March 6, 1951 W. J. KONVALINKA 2,544,267

CUSHIONING DEVICE FOR TELEPHONE RECEIVERS

Filed Oct. 25, 1947

Fig. 1.

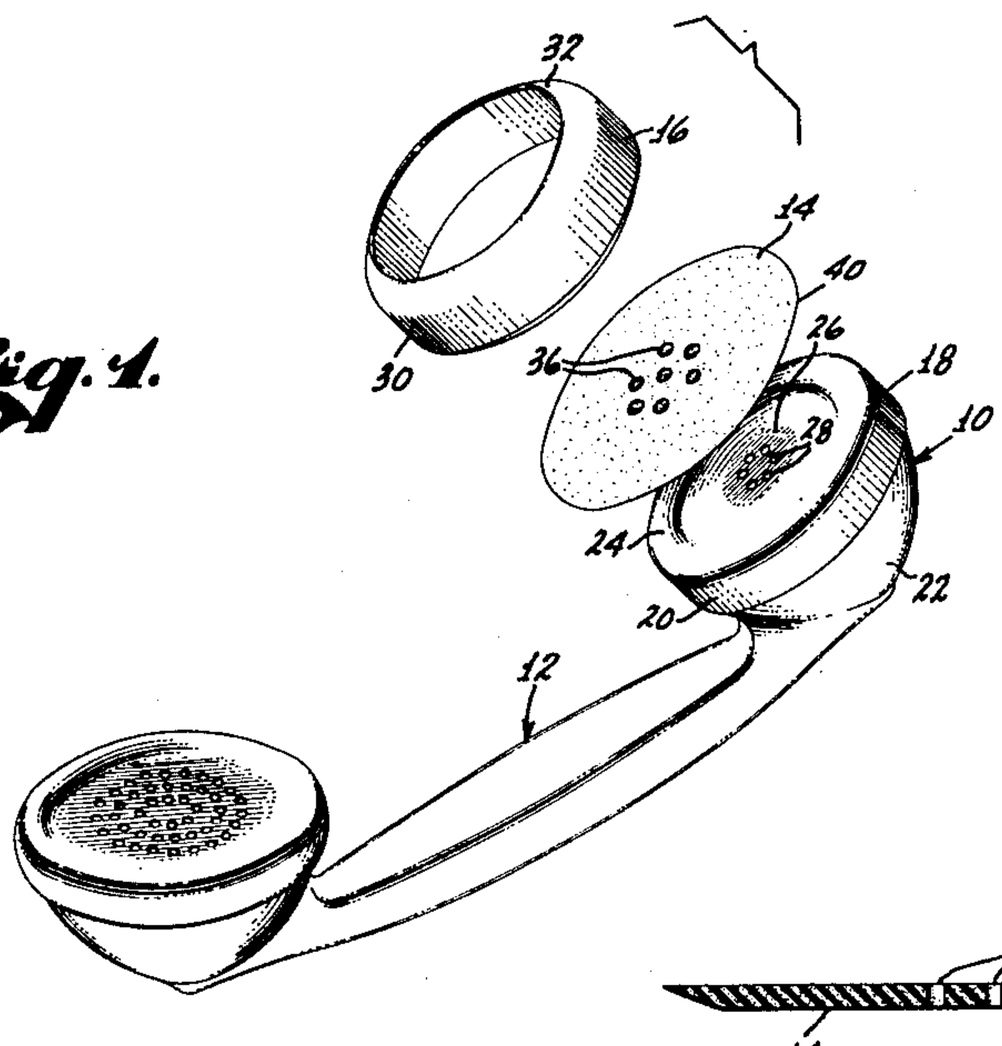


Fig. 2.

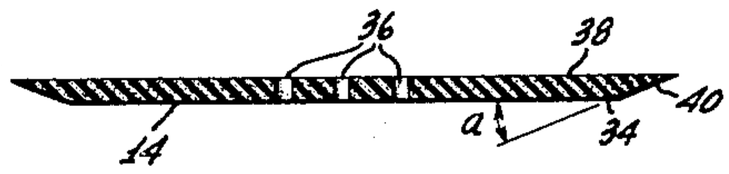


Fig. 3.

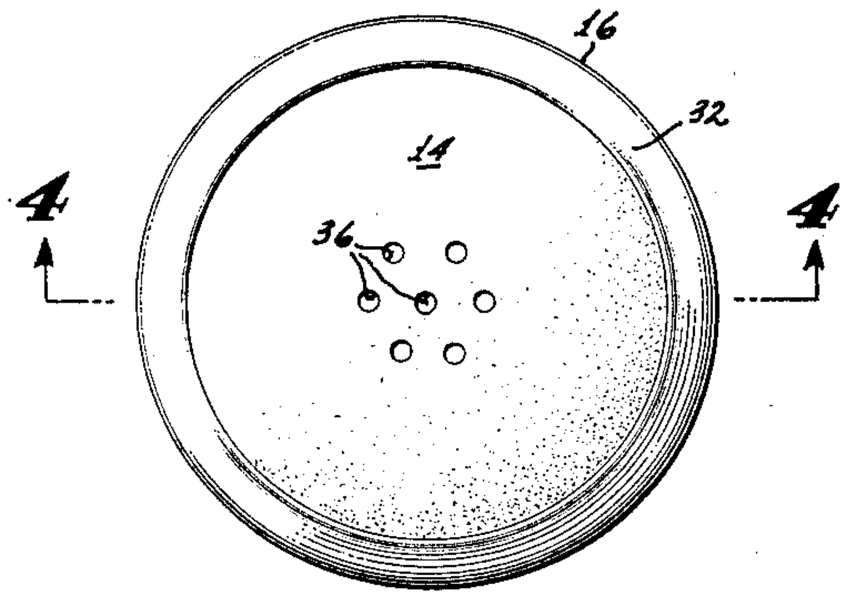
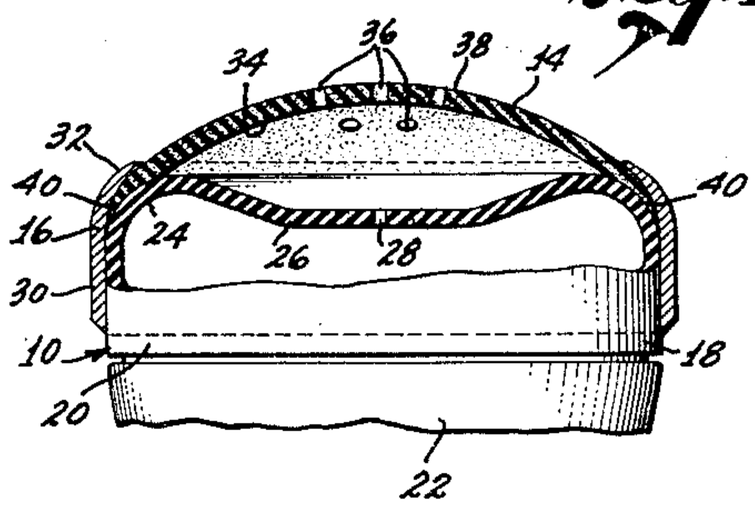


Fig. 4.



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CUSHIONING DEVICE FOR TELEPHONE RECEIVERS

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4 Claims. (Cl. 179—184)

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My invention relates to cushioning devices that are employed with acoustic receivers, such as telephone receivers.

An acoustic receiver of the type to which my invention is applicable employs a sound reproducing device encased in part by a perforated cap. In use, this cap is usually pressed against the user's ear when he desires to listen to the sound being generated by the reproducing device. The sounds are transmitted to the ear through the perforations in the cap. Receivers of this type include telephone receivers, telegraph headsets, and similar devices.

Such caps are generally made of a hard material such as Bakelite. In practice, it is usually found that such a cap must be pressed against the ear in order to achieve efficient sound transmission to the ear, especially if there is considerable extraneous, or ambient, noise. As a result of this pressure, it is often found that the use of such an acoustic receiver is very uncomfortable and fatiguing, especially when the receiver is used over an extended period.

One of the objects of my invention is to provide an acoustic receiver with a cushioning device which can be secured to the cap thereof in such a way as to render the use of the receiver more comfortable and less fatiguing.

Another object of my invention is to provide such a cushioning deivce which is of simple, inexpensive construction and which is easily attached to and removed from such a receiver.

A further object of my invention is to provide such a cushioning device which increases the ratio of the intensity of sound transmitted to the ear from the sound reproducing device compared with the intensity of extraneous sounds.

A still further object of my invention is to provide such a cushioning device with a cushioning diaphragm which is easily cleaned.

The foregoing and other objects and advantages of my invention will be more clearly understood by reference to the following description when considered with the accompanying drawing, in which:

Figure 1 is an exploded isometric view of a French telephone together with a cushioning device incorporating features of my invention;

Figure 2 is a sectional view of a cushioning diaphragm incorporating features of my invention;

Fig. 3 is an end-on view of the telephone receiver of Fig. 1 showing the cushioning device in place; and

Fig. 4 is a fragmentary partly sectional view of

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the receiver and cushioning device taken on the line 4—4 of Fig. 3.

In the drawing, there is illustrated an application of my invention to a receiver 10 of a French telephone 12. The cushioning device of this invention comprises a resilient sound transmitting diaphragm 14 and a clamping member 16 which cooperates therewith to cause the diaphragm to dome outwardly from the receiver 10, when held in place thereon.

The telephone receiver 10 to which this cushioning device is applied, is provided with a cap 18 having a threaded skirt 20 by means of which it is attached to the body 22 of the case, which encloses an electromagnetic sound reproducing device (not shown). The outer end of the cap 18 is of reentrant configuration and is connected with the skirt 20 by means of a rounded annular shoulder 24. The center end plate 26 in the reentrant portion of the cap 18 is provided with a plurality of perforations 28 to permit sound generated by the sound reproducing device to be transmitted through the cap.

The clamping member 16 is preferably ring-shaped. This ring-shaped member 16 has a cylindrical portion 30 having a length between about $\frac{5}{8}''$ and about $\frac{3}{4}''$, which is adapted to be pressed-fit over the skirt 20 of the receiver cap 18. A narrow flange 32, having a width between about $\frac{1}{8}''$ and about $\frac{1}{4}''$ curves inwardly from the outer end of the cylindrical portion 30. The curvature of this flange 32 in an axial plane is preferably less than that of the annular shoulder 24 of the receiver cap 18.

The diaphragm 14 itself is preferably normally flat when unconstrained and has an outside dimeter somewhat greater than that of the receiver cap 18 and less than the internal diameter of the cylindrical portion 30 of the clamping member 16. For use with conventional telephone receivers, the diaphragm diameter is preferably about 3'' or in other words about 20% greater than the diameter of the receiver to which it is applied. The outer portion of the diaphragm 14 is preferably tapered on one side 34 at an angle a of about 20° to 40°. The diaphragm may or may not be provided with center perforations 36 acording to the type of material of which the diaphragm is made, as more fully explained hereinbelow.

In assembling the cushioning device, the diaphragm 14 is inserted within the clamping member 16 with the flat or untapered side 38 contacting the inner surface of the flange 32. The assembled cushioning device is then pressed over

the cap 18 of the telephone receiver 10 forcing the tapered edge 40 against the shoulder 24 of the receiver cap 18. When thus located on the telephone receiver 10, the cushioning diaphragm 14 is domed, or bulged, outwardly into ear-receiving position.

Preferably, the resilient diaphragm 14 is composed of a cellular material such as cellular rubber. By a "cellular material," both here and in the claims, is meant a material which comprises a plurality of empty, or gas-filled, cells. Such cells may either be connected or unconnected. In either event, the employment of such a cellular material permits the transmission of sound through the diaphragm with very little attenuation. Besides, when a telephone receiver employing such a cushioning device is pressed against the ear, the diaphragm adjacent the inner portion of the shoulder 24 is compressed, forming a sound absorbing wall which encircles the ear. This wall serves to attenuate extraneous noises without, however, reducing the efficiency of the transmission of sound to the ear from the telephone receiver itself. Cushioning diaphragms composed of cellular material, preferably have a thickness between about ¼'' to about ⅜''.

Of the cellular rubbers which may be used for diaphragm material, those found most satisfactory for my purpose are those such as latex foam rubbers which have interconnecting cells, as these offer the minimum attenuation of sound from the telephone receiver to the ear without the employment of perforations. Soft and medium latex foam rubbers have been found most suitable for my purpose. These rubbers have sufficient body to form genuine cushions, but are not so stiff as to tear readily from repeated flexing at the tapered edges.

The compression characteristics of latex foam rubber is specified by the Rubber Manufacturers' Association as follows:

	P. S. I.
Extra soft	0.1–0.2
Soft	0.2–0.5
Medium	0.5–0.8
Firm	0.8–1.7

The pressure given in this table is the load required to produce a 25% indentation of a slab sample under standard conditions (see Buyers Specification—Latex Foam as revised October 27, 1944, published by The Rubber Manufacturers' Association, Inc.).

If the cushioning diaphragm is composed of non-cellular material or cellular material having unconnected cells, the sound may be transmitted therethrough most efficiently by employing central perforations, as described. However, the use of such perforations is unnecessary when the thickness of the walls between adjacent cells is small compared to the dimensions of the cells themselves.

From the foregoing description of my invention, it is seen that I have provided a cushioning device for acoustic receivers which renders the use of such receivers more comfortable and less tiring. By employing cushioning diaphragms composed of cellular materials in such devices not only is increased comfort of use of a telephone receiver obtained but, at the same time, the ratio of the intensity of desired sound to the intensity of extraneous sound is increased. Furthermore, cushioning diaphragms composed of such cellular materials may be readily washed with soap and water and, for this reason, they are easily maintained in a sanitary condition.

Obviously, many modifications may be made in the construction of the clamping member and the diaphragm without departing from the nature of my invention, as set forth in the appended claims.

I claim:

1. In a cushioning device adapted to fit over a cap of an acoustic receiver of the type described and employing a unitary clamping member adapted to clamp about the periphery of said cap, said clamping member having an inwardly directed holding flange at the outer end thereof, the inner diameter of said flange being less than the outer diameter of said cap, the improvement comprising a normally flat disc-like cushioning diaphragm formed of resilient cellular material, said diaphragm when flat being of such a diameter slightly greater than said cap so as to adapt it for clamping between said cap and said holding flange, whereby said diaphragm is domed outwardly from said cap when clamped between said cap and said clamping member.

2. A cushioning device as described in claim 1 in which said diaphragm is made of cellular rubber which has closed cells which do not connect and in which said diaphragm is provided with a plurality of perforations in the central portion thereof.

3. A cushioning device as described in claim 1 in which said diaphragm is made of latex foam rubber having open and interconnecting cells and selected from the class consisting of soft latex foam rubber and medium latex foam rubber.

4. For an acoustic receiver of the type described, a normally flat disc-like diaphragm composed of resilient cellular material, said diaphragm having a thickness between about ¼'' and about ⅜'', said diaphragm having a diameter of about 3'', and said diaphragm being tapered at an angle of about 20° to about 40° at its outer edge.

WILLIAM J. KONVALINKA.

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