

No. 800,676.

PATENTED OCT. 3, 1905.

H. G. PAPE.

COMBINED TELEPHONE RECEIVER AND AURAL MASSAGE INSTRUMENT.

APPLICATION FILED JUNE 16, 1904.

2 SHEETS-SHEET 1.

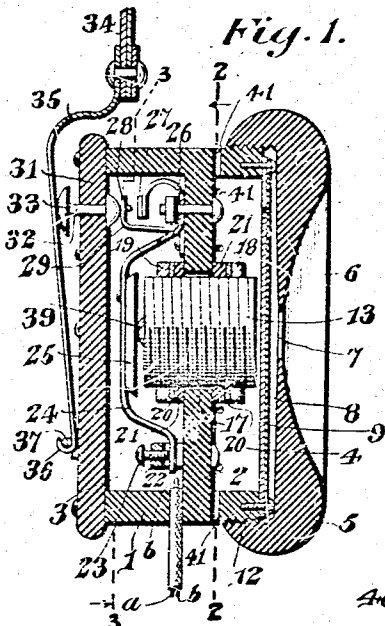


Fig. 1.

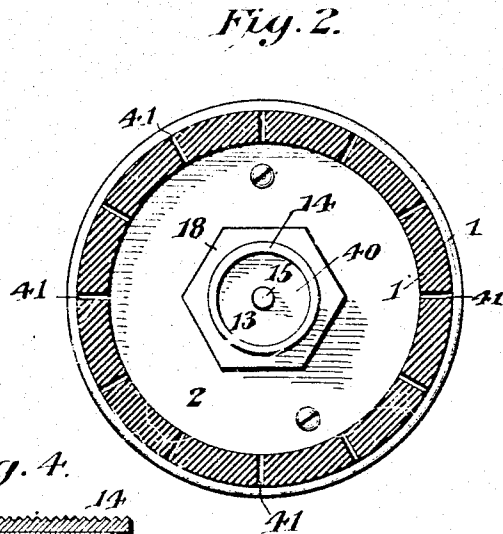


Fig. 2.

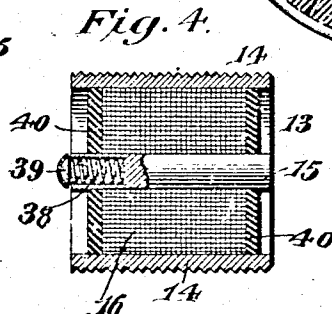


Fig. 3.

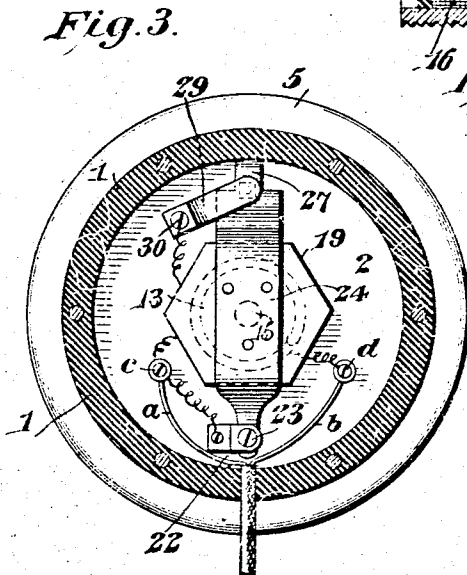


Fig. 4.

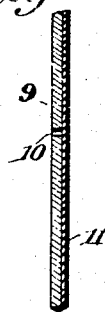


Fig. 5.

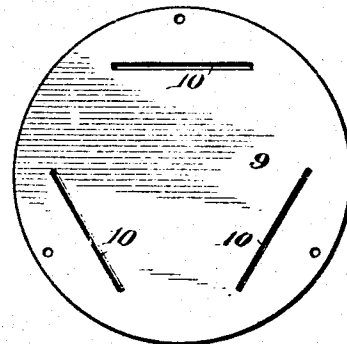


Fig. 6.

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2 SHEETS—SHEET 2.

Fig. 7.

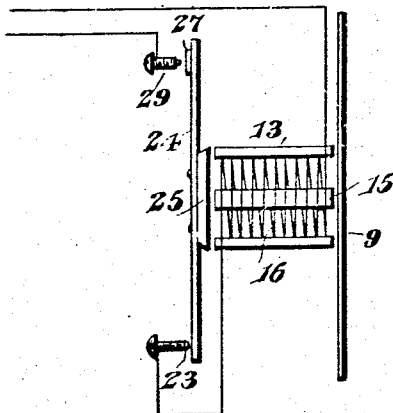


Fig. 9.

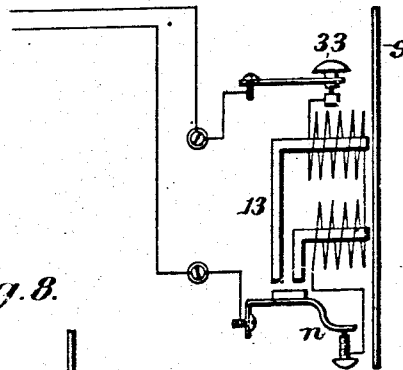


Fig. 8.

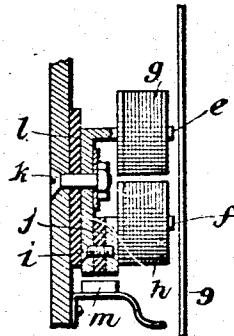
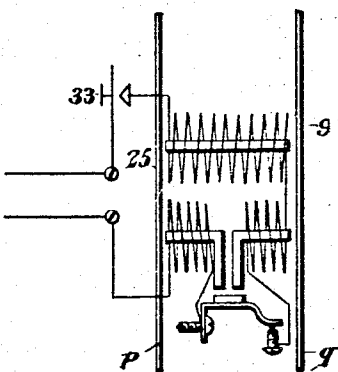


Fig. 10.



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UNITED STATES PATENT OFFICE.

HERMANN G. PAPE, OF NEW YORK, N. Y.

COMBINED TELEPHONE-RECEIVER AND AURAL MESSAGE INSTRUMENT.

No. 806,676.

Specification of Letters Patent.

Patented Oct. 3, 1906.

Application filed June 16, 1904. Serial No. 212,822.

To all whom it may concern:

Be it known that I, HERMANN G. PAPE, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a new and useful Combined Telephone-Receiver and Aural Massage Instrument, of which the following is a specification.

My present invention relates to a combined telephone-receiver and aural massage instrument, the object being to produce in the smallest possible compass an instrument which may be used either as an earpiece for audiphone sets or as a massage device for the treatment of a patient having impaired hearing.

To the accomplishment of this object the preferred embodiments of the invention reside in those constructions and arrangements to be hereinafter described, illustrated in the accompanying drawings, and succinctly defined in the appended claims.

In the accompanying drawings, Figure 1 is a sectional view of my instrument. Fig. 2 is a sectional view of the same subject-matter on the line 2 2 of Fig. 1. Fig. 3 is a sectional elevation on the line 3 3 of Fig. 1. Fig. 4 is a detail sectional view of the magnet detached. Fig. 5 is a face view of the diaphragm. Fig. 6 is a sectional view thereof. Fig. 7 is a diagrammatic view of the arrangement shown in Fig. 1. Fig. 8 is a sectional view of a modified form of the invention. Fig. 9 is a diagrammatic view of the arrangement shown in Fig. 8, and Fig. 10 is a diagrammatic view of another modification.

Like characters indicate corresponding parts in the several views.

1 indicates a casing preferably constructed of hard rubber and divided by a partition-wall 2 into front and rear compartments 3 and 4. The front compartment 4 is closed by a cap-piece 5, secured upon the casing and having a concave front face 6 and an axial aperture 7, as usual. The rear face 8 of the cap is also slightly concave, as shown, and disposed adjacent thereto is a metallic diaphragm 9, peripherally weakened by a plurality of narrow slots 10 equidistant from the axis of the diaphragm and disposed tangentially to a circle concentric therewith. These slots 10 are preferably three in number and, as shown in Fig. 5, are arranged to correspond substantially with the alternate edges of a hexagon having its center at the axis of the diaphragm. As it is of course well understood that the point of the diaphragm most sensitive to vi-

bration is the center thereof, it will readily appear that the provision of these slots well within the periphery of the diaphragm, but comparatively remote from its center, will materially increase its sensitiveness, and thus render the instrument more effective. It is necessary, however, to close these openings, and while this may be done in a variety of ways—as, for instance, by patches—I prefer to cover one side of the diaphragm, usually the front side thereof, with a thin disk 11 of any material of greater flexibility than that of the diaphragm. The means employed for the peripheral retention of the diaphragm is not material; but it may be held by screws 12, which serve to hold it independently of the cap 5, thus permitting the latter to be adjusted toward or from the diaphragm for the purpose of regulating the distance between the latter and the ear in accordance with the desires of individual users.

Opposed to the rear side of the diaphragm at the center of the instrument is a magnet 13, comprising a shell 14, an axial core 15, and an interposed coil 16, wound upon the core and designed to magnetize both the core and shell when a circuit is closed through the coil. The shell 14 is externally threaded and is retained within an axial opening 17 in the wall 2 by adjusting-nuts 18 and 19, screwed upon the shell beyond opposite sides of the wall 2 and opposed to wear-plates 20, between which and the opposite faces of the wall 2 are interposed soft-rubber gaskets 21. This character of retaining means for the magnet is provided in order that slight endwise adjustment of the latter may be readily secured, it being noted that by screwing up one or the other of these nuts slight endwise adjustment of the magnet may be effected for the purpose of regulating with great nicety the relation of the magnet and diaphragm.

In ordinary forms of telephone-receivers the magnet is arranged in the transmitting-circuit to vibrate the diaphragm; but by reason of the dual nature of my instrument it is necessary for the magnet to perform a dual function. This function is the actuation of an interrupter 22, which serves, when the device is used as an aural massage instrument, to repeatedly interrupt the circuit through the magnet in a manner and for a purpose to be explained.

The interrupter 22 comprises a pair of contact elements 23 and 24, the former preferably having the form of a binding-post and the

latter being defined by the end of an armature-spring 24, secured to an armature 25, opposed to the rear end of the magnet and located within the rear compartment 3 of the casing.

5 The spring 24 after passing across the armature 25 is bent forward and secured, as indicated at 26, to a wall 2, its extremity being curved back, as indicated in Fig. 1, to constitute the fixed contact 27 of the primary
10 circuit-closer, which also includes a movable contact 28, formed by the end of a contact-spring 29, having its opposite extremity secured to the wall 2 by a binding-screw 30, as shown in Fig. 3. The interrupter 22 is normally closed and the circuit-closer normally
15 open, as shown.

The back of the casing 1 is closed by a back plate or wall 31, through which is passed a
20 push-pin 32, opposed at its inner end to the movable contact 28 of the circuit-closer and provided at its outer end with a push-button 33, located exterior to the casing. The button 33 may be pressed by the finger of the
25 operator to operate the circuit-closer, and thus close the circuit through the instrument when it is desired to use the latter. Preferably, however, the circuit-closer is disposed for automatic actuation. For this purpose the usual
30 head-band 34 is provided with an extension 35, opposed to the button 33, and having at its lower extremity a hook 36, disposed to engage the keeper 37, carried by the wall 31. The engagement of the hook and keeper effect a pivotal connection between the head-band and
35 the instrument, so that when the band is placed upon the head with the instrument in contact with the ear the pin 32 will be automatically moved in to bring the contacts 27 and 28 together, and thus close the instrument-
40 circuit.

In order to augment the action of the armature-spring 24, the core 15 is made hollow at its rear end to receive an auxiliary armature-spring 38, arranged to urge rearwardly an
45 armature-retracting plunger 39, opposed to the armature, as shown in Fig. 1, and preferably having a covering of some soft material. The opposite ends of the magnet-coil 16 are preferably covered by hard rubber or other suitable
50 heads 40. To accommodate the variation of the air-space within the compartment 4, due to the flexing of the diaphragm, I form the peripheral wall of the casing with a series of relief-openings 41, disposed adjacent to the
55 front face of the wall 2, so that the cap may be screwed up without interference therewith.

The wiring of the instrument is clearly indicated in Fig. 3. The line-wires *a b* are carried into the rear compartment 3 of the instrument and are connected to the binding-posts
60 *c* and *d*, mounted on the wall 2. From the post *d* connection is made with one terminal of the magnet-coil 16, the other terminal of which is wired to the binding-post 30 of the
65 movable circuit-closer contact 28. The post

c is wired to a binding-post 23, constituting the fixed contact of the interrupter. Thus it will be seen that both the circuit-closer and the interrupter must be closed in order to energize the magnet-coil.

70 The operation of the instrument shown in the first seven figures of the drawings is as follows: The head-band being placed upon the head with the earpiece at the ear, the contacts 27 and 28 will be brought together, thus closing the circuit through the instrument. If
75 the current is of low amperage, the instrument may be used in the ordinary manner as a receiver, the electrical undulations effected by the vibrations of the transmitter-diaphragm varying the attractive power of the magnet
80 13, and thus causing the vibration of the diaphragm to reproduce the sounds uttered adjacent to the transmitter. If, however, the current is of high amperage, both the diaphragm 9 and the armature 25 will be attracted
85 by the opposite ends of the magnet. This attraction of the armature will cause the circuit to be interrupted by the separation of the interrupter-contacts 22 and 23, and the magnet thus becoming inactive the diaphragm will
90 spring back and the armature will also move back to close the interrupter, and thus restore the circuit, which will be similarly opened and closed in quick succession as long as the instrument is connected with a suitable source
95 of electrical energy and the circuit-closer maintained in the closed position. When a current of high amperage is utilized and the interrupter thus brought into play, the instrument is adapted for use as a massage device,
100 the ordinary vibrations of the diaphragm being greatly magnified, so that the vibrations transmitted to the drum of the ear will be sufficiently intense and the circulation of air through the ear and nasal passages sufficiently
105 marked to constitute a massage, which has been found highly efficient, particularly when the patient is suffering from catarrhal deafness.

110 While I consider the magnet shown in Fig. 4 and having double-ended concentric pole-pieces to be preferable, other forms of magnet may be employed. For instance, in Fig. 8 of the drawings I have shown a portion of the instrument equipped with a magnet comprising a pair of angular pole-pieces *e* and *f*,
115 surrounded by separate coils *g* and *h* and connected by a screw *i* passing through an interposed soft-rubber insulation *j*, the pole-pieces *e* being in turn secured to the casing by a screw *k* and similar soft-rubber insulation *l* being interposed between the pole-pieces and casing, as shown. The armature *m* is disposed opposite the laterally-extended rear
125 ends of the pole-pieces *e* and *f* and is arranged to operate the interrupter *n*. The circuit is controlled by a circuit-closer, as in the form of invention previously described, and the method of wiring is clearly shown in
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Fig. 9. In Fig. 10 is shown still another form of the magnet interposed between a pair of diaphragms *p* and *q* for use in a double receiver, of which many types are in use, the essential characteristics of the instrument being the same as has heretofore been described in detail. Obviously in any of the several forms of the invention the magnet may be polarized, if desired.

10 It is thought that from the foregoing the construction, operation, and many advantages of my combined earpiece and massage instrument will be fully comprehended; but while the illustrated embodiments of the invention appear at this time to be preferable I wish to be understood as reserving the right to effect such changes, modifications, or variations as may come fairly within the scope of the protection prayed.

20 What I claim is—

1. In an instrument of the character described, the combination with a casing, of an armature and a diaphragm therein, an electromagnet arranged to operate both of said elements, an interrupter located in the magnet-circuit and arranged to be operated by the armature, and an automatic circuit-closing device for closing the circuit through the magnet and interrupter.

30 2. In an instrument of the character described, the combination with a casing, of a diaphragm and an interrupter, an electromagnet common to said devices, a circuit-closer arranged to close a circuit through the magnet and interrupter, a head-band connected to the casing, and means operated by the head-band for actuating the circuit-closer when the instrument is applied to the head.

40 3. In an instrument of the character described, the combination with a casing having an apertured wall dividing the casing into front and rear compartments, of an electromagnet mounted in said apertured wall, an armature located in the rear compartment of the casing and opposed to one end of the magnet, a diaphragm located in the front compartment of the casing and opposed to the opposite end of the magnet, an interrupter operated by the armature and located in the magnet-circuit, and means for closing a circuit through the magnet and interrupter.

50 4. An instrument of the character described, the combination with a casing having an apertured partition-wall, of a cylindrical electromagnet mounted in said wall, magnet-adjusting nuts mounted on the magnet at opposite sides of the wall, a diaphragm opposed to one end of the magnet, an armature opposed to the opposite end thereof, an interrupter located in the magnet-circuit and including an element constituting an armature-spring, and means for closing a circuit through the instrument.

65 5. In an instrument of the character described, the combination with a casing, of an

electromagnet therein, a diaphragm opposed to the magnet, an armature also opposed to the magnet, a circuit-closer, an interrupter, and an armature-spring one end of which constitutes a contact element of the circuit-closer and the other end of which constitutes a contact element of the interrupter.

70 6. In an instrument of the character described, the combination with a casing, of a diaphragm therein, an electromagnet comprising a cylindrical shell, a central core and an intermediate coil, an armature opposed to one end of the magnet, and an interrupter operated by the armature.

80 7. In an instrument of the character described, the combination with a casing having an apertured partition-wall, an electromagnet mounted in said wall and comprising a cylindrical shell, an axial core and an intermediate coil, a diaphragm opposed to one end of said magnet, an armature opposed to the opposite end thereof, an interrupter, a circuit-closing device, an armature-spring having its opposite ends arranged to constitute contact elements of the interrupter and circuit-closer respectively, and a push-pin extended through the back wall of the casing to operate the circuit-closer.

95 8. In a combined receiver and massage instrument, the combination with a casing, of a diaphragm therein, an interrupter, an electromagnet common to the diaphragm and interrupter, and a cap for said casing adjustable toward and away from the diaphragm to regulate the intensity of the sounds produced by the vibration of the diaphragm.

100 9. In an instrument of the character described, the combination with a casing, of an electromagnet located therein and comprising a cylindrical shell, an axial core and an intermediate coil, a diaphragm opposed to one end of the magnet, an armature opposed to the opposite end thereof, an interrupter operated by the armature, and a spring-urged plunger mounted in the core of the magnet and disposed to aid in the retraction of the armature.

110 10. In an instrument of the character described, the combination with a casing, of an armature and a diaphragm, an electromagnet arranged to operate both of said elements, an interrupter located in the magnet-circuit and arranged to be operated by the armature, and a circuit-closing device for closing the circuit through the magnet and interrupter.

120 11. An instrument of the character described, the combination with a casing, of an electromagnet, a diaphragm opposed to one end of the magnet, an armature opposed to the opposite end thereof, an interrupter located in the magnet-circuit and including an element constituting an armature-spring, and means for closing a circuit through the instrument.

125 12. In an instrument of the character described, the combination with a casing, of an armature and a diaphragm, an electromagnet

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arranged to operate both of said elements, an interrupter located in the magnet-circuit and arranged to be operated by the armature, and a circuit-closing device for closing the circuit through the magnet and interrupter, said device being operated from the exterior of the casing by a push-pin.

13. In an instrument of the character described, the combination with a casing, of an electromagnet located therein and comprising a cylindrical shell, an axial core and an intermediate coil, a diaphragm opposed to one end

of the magnet, an armature opposed to the opposite end thereof, and a spring-urged plunger mounted in the core of the magnet and disposed to aid in the retraction of the armature.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

HERMANN G. PAPE.

Witnesses:

M. J. H. FERRIS,
E. J. HIGGINS.