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E. B. NEWMAN ET AL

2,408,474

NOISE SHIELD FOR TRANSMITTER MOUTHPIECES

Filed Dec. 29, 1944

2 Sheets-Sheet 1

Fig. 1.

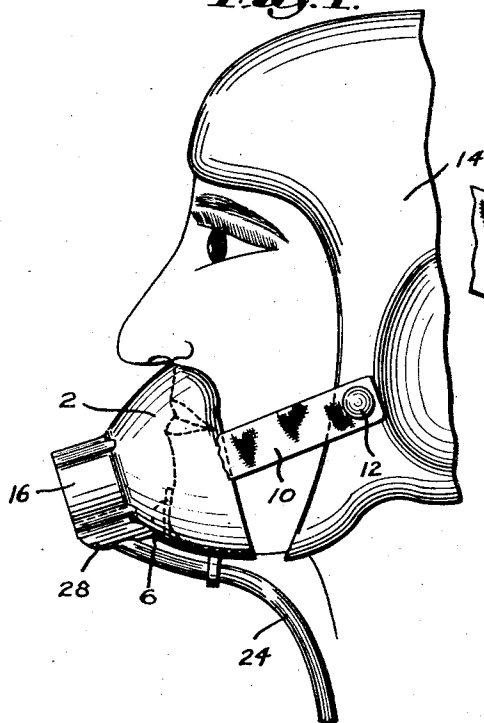


Fig. 2.

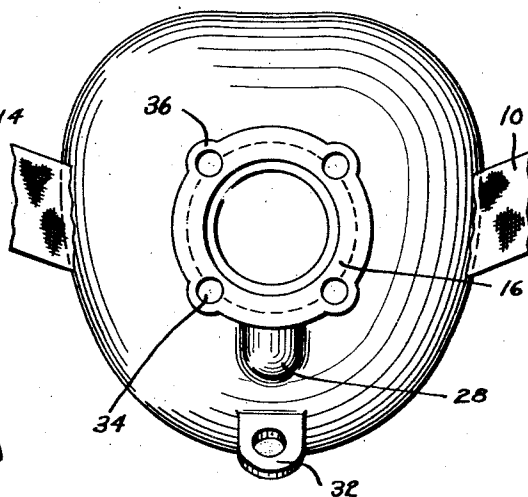


Fig. 3.

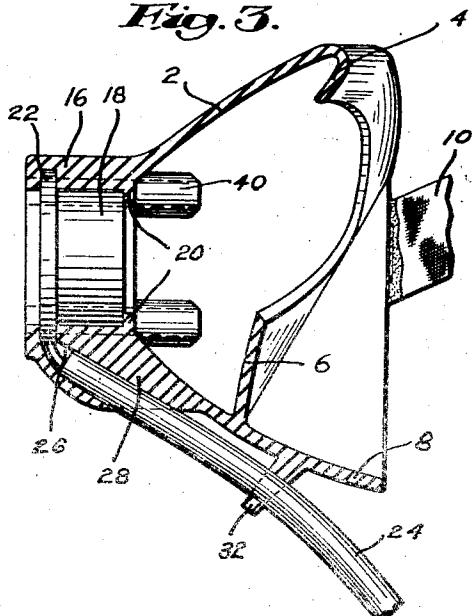
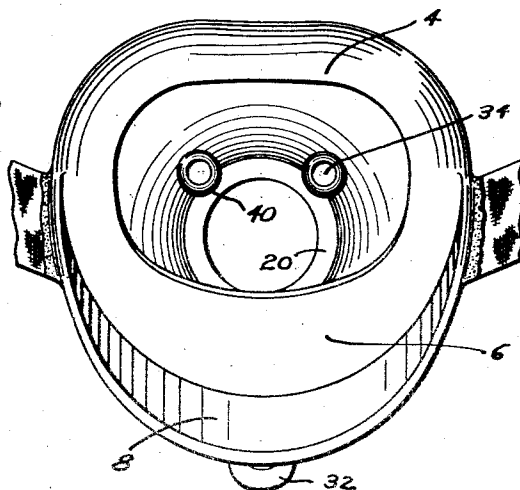


Fig. 4.



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Fig. 5.

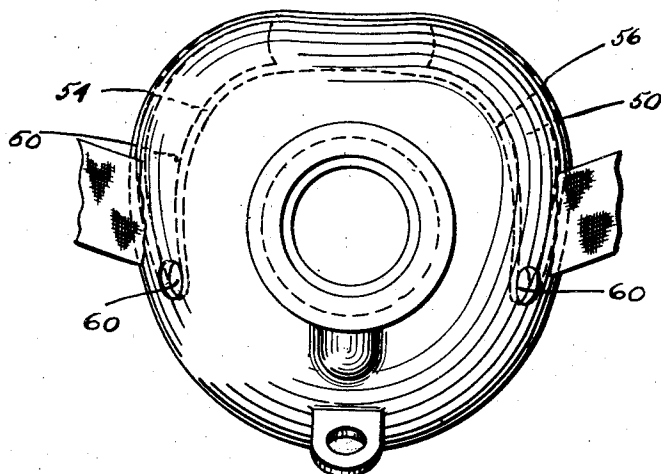


Fig. 6.

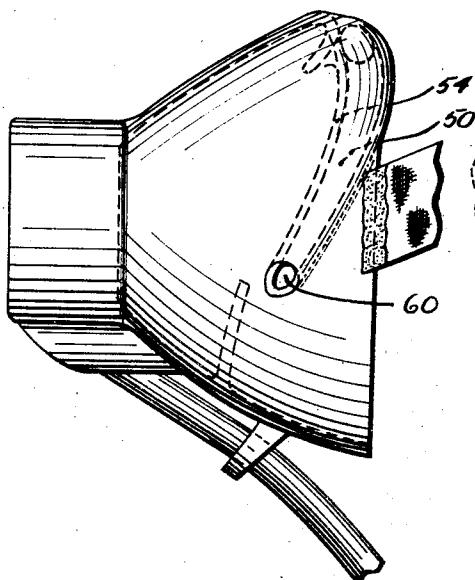
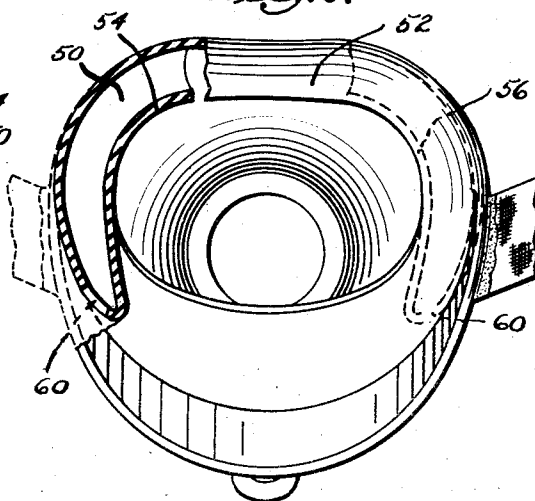


Fig. 7.



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NOISE SHIELD FOR TRANSMITTER
MOUTHPIECESEdwin B. Newman and Joseph Miller,
Cambridge, Mass.

Application December 29, 1944, Serial No. 570,354

5 Claims. (Cl. 179—188)

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This invention relates to microphones and more especially to an enclosure or shield for use with microphones to exclude ambient noise and improve speech communication.

An object of the invention is to improve microphones, and to devise a microphone and noise shield arrangement having a size and shape which permits most effective speech communication. Another object of the invention is to provide a shield which insulates against ambient noise. Still another object of the invention is to provide a noise shield which is compact, easily located in a correct operating position, comfortable to wear, and adapted to avoid interference with the visual field. Other objects of the invention will appear from the following description.

In the accompanying drawings:

Fig. 1 is a view in side elevation diagrammatically illustrating the microphone and noise shield of the invention in use;

Fig. 2 is an end elevational view of the noise shield;

Fig. 3 is a central vertical cross section of the noise shield;

Fig. 4 is a front elevational view; and

Figs. 5, 6 and 7 illustrate a modification of the invention.

The invention generally includes a cup-like enclosure having a sealing portion which corresponds to the contour of the face at points immediately surrounding the mouth. The enclosure includes side walls of flexible sound insulating material. The walls converge to form a microphone socket portion in which a microphone may be supported in spaced relation to the lips thus providing a cavity. The size of the cavity is designed to minimize low frequency resonance and openings are incorporated in the device to provide for passage of air.

Referring more in detail to the drawings, numeral 2 indicates an enclosure member consisting of a generally cup-like body having a sealing portion which is designed to fit snugly along the upper lip and to extend rearwardly and downwardly across the cheeks and under the chin, in the manner illustrated in Fig. 1 of the drawings. The shield member is preferably formed of rubber, soft plastic or other material suitable for providing insulation of noise.

Those portions of the shield 2 which are adapted to contact the upper lip and cheeks of an operator, are formed with a rolled edge 4. The rolled edge 4 is a continuation of the side walls of the shield 2, being slightly thinned and curved sharply inwardly into a position adapted to lie conveniently against the upper lip of the oper-

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ator, as may be observed from an inspection of Fig. 3 and Fig. 4. Curvature of the rolled edge 4, together with its width, constitutes a relatively large bearing surface, against which the upper lip may be located with sufficient pressure to provide a seal for excluding ambient noise. The thinned rolled edge construction is especially effective in permitting pressure suitable for sealing purposes with a minimum of discomfort.

In following the contour of the face, the rolled edge 4 curves rearwardly and downwardly away from either side of the upper lip, and merges with a wall or partition 6. The partition 6 is of a height adapted to provide a stop or guide against which the chin may be positioned in the manner illustrated in Fig. 1. It is pointed out that the rolled edge 4 and the partition 6 constitute a means of controlling the size of the cavity in the noise shield 2, and forming an opening in which speech communication may be efficiently carried out, as may be seen from Fig. 4.

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 that the microphone has a reduced or falling response curve.

The noise shield at its lower side extends beyond the partition 6 to furnish a chin seat 8 which further assists in sealing the noise shield about the face of an operator, and in addition, is effective in correctly locating the device against the face since the chin naturally assumes a seated position on the seat 8 and against the partition 6. In addition, the chin seat maintains the sealed relation during the talking movement and cooperates with the tension of the supporting straps to furnish a comfortable seat.

Attached to the edge of the shield at either side thereof are supporting straps 10 which may be secured in any suitable manner, as by being molded directly in the material of which the noise shield is formed. The point of attachment noted in the drawings has been found to be very satisfactory in permitting the straps to hold the noise shield in a firmly seated and sealed position against the face, and the detachable end of the strap, which may for example be furnished with a snap fastening 12, conveniently falls into a position overlapping an aviation helmet 14, in the manner illustrated in Fig. 1. The shield may also be attached to and supported by a suitable telephone handset, a head harness, a steel helmet or the like.

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Numeral 16 denotes a microphone socket portion which is of cylindrical shape and provided with an opening of a size adapted to receive a microphone 18. At the inner periphery of the socket portion 16 is a rim 20 against which the microphone 18 is located. 22 indicates a cap which is secured in a groove formed in the socket portion. Electrical conductors 24 are attached to the microphone as illustrated in Fig. 3, and these conductors pass through a passageway 26 provided in a projection 28 of the socket portion. The conductors 24 extend from the opening 23 along the under side of the noise shield and are received through a support 32 formed on the under side of the noise shield member. This arrangement provides for the wires being conveniently held in a position where they are less likely to become entangled or to interfere with the movement of the hands of an operator.

In using the device, it is desirable to provide passageways through which air may be permitted to pass. A preferred embodiment of air passage consists of openings 34 which extend axially through the outer portions of the socket 16 in the manner illustrated in Fig. 2. Preferably the socket member 16 is formed with projections 36. The socket and projections 36 extend beyond the face of the microphone 18 so that the ends of the openings 34 terminate at points outside of the microphone. Within the shield 2 are provided tubular portions 40 through which extend the air passages 34. These tubular portions have been found to provide excellent insulating means for excluding ambient noise. The relatively long passageways formed by the tubular members act as sound attenuating members.

The shape and proportion of the noise shield may be modified in various respects. For example, in Figs. 5, 6 and 7 we have illustrated a modification of noise shield in which air passages 50 of different form are provided. The noise shield at points adjacent an upper rolled edge 52 is formed with tubular sections 54 and 56, which extend outwardly and downwardly in the manner more clearly illustrated in Fig. 7 to terminate in openings 60 at either side of the noise shield as may be readily observed in Figs. 5 and 6. The tubular portion is preferably composed of a soft rubber, similar to that utilized in the rest of the noise shield.

The purpose of the air passageway disclosed is to provide a more indirect path by which ambient noise entering the noise shield cavity may be muffled or insulated. The effect of the relatively long and curved passageway is to substantially reduce transmission of ambient noise through the shield in comparison with noise transmitted through relatively long passageways. Various other forms of passageways may be resorted to for the purpose of thus excluding ambient noise or muffling such noise.

It will be seen that the device provides an efficient means of excluding ambient noise. The device may be held in position for use without the assistance of the hands and is thus particularly suited for use in the operation of aircraft. The design and shape of the noise shield provides for satisfactory sealing against the face, together with flexibility and compliance which provides for comfort in wear. The chin seat and partition combine to furnish a means of quickly and accurately locating the noise shield about the face, and at the same time serves as a means of arriving at a proper size of cavity to give a correct acoustic capacitance. The angular disposi-

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tion of the shield and socket portion in relation to the face prevents interference with the visual field, and the connecting wires are conveniently supported in a position such that they are not subject to becoming entangled or to interfere with the use of the hands of the operator. The device generally is of a compact one-piece construction which can be easily and cheaply manufactured.

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

We claim:

1. An article of the character described comprising an enclosure member adapted to overlie the face at points adjacent the lips, said enclosure being of a generally cup-like formation and presenting along its upper side a rolled edge for compliantly sealing with an upper lip, said enclosure further presenting a chin rest at the lower portion thereof, said chin rest being a continuation of the rolled edge, the enclosure having an inwardly extending chin seating portion adapted to underlie the chin, a microphone socket portion formed at the outer side of the enclosure, and air passage means located through the said socket portion.

2. A noise shield for microphones comprising a cup-shaped enclosure adapted to overlie the face at points adjacent the mouth, said enclosure having along its upper side a rolled edge for resiliently engaging against the upper lip, a microphone socket portion formed at the outer side of the enclosure, and tubular means for expelling air extending through and wholly within the outer limits of the enclosure.

3. A noise shield for microphones comprising a cup-shaped enclosure member adapted to surround the face and being formed along its upper side with a rolled edge, a partition member consisting of a continuation of the rolled edge, said partition member constituting a stop for locating the chin in the enclosure, a chin seat extending rearwardly from the said partition, a microphone socket portion formed at the outer side of the enclosure, tubular means located through the microphone socket portion for providing passageways through which air may be expelled, said socket portion having a channel formed therein for the purpose of receiving electrical conductor members connected to the microphone.

4. A noise shield for microphones comprising a cup-shaped inclosure member adapted to overlie the face at points adjacent the lips of an operator, said inclosure having a resilient edge about the open end for compliantly sealing about the lips, a chin seating portion extending outwardly from the lower edge thereof adapted to underlie the chin, a microphone socket portion formed in the closed side of said inclosure and a plurality of elongated air passage means located wholly within the outer surface limits or said inclosure.

5. A noise shield for microphones comprising a cup-shaped inclosure with a microphone socket portion located within the closed end of said inclosure, tubular means for air passage located entirely within and through said socket portion and resilient edges about the opening of said cup-shaped inclosure for fitting snugly against the face and about the mouth of an operator.

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