present instance may be employed advantageously in connection with a portable telephone set, and in the drawings a holder has been shown that will enable parts of the set to be conveniently carried. The holder in the present instance embodies a plate or backing having an upper portion 14 to which the transmitter 15 is secured and a lower portion 16 adapted to support the receiver when not in use on which it is detachably secured by a spring arm or retaining finger 17. The latter is preferably struck up from the metal backing and is adapted to bear in the concavity or depression in the ear cap cover 12, the end of the said arm being enlarged or expanded as at 18 and serving to close the opening 13 therein for the purpose of excluding dust and moisture from the receiver when the telephone apparatus is not in use, or is being carried in a person's pocket.

A telephone receiver constructed in accordance with my present invention is not only capable of faithfully and efficiently reproducing sounds received by the transmitter, but the construction and arrangement of its parts enables it to operate suc-

cessfully with current of a comparatively small strength. The rim of the magnetized shell forms one pole of the magnet and the central core forms a consequent pole of opposite polarity, although it will be understood that if desired, the central core could be a permanent magnet and the shell a consequent pole of soft metal. The rim in either case serves to provide a polar surface on each side of the central pole piece, so that the lines of magnetic force are collected at the central core, whereby the diaphragm engaging the rim of the shell will be charged with magnetism of opposite polarity from that of the central core, so that the fluctuations or modifications in the strength of current traversing the coil about the central core will produce corresponding fluctuations in the magnetic attraction between the central core and the diaphragm.

The receiver shown herein is of such a form that, by reason of its compactness, especially adapts it to portable purposes, but the invention is not limited in this respect, as it could be applied to telephone apparatus of different types, and when employed in connection with the transmitter and holder, it is especially adapted for use of persons with impaired hearing.

The receiver shown herein is diminutive in size and is especially adapted to be used as a part of portable telephone sets such as those employed by persons with impaired hearing, but receivers embodying the invention are also capable of being used on other types of telephone apparatus.

I claim as my invention:

1. In a telephone receiver, the combination with a suitable magnet and a coil for modifying the magnetic influence thereof, of a diaphragm arranged in cooperative relation with said magnet comprising flexible concavo-convex members arranged with their convex sides in engagement, said plates being compressed to form a laminated diaphragm.

2. In a telephone receiver, the combination with a suitable magnet and a winding therefor, of a diaphragm arranged in cooperative relation with said magnet, embodying a pair of soft iron plates of concavo-convex form having their convex sides superposed, the plates being compressed to arrange their surfaces in substantially parallel planes.

3. In a telephone receiver, the combination with a suitable magnet, and a winding therefor, of a diaphragm adapted to cooperate with said magnet, embodying a pair of magnetically permeable plates of concavo-convex form having their convex sides superposed, and means engaging the peripheries of the plates for compressing them.

4. In a telephone receiver, the combination with a casing having a rim thereon, and

a core arranged therein, of a diaphragm adapted to cooperate with said casing and core embodying a pair of plates of magnetically-permeable metal, each concavo-convex
5 in form and having their convex surfaces juxtaposed, and an ear cap cooperating with the periphery of one of the plates and fit-

ting the rim of said casing for compressing said plates between the latter and the cap.

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Witnesses:

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