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SOUND SHIELD FOR TELEPHONE TRANSMITTERS

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Fig. 1.

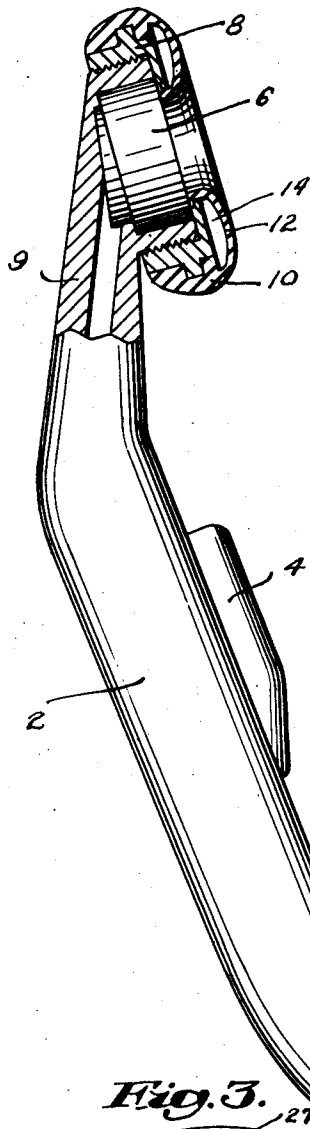


Fig. 2.

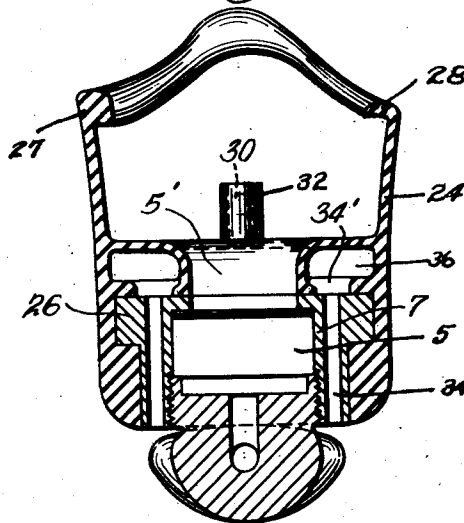
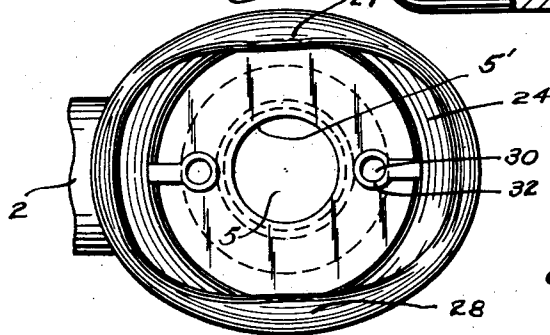


Fig. 3.



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SOUND SHIELD FOR TELEPHONE
TRANSMITTERS

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2 Claims. (Cl. 179-187)

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This invention relates to telephones and more particularly to a hand telephone set.

An object of the invention is to improve hand telephone sets and to devise a receiver portion of a hand telephone set which is particularly adapted for use with army helmets. Another object is to incorporate in the transmitter portion of a hand telephone set means for obtaining improved speech communication and noise exclusion. Another object is to provide a simple, durable and efficient hand telephone set. Other objects will appear from the following description of the drawings and discussion relating thereto.

In the accompanying drawings:

Fig. 1 is a view in side elevation and partial longitudinal section illustrating the hand telephone set of the invention;

Fig. 2 is a cross section taken on the line 2—2 of Fig. 1; and

Fig. 3 is a detail front elevational view of a microphone and noise shield assembly.

Referring more in detail to the drawings, numeral 2 denotes a frame member for a telephone hand set. The frame is of tubular construction and at its middle portion is provided with a conventional switch arrangement which is not disclosed in detail in the drawings. The switch is operated by means of a switch button 4, partly recessed in the frame member at the inner side thereof.

At the lower or transmitter end of the frame member 2 is located a microphone 5 of the mask type. The microphone is held in place by means of a cap 7 which is threaded to the extremity of the frame 2, as is more clearly illustrated at the lower right-hand side of Fig. 1. At the upper end 9 the frame member is provided an earphone 6 which may also be of conventional design. The earphone is held in place by a receiver cap 8 threaded around the extremity of the frame member.

The receiver cap 8 has snugly fitted around it an ear cushion member 10, preferably formed of a resilient rubber-like material such as for example neoprene or other substances. The cushion member is characterized by an annular rim 12 which occurs in spaced relation to the base of the cushion, thereby leaving a cavity 14 which permits the annular rim to be depressed. There is thus provided substantial compliance or yieldability.

Noise excluding means have been provided for at the microphone end of the hand set. An indicated in the drawings, numeral 24 indicates a noise shield member formed of soft rubber or

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rubber-like material such as neoprene or other substances. The noise shield is a generally cup-like member having forwardly flared flexible sides forming a forward voice chamber. The rearward part of the noise shield is circular, so as to engage around shouldered portions 26 of the microphone-retainer cap 7, which serves as a support for the shield, as clearly indicated in Figs. 1 and 2.

The volume of the cavity existing in the noise shield, when engaged against the face, is so chosen that when the device is used with currently available microphones, a substantially flat frequency response curve is achieved. The reason is that this size of cavity is adapted to accentuate low frequencies to a degree such that the microphone has a reduced or falling response curve.

The noise shield member is especially fitted to conform to the shape of the face and the contour of a transverse section of the noise shield member is oval-shaped for this reason. In addition, the forward extremity of the shield member is further provided with upper and lower rolled edges 27 and 28 against which the upper lip and lower lip respectively of the user may be pressed while the telephone set is being used.

Another feature of the noise shield consists in a variation in thickness of its side walls. The wall portion adjacent to the upper rolled edge 27 is relatively thick, while the wall section adjacent to the lower rolled edge 28 is relatively thin. The purpose of the relatively thin wall section at the latter point noted is to impart increased compliance and flexibility at this point in order to allow the noise shield to move with the lower lip and chin of the operator during speech. This eliminates any tendency of the noise shield to interfere with proper speaking, while at the same time excluding ambient noise and more efficiently transmitting the speech signal.

An annular chamber 36 is formed integrally with, and concentrically within, the wall parts of the voice chamber, forming a rearward boundary of the voice chamber, the inner wall of this chamber 36 forming a rearward terminal part 5' of the voice chamber aligned with and leading to the microphone. The rear wall of the chamber 36 is planiform and lies flat against a planiform forward face of the cap 7. At the forward side of the chamber 36, open tubular extensions 32 are formed, connected to the side wall of the voice chamber, extending forwardly and opening immediately of the front-to-rear dimension of the voice chamber. Two of these extensions are shown located adjacent a horizontal diameter of the voice chamber so as to lie adjacent respective

ends of the mouth of the user. Respective ducts 30 are formed through these extensions opening into the chamber 36, and in the rear wall of the chamber 36 there are formed four ports 34' somewhat larger in diameter than the ducts 30 two of which are opposite the ducts 30. Four equally spaced ducts 34 of smaller diameter than the ducts 30 are formed through the cap 7 opening from the ports 34', and two of which are nearly in line with the ducts 30 but slightly eccentric to the latter and two non-registering ducts 34 spaced midway between ducts 30.

The two sets of air ducts 30-34 constitute acoustical impedance elements analogous to electrical inductances, and the larger annular chamber 36 intermediate the two tubes constitutes an acoustical impedance element analogous to electrical capacitance, coactive with ducts 30-34. The combined effect of the two types of elements provides an acoustical low-pass filter whose function is to exclude high frequencies while permitting the operator to breathe freely. This filter arrangement greatly increases the efficiency of the device in a high ambient noise field.

As a result of the relations and proportions of the ducts and the chamber 36, it may be seen that sound waves entering through the ducts 34 will expand considerably in the chamber 36, so that only a limited part will pass directly to the opposite ducts 30, and in addition interfering and out-of-phase reflections and reaction waves will be returned to the passages 30 from the chamber 36. In addition, sound waves from the same external source as those passing directly to the ducts 30, will be transmitted partly around the chamber 36 from the two non-registering ducts 34, which will reach the ducts 30 also out-of-phase with the directly transmitted waves, producing a pronounced interference and other levelling or neutralizing effects.

It should be also appreciated that the device will in some uses have importance in preventing unauthorized persons nearby from obtaining information by listening to the voice of the person using the microphone for the transmission of information. In such use the sound emanating from the voice chamber will be attenuated in the ducts 30, and leaving these will be diverted and diffused in the chamber 36, a small portion tending to escape through the directly opposite duct 34 and a part being reflected nearly reversely to the direction of incidence, owing to the planiform surface surrounding the smaller duct 34 within the large ports 34'. This reversed sound will neutralize a substantial part of the sound leaving or in the ducts 30, and the reactive and diversional effects manifest in the chamber 36 will produce out-of-phase elements further contributing to neutralization. Eddies of air in the breath currents leaving the ducts 30 and engaging the surfaces around the ducts 34 in ports 34' will also contribute to dampening of sound from within the voice chamber passing through the ducts 30. In addition, the ducts 34 being smaller than the ducts 30, much of the escaping air and sound is forced to diverge from the axis of the ducts 30 and pass partly around the chamber 36 meeting currents and waves from the opposite direction and producing great damping action upon sound reaching this chamber, so that a very small amount of the air, and little if any sound, escape at the non-registering ducts 34.

It is intended that the noise shield member may be modified in various ways and utilized with

other transmitting devices. The features described, such as the design of a correct acoustical cavity size to provide a proper response curve, may be used independently of the other features. Similarly, the acoustical low-pass filter may be applied to other devices where such a feature becomes desirable. In general, the size and shape of the shield as well as the openings forming the low-pass filter are likewise subject to modification.

It will be seen that the features described provide an easily installed means of excluding ambient noise and thus improve transmission in a hand telephone set. Other advantages are also present which render the device more comfortable when held against the face and allow the shield to be maintained in place for relatively long periods.

While I have shown a preferred embodiment of my invention, it should be understood that various changes and modifications may be resorted to, in keeping with the spirit of the invention as outlined in the appended claims.

Having thus described my invention, what I claim is:

1. A noise shield for a microphone or the like, comprising a compliant cup-shaped member adapted to be secured around the outer periphery of a microphone, said member having upper and lower rolled edges for engagement against the lips of an operator, the wall portions of said cup-shaped member adjacent to said lower rolled edge being relatively thinner than the thickness of the wall portions adjacent to the upper rolled edge for the purpose of providing flexibility and whereby the lower side of said member may move with the lips and chin of the operator during use.

2. In a noise shield of the class described, a cup-shaped member adapted to be secured around the periphery of a microphone and shaped to engage the face of a wearer around his mouth to form a voice chamber, an annular chamber formed around the cup adjacent its outer wall and at the rearward part thereof, and around a space symmetrically extending forwardly from the microphone when engaged in the shield, said annular chamber constituting a rearward boundary of the voice chamber, ducts being formed on the inner wall of the voice chamber at diametrically opposite sides in communication with the voice chamber and the interior of the annular chamber, said annular chamber having a substantial dimension longitudinally of the noise shield, ports formed in the rear wall of said annular chamber, and a plurality of ducts of smaller diameter than the first named ducts but in greater number extending from the annular chamber rearwardly to the atmosphere.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,368,261	Jenkins	Feb. 15, 1921
1,440,752	Stone	Jan. 2, 1923
1,743,290	Stehlik	Jan. 14, 1930
1,757,463	McCann	May 6, 1930
1,930,906	Nordenswan	Oct. 17, 1933
2,390,488	Alfred et al.	Dec. 11, 1945
2,398,076	Bulbulian	Apr. 9, 1946
2,408,474	Newman et al.	Oct. 1, 1946