

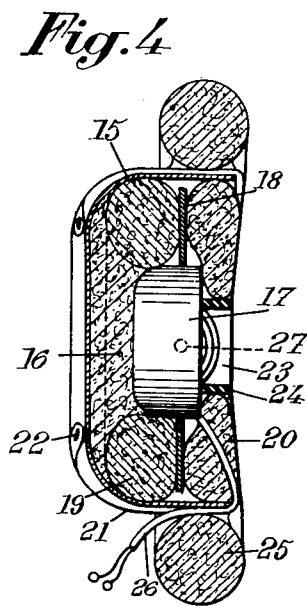
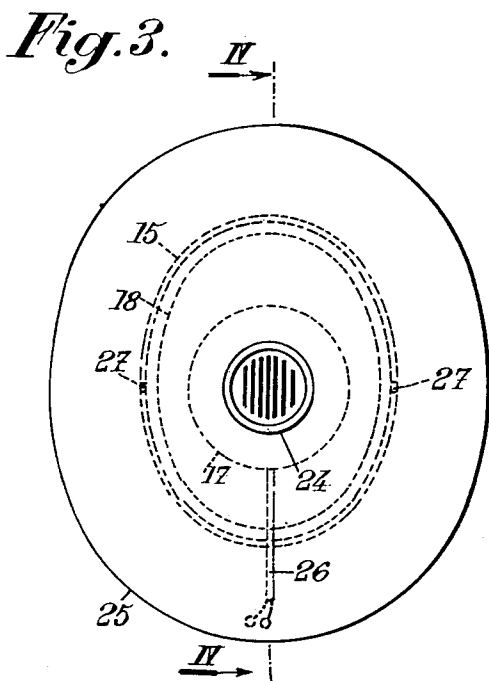
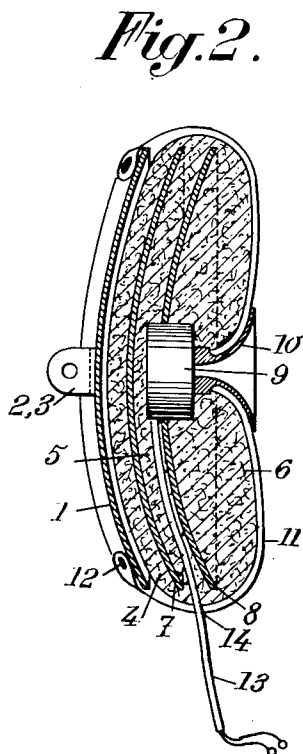
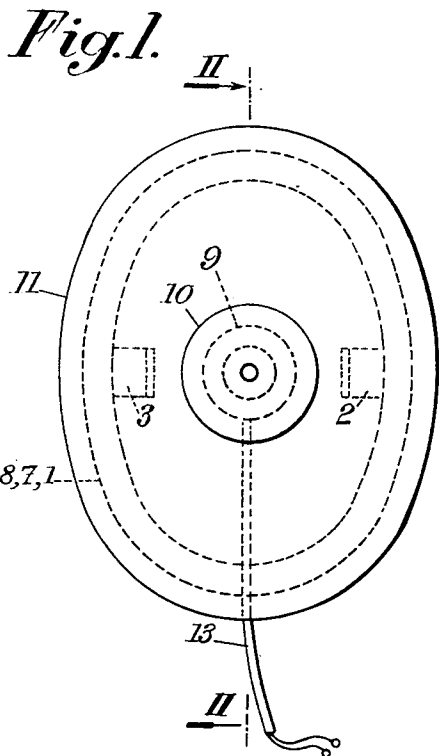
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NOISE, EXCLUDING TELEPHONE RECEIVER

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NOISE EXCLUDING TELEPHONE RECEIVER

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3 Claims. (Cl. 179—182)

The present invention relates to noise excluding telephone receivers and its object is to provide a receiver which enables someone placed in a noisy atmosphere to hear telephone communication without being disturbed by surrounding noise.

It was already proposed for this purpose to cover the receiver with an insulating substance such as cotton or felt. It was also proposed to make very small receivers provided with an extension intended to be introduced into the auditory duct so as to convey sound waves toward the eardrum. The devices used up to now did not give satisfactory protection against noise.

The receiver device according to my invention is essentially characterized in that it comprises, in combination with the receiver proper, means for protection against noise including multiple partitions of high specific acoustic resistance (and of rather high density) without direct contact with one another, held in position by a material of low specific acoustic resistance (and relatively flexible), the receiver unit proper being rigidly connected with and centrally mounted in the partition which is the nearest to the ear.

The specific acoustic resistance of a substance is the product of its specific mass, for instance in grams per cubic centimeters, by the velocity of propagation of sound, for instance in centimeters per second.

By way of example, it may be indicated that the best results seem to be obtained when making use of metallic plates or partitions (or partitions of another heavy material such as cement), in the form of cup-shaped elements, held in position by intermediate layers, or cushions, of kapok, whereas a toroidal cushion, also filled with kapok, surrounding the whole, provided for protection against low frequency sounds. Kapok is not only a very flexible substance but also a good absorbing material from the acoustic viewpoint, which also contributes in the protection against sound; finally the very efficient mechanical damping of the vibrations of the metal elements by the kapok filling reduces resonances and thus achieves an efficient protection within the range of audible and ultra-audible frequencies. Furthermore, this mechanical damping effect of the kapok material increases very much when the amplitude of vibration increases, whereby sounds are the more reduced as they are more intensive.

I will now describe by way of example two preferred embodiments of my invention with reference to the appended drawings in which:

Fig. 1 is a plan view of a telephone receiver according to my invention, seen from the side which is in contact with the ear;

Fig. 2 is a corresponding cross-section on the line II—II of Fig. 1;

Figs. 3 and 4 are views similar to Figs. 1 and 2, relating to another embodiment of the invention.

In the construction of Figs. 1 and 2, a cup-shaped piece 1 of a rigid material, for instance a metal sheet 1 mm. thick, is provided with two angle-pieces 2 and 3 for attaching the sound excluding receiver to the head band

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of a head-set. On the inner side of piece or plate 1 are provided three layers 4, 5 and 6 of a non-metallic fibrous compressible material having a low specific acoustic resistance, layers 4 and 5 being separated from each other by a slightly concave, for instance cup-shaped, metal sheet 7 and layers 5 and 6 by a metal sheet or cup-shaped element 8. The absorbing material is for instance kapok; cup-shaped elements 7 and 8 may be made of lead sheets 1 mm. thick, while the supporting cup-shaped piece 1 is made of an iron or brass sheet.

One of the essential features of my invention lies in the fact that sheet 8 is provided with a hole in its central part and that a very small telephone receiver 9 is fitted in this hole. A funnel-shaped rubber member 10, rigid with this receiver, extends through the fabric 11 which surrounds the whole of the ear protector. The funnel-shaped member 10 defines an acoustic conduit which extends through the fibrous material 6 from the receiver unit 9 to the ear of a listener. Thus the mass of receiver 9, added to that of cup-shaped member 8, which is elastically suspended, without any rigid contact with the outside, also contributes in increasing the acoustic insulation achieved by this device. The fabric 11 which covers the ear-protector is held in position by an elastic wire 12, so that it can be easily removed for cleaning or replacement or for repairing the receiver unit 9. Electric connections are established by means of a two-conductor cord 13 which enters the device through an aperture 14 provided in the outer fabric 11. This cable does not pass through any of the metal plates.

Another form of construction of a telephone receiver device according to my invention is shown by Figs. 3 and 4.

This arrangement, which is more especially intended for use under water, is provided with a high efficiency electro-dynamic receiver unit. It includes a brass shell 15 the bottom of which is filled with kapok 16. An electrodynamic receiver unit 17 is centrally mounted in a lead plate 18. The structure comprising elements 15, 16 and 18 constitutes a "multiple partition" giving a very efficient protection against external noises. The assembly comprising receiver 17 and plate 18 is held in position by two cushions 19 and 20 of toroidal shape made of a gauze envelope filled with kapok, so that no metallic contact exists between shell 15 and the unit constituted by elements 17 and 18. In these conditions, the mass of receiver 17 added to that of plate 18 achieves a very efficient acoustic damping of the noises of external origin.

The whole is covered with an envelope of a washable fabric 21 held in position by an elastic rubber wire 22. This fabric envelope 21 is provided with an aperture 23 and a rubber ring 24 prevents toroidal cushion 20 from coming over this aperture and contributes in keeping the ear-piece in correct position.

The whole device may be made more watertight and still more efficient by surrounding it peripherally with a toroidal cushion 25 made of a washable fabric envelope filled with kapok. The electrical connections are provided by means of a rubber covered cable 26 which enters the apparatus through a suitable aperture and passes under cushion 25. Holes 27, provided in shell 15, make it possible to incorporate the complete receiver conveniently in a head-set.

In the case of the device shown by Figs. 1 and 2, I may also use, to increase its efficiency, a toroidal cushion such as the cushion 25 of Figs. 3 and 4.

The device according to my invention has many advantages and in particular the following ones:

a. It is very efficient and makes it possible to listen to a telephonic communication in very noisy places; it is especially efficient as protection against industrial noises and shock waves.

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b. It makes it possible to listen intelligibly and comfortably in a place where other persons are talking or transmitting orders without being disturbed by such interference; this avoids the necessity of acoustically insulated booths or call boxes.

c. It includes no part to be introduced into the auditory duct, and the part in contact with the ear can be easily cleaned or replaced.

d. It can be easily adapted to a telephone head-set and is easily supported without fatigue for long times.

In a general manner, while I have, in the above description, disclosed what I deem to be practical and efficient embodiments of my invention, it should be well understood that I do not wish to be limited thereto as there might be changes made in the arrangement, disposition and form of the parts without departing from the principle of the present invention as comprehended within the scope of the accompanying claims.

What I claim is:

1. A noise excluding telephone receiver comprising: 20
first and second confronting spaced substantially coextensive parallel metallic plates; a telephone receiver unit mounted centrally on said first plate and directed away

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from said second plate; a mass of compressible non-metallic fibrous material substantially filling the space between said plates and extending over the non-confronting side of said first plate; and an acoustic conduit extending from 5
said receiver unit through said fibrous material to the exterior thereof.

2. A telephone receiver according to claim 1 and additionally comprising at least one further plate surrounded by said mass of fibrous material and interposed between 10
said first and second plates.

3. A telephone receiver according to claim 1, wherein said fibrous material is kapok.

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