No. 800,675. PATENTED OCT. 3, 1905.

H. G. PAPE.

TELEPHONE RECEIVER.

APPLICATION FILED JUNE 16, 1904.

Fig. 1

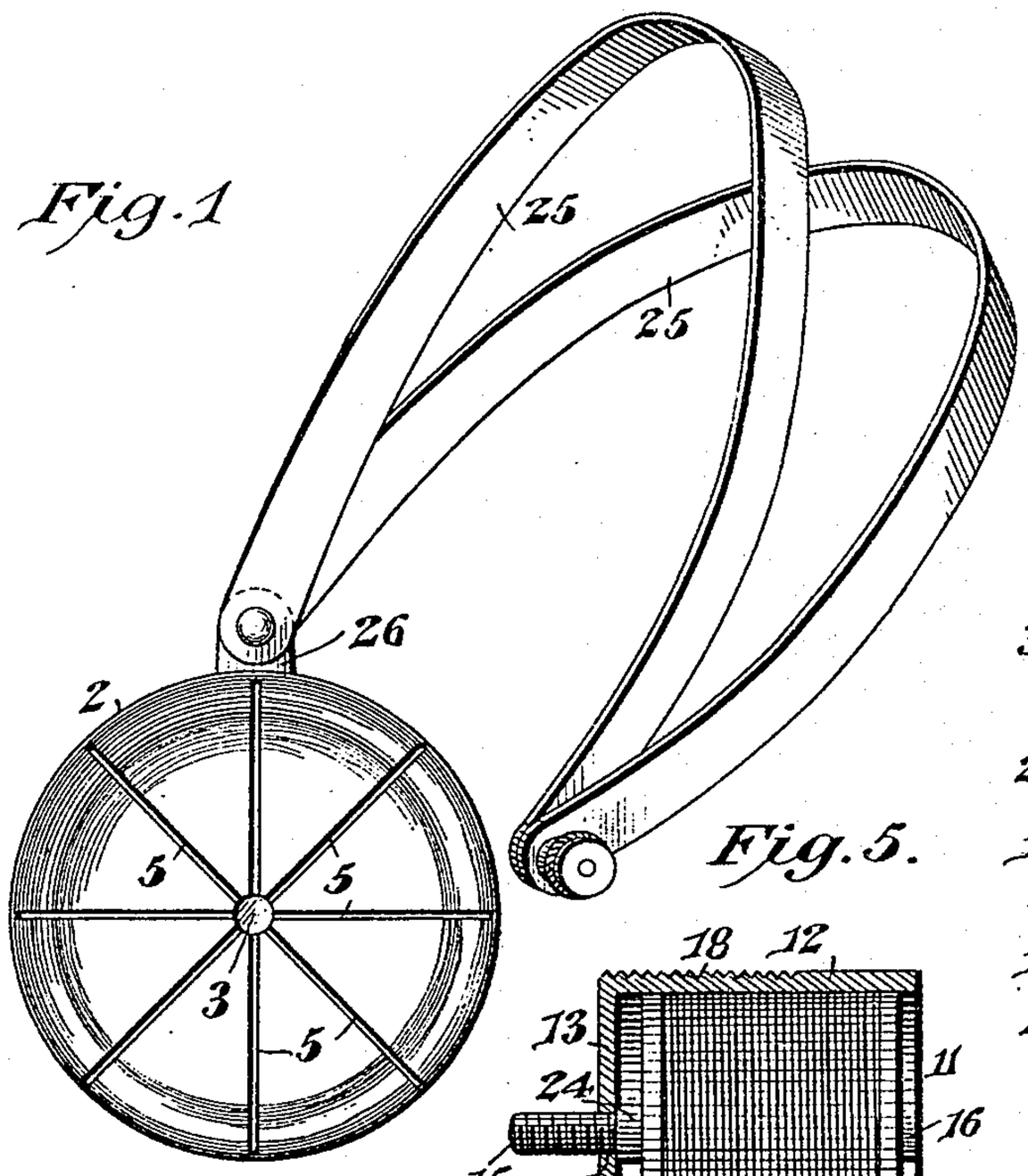


Fig. 2.

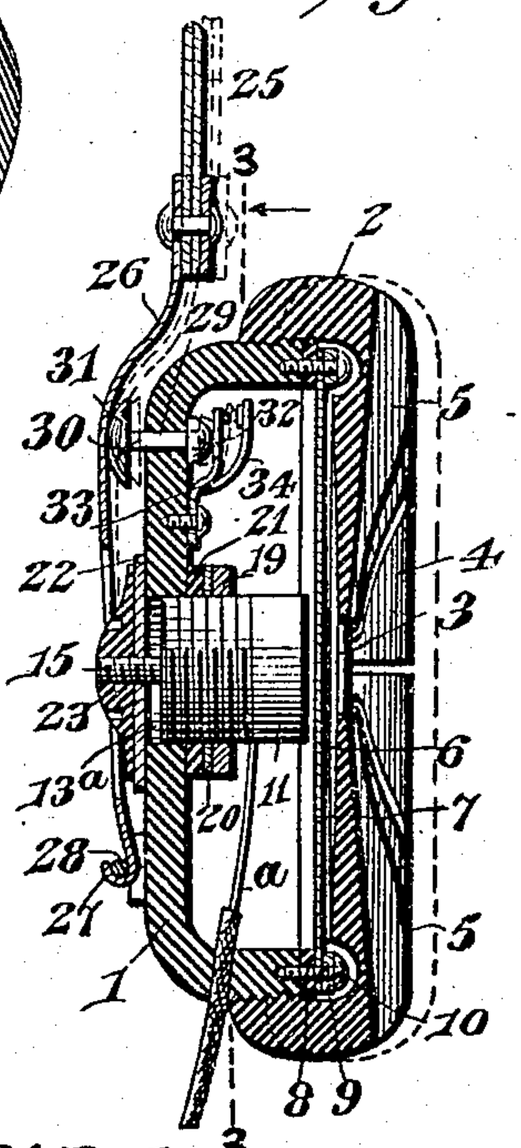


Fig. 5.

Fig. 3.

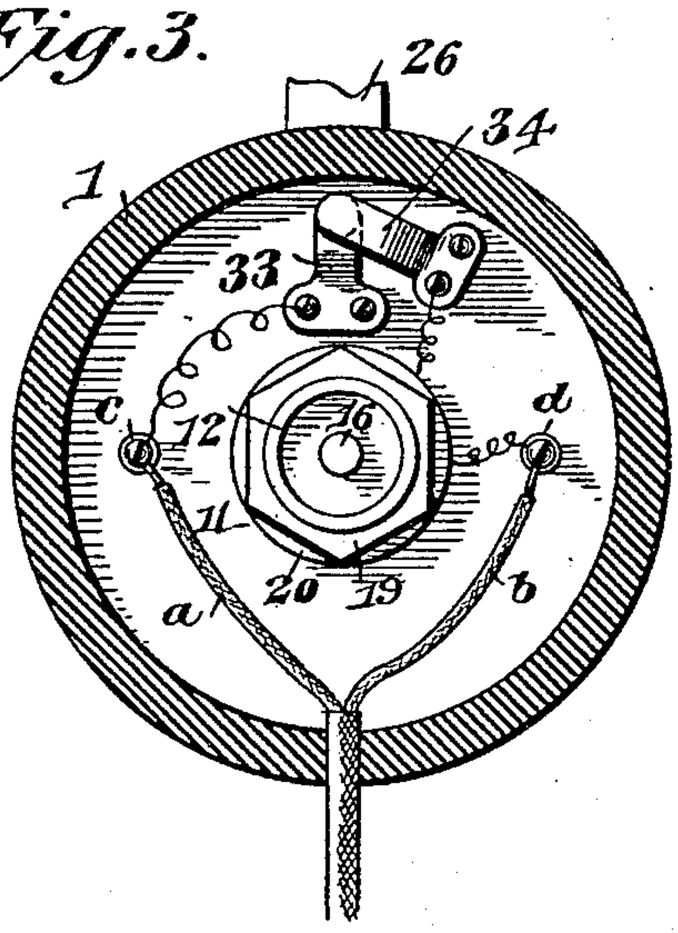
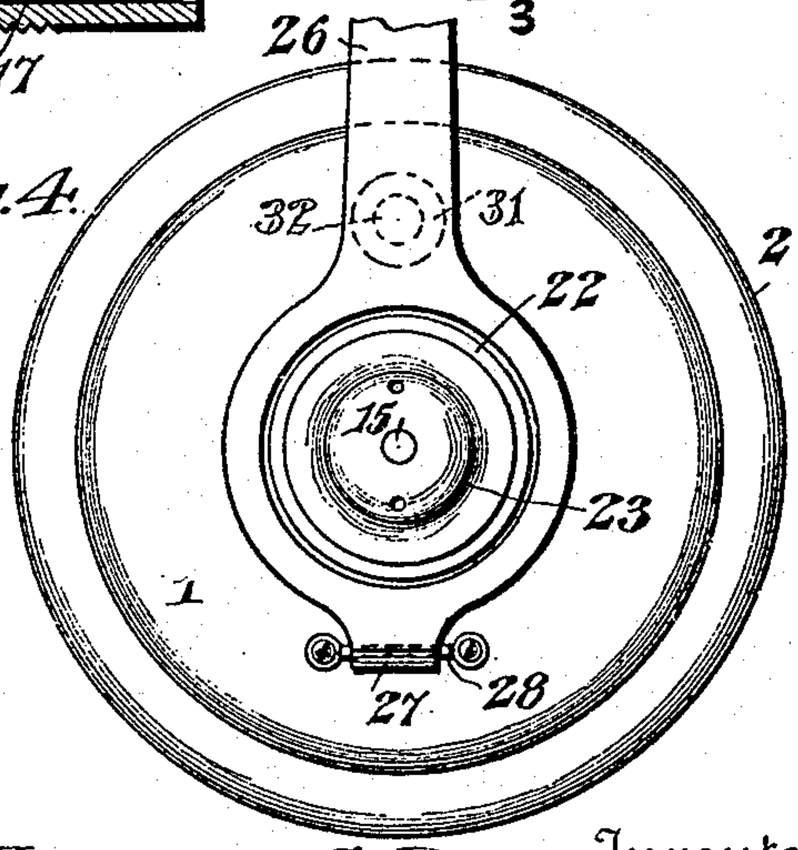


Fig. 4.



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UNITED STATES PATENT OFFICE.

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

TELEPHONE-RECEIVER.

No. 800,675. Specification of Letters Patent. Patented Oct. 3, 1905.

Application filed June 16, 1904. Serial No. 212,819.

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 Telephone-Receiver; of which the following is a specification.

This invention relates to a novel telephone-receiver constructed with special reference to its use as the earpiece of an audiphone set, which latter is used as an aid to defective hearing and comprises an earpiece electrically connected to a sound-receiver corresponding in function with the transmitter of a telephone apparatus.

The objects of the invention are to produce a receiver or earpiece of minimum size and weight and of maximum efficiency, to improve the construction and mounting of the diaphragm-operating magnet, to provide means accessible from the exterior of the instrument for effecting a nice adjustment of the magnet relative to the diaphragm, and to regulate the intensity of sound by the adjustment of the instrument-cap with respect to an independently-mounted diaphragm.

To the accomplishment of these objects and others subordinate thereto the preferred embodiment of the invention resides in that construction and arrangement of parts to be hereinafter described, illustrated in the accompanying drawings, and succintly defined in the appended claims.

In said drawings, Figure 1 is a perspective view of a head-band with my earpiece applied thereto. Fig. 2 is a sectional view of the earpiece, showing a portion of the head-band, the closed position of the circuit-closer and the adjusted position of the casing-cap being indicated in dotted lines. Fig. 3 is a section on the line 3 3 of Fig. 2. Fig. 4 is a rear elevation of the receiver; and Fig. 5 is a sectional view, on a somewhat enlarged scale, of the magnet.

Like characters are employed to designate corresponding parts throughout the several views.

1 indicates the cup-shaped casing of the receiver externally threaded for the reception of an adjustable cap 2, closing the open side of the casing and provided with a central opening 3, a concave outer face 4, and radial kerfs 5, constituting sound-dissipating openings. The inner face 6 of the cap 2 is also slightly concave, as shown in Fig. 2, and opposite the same is located the diaphragm 7, preferably a thin metal disk retained at its periphery between a pair of soft-rubber gaskets 8 and 9. The diaphragm and gaskets are secured to the casing 1 by screws 10. It will be observed in this connection that the diaphragm is secured to the casing independently of the cap 2, which latter may therefore be adjusted toward and from the diaphragm for the purpose of regulating the distance between the latter and the drum of the ear when the receiver is in use. By this means the intensity of sound is regulated to suit the convenience of the user of the instrument without necessity for disturbing the adjustment of the diaphragm. Furthermore, by reason of the imposition of the soft-rubber gasket 8 between the diaphragm and the casing it is possible to secure slight adjustment of the diaphragm when desired by tightening up the screws 10 or loosening the same, the former serving to compress the gasket 8, and thus move the diaphragm inward a slight distance, and the latter permitting the gasket to expand, and thus move the diaphragm outward.

Within the casing, opposite the center of the diaphragm 7, is arranged a magnet 11, the construction and mounting of which is novel. This magnet comprises a cylindrical shell 12, closed at one end by an integral head 13, having an axial opening 14, through which extends the threaded extremity 15 of an axial core 16, terminating in the plane of the front end of the shell 12. Around the core 16 is wound the magnet-coil 17, through which the current is designed to pass for the purpose of magnetizing the inner and outer pole-pieces—to wit, the core 16 and the shell 12—for the purpose of attracting the diaphragm 7 in a manner well understood in the art. The rear end of the shell 12 is extended into an axial opening 13^a in the casing 1, and for a considerable portion of its length said shell is externally threaded, as indicated at 18, for the reception of a nut 19, bearing against a thin metal wear-plate 20, between which and the inner face of the casing is interposed a rubber gasket 21. Opposed to the opposite or outer face of the casing 1 is interposed a washer 22, against which bears an external magnet-adjusting nut 23, screwed upon the threaded end 15 of the magnet-core 16, it being understood that the end 15 of the core is

slightly reduced to define a shoulder 24, bearing against the head 13 of the shell. Thus by turning the nut 23 in the proper direction the magnet is drawn back from the diaphragm against the resistance opposed to such movement by the gasket 21. On the contrary, if the nut 23 is turned in the opposite direction the expansion of the gasket 21 thus permitted will move the magnet in the opposite direction—that is to say, toward the diaphragm.

The described means for conveniently adjusting the magnet 11 with great nicety is an improved feature of the present invention, and attention may be directed to the fact that the nut 23 constitutes means exterior to the casing for adjusting the magnet in one direction and that the gasket 21 constitutes internal reactive means for moving the magnet in the opposite direction. The instrument therefore embodies independent adjusting means for the magnet and diaphragm, respectively, each of said means including a reactive element—to wit, the gaskets 21 and 8—by means of which a great nicety of adjustment may be accomplished to obtain a maximum efficiency.

In addition to the features described the receiver or earpiece is equipped with an automatic circuit-closer associated with the head-band in such a manner that the circuit is automatically closed through the instrument whenever the latter is retained against the ear by the application of the head-band to the head of the operator. The head-band 25 is provided with an extension 26, disposed opposite the back of the casing, as shown in Figs. 2 and 4, and provided at its lower extremity with a hook 27, engaging a keeper 28, attached to the casing 1. This hook and keeper when in engagement constitute a hinge connection between the head-band and receiver to obtain sufficient relative movement for the proper actuation of the automatic circuit-closer.

Adjacent to the upper side of the casing 1 the back wall thereof is provided with an opening 29, through which is passed a push-pin 30, provided at its outer end with a button 31; opposed to the band extension 26 and having at its inner end a head 32, opposed to a contact element, preferably a spring 33, secured at one end to the casing. The relative movement of the receiver and head-band is designed to urge the push-pin 30 inwardly for the purpose of flexing the spring 33 into contact with a second contact element or spring 34, similarly attached to the casing, as shown best in Fig. 3.

The precise method of wiring the instrument is not material; but, as shown in Fig. 3, the line-wires *a* and *b* are passed through the wall of the casing and are connected to binding-posts *c* and *d*, the post *c* being wired to the spring 33 and the post *d* being wired to the spring 34, with the coil 17 of the magnet interposed. Ordinarily the circuit through the instrument will be open, so as to minimize the consumption of electrical energy; but when the head-band is placed over the head with the receiver opposed to the ear the pin 30 will be moved in, thus bringing the springs 33 and 34 into contact and closing the circuit, fluctuations of the current varying the energy of the magnet, and thus causing the vibration of the diaphragm 7 for the purpose of reproducing the sound-waves produced by the words spoken into the telephone-transmitter or audiphone-receiver, as the case may be. If the transmitted sounds are too intense, it is simply necessary to turn the cap 2 until the diaphragm 7 is located at a proper distance from the ear. The sound-dissipating slots or kerfs 5 in the front face of the cap are found to be greatly beneficial in preventing reverberation of the sound-waves, and they improve the instruments in matter of distinctness. They lead from the central opening 3 to the periphery of the cap. Obviously the magnet of the receiver may be polarized, if desired—as, for instance, by utilizing a permanent magnet for the outer pole or shell.

It is thought that from the foregoing the construction, operation, and advantages of my telephone-receiver or audiphone-earpiece will be comprehended; but while the present embodiment of the invention appears at this time to be preferable I wish to be understood as reserving the right to effect such changes, modifications, and variations of the illustrated structure as may come fairly within the scope of the protection prayed.

What I claim is—

1. A receiver including a casing having an apertured wall, a diaphragm within the casing, a magnet opposed to the diaphragm and including a shell, a core, and an interposed coil, the shell being screwed into the apertured wall of the casing and the core being extended to the exterior of the casing, and a nut screwed upon the extended end of the core.

2. A receiver including a casing having an apertured wall, a diaphragm, a magnet opposed to the diaphragm and extended into the apertured wall of the casing, a nut carried by the magnet, and an elastic gasket interposed between said nut and the apertured wall of the casing.

3. A receiver including a casing having an apertured wall, a diaphragm, a cylindrical magnet opposed to the diaphragm and extended into the apertured wall of the casing, a nut carried by the magnet, an elastic gasket interposed between the nut and the apertured wall of the casing, and means for retaining the magnet in opposition to the expansive force of the gasket.

4. A receiver including a casing having an apertured wall, a diaphragm, a magnet opposed

the diaphragm and having a shell, a core
d an interposed coil, and adjusting-nuts con-
cted to the magnet and located at opposite
les of the apertured wall of the casing.
5. A receiver including a casing having an
ertured wall, a diaphragm, a magnet mount-
in the apertured wall and having a shell, a
re having a threaded end, a coil interposed
tween the core and shell, adjusting-nuts
ewed upon the core and shell respectively
d located at opposite sides of the apertured
ll of the casing, and an elastic gasket inter-
sed between one of the nuts and said wall.
6. A receiver provided with a cap having a
ncave face provided with an opening and
th kerfs in the outer face of the cap and ex-
ding outwardly from the opening.
7. A receiver including a casing having an
ertured back wall, a diaphragm and a mag-
t within the casing, said magnet being ex-
ded into the apertured wall, and externally
eaded, and a nut working over the thread-
portion of the magnet.
8. A receiver including a casing having an
ertured wall, a diaphragm, a magnet mount-
in the apertured wall and having a shell, a
e having a threaded end, a coil interposed
ween the core and shell, adjusting-nuts
ewed upon the core and shell respectively
l located at opposite sides of the apertured
ll of the casing.
9. A receiver having its cap provided with
entral opening communicating with the dia-
ragm, and radial sound-dissipating open-
gs leading from the central opening to the
iphery of the cap and having no commu-
ation with the interior of the receiver ex-
t by way of the central opening in the cap
reof.
10. A receiver, including a casing having an
rtured wall, a diaphragm, a magnet com-
sing a shell, a core and an interposed coil,
ans coacting with the core to move the mag-
in one direction, and means coacting with
shell to move the magnet in the opposite
ection.
11. A receiver, including a casing having an
rtured wall, a diaphragm, a magnet com-
sing a shell, a core and an interposed coil,
ans coacting with the core to move the
gnet in one direction, and means coacting
h the shell to move the magnet in the op-
ite direction, one of said means being re-
ive.
12. A receiver, including a casing, a dia-
agm, a magnet comprising a shell, a core
an interposed coil, said core being ex-
ded through the back wall of the casing, an
usting-nut mounted on the extended end
he core, and an elastic device located with-
he casing and coacting with the shell of the
gnet to urge the latter toward the dia-
agm.

13. A receiver, including a casing, a magnet located therein, means exterior to the casing for adjusting the magnet, a diaphragm disposed to be operated by the magnet, means for adjusting the diaphragm independently of the magnet, and a front cap for the casing, said cap constituting a housing for the diaphragm-adjusting means and having adjustable connection with the body of the casing independently of said means.

14. A receiver, including a casing, a diaphragm and a magnet located in the casing, diaphragm-retaining means including a pair of rubber gaskets between which the diaphragm is retained, screws passed through the gaskets and diaphragm and into the casing, and a cap constituting a housing for the screws and gaskets and having adjustable connection with the body of the casing independently of the diaphragm-retaining means.

15. A receiver, including a casing having a front cap, and a diaphragm and magnet located within the casing, each of said elements, to wit, the cap, the diaphragm and the magnet, having independent, adjustable connection with the body portion of the casing.

16. A receiver, including a casing having an apertured back wall, a diaphragm and a magnet within the casing, said magnet comprising a core, a shell and an interposed coil, the shell being extended into the apertured wall, and means coacting with the shell to urge the magnet toward the diaphragm.

17. A receiver, including a casing having a cap secured upon the exterior thereof, a magnet within the casing, and a diaphragm adjustably secured directly to the front of the casing, said diaphragm and its adjusting means being inclosed by and housed within the cap.

18. A receiver, having its cap formed with a slight concavity in its inner face, with a greater concavity in its outer face, and with radial slits constituting sound-dissipating openings leading outwardly to the periphery of the cap from the central opening therein whereby reverberation within the outer concavity of the cap is prevented.

19. A sound-conveying member having a concavity in one side face, a central opening extending through the member, and a series of constantly-open sound-dissipating openings extending outwardly from the concavity to prevent reverberation therein and spaced from the opposite side of the member.

20. In combination, a diaphragm and a sound-conveying member separated therefrom by an air space or passage, said member having a perforated center, a concavity in its outer face, and a series of constantly-open sound-dissipating openings extending from the concavity to prevent reverberation therein and having no direct communication with the air

passage or space between the sound-conveying member and the diaphragm.

21. A receiver-cap having a perforated center, a concavity in its outer face, and a series of constantly open and unobstructed sound-dissipating openings leading outwardly from the concavity and spaced from the inner side of the cap.

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.