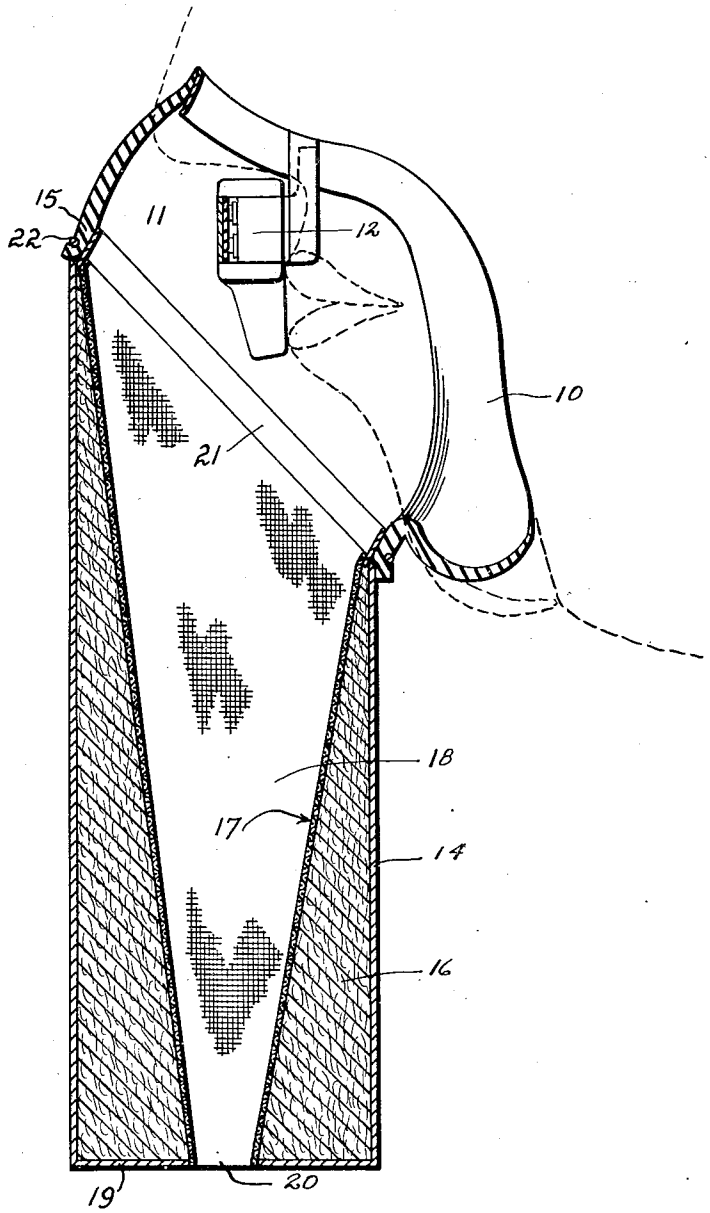
May 23, 1950 C. T. MORROW 2,508,581

NOISE SHIELD FOR MICROPHONES

Filed Feb. 18, 1946



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Patented May 23, 1950 2,508,581

UNITED STATES PATENT OFFICE

2,508,581

NOISE SHIELD FOR MICROPHONES

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Application February 18, 1946, Serial No. 648,512

6 Claims. (Cl. 179—188)

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This invention relates to a noise shield and more particularly to a noise shield for use with microphones.

It is desired, in some instances, to exclude ambient noise when speaking into a microphone, and for this purpose it has been proposed to surround the microphone with a flexible casing conveniently formed to fit against the face and form a seal along those areas immediately surrounding the mouth. One objection to such an arrangement is that the operator speaks into a relatively small volume of air, and reaction on the voice by standing waves of sound creates distorted voice communication.

An object of the invention, therefore, is to improve noise shields of the character described and to devise means for reducing distortion arising from the reaction of standing waves of sound, as well as to reduce access of ambient sound directly to the microphone, and prevent voiced information from being heard without the shield; all while interposing a minimum of obstruction to breath flow from the device. Other objects and novel features will appear from the following description of the invention.

In the accompanying drawings, the figure shown is a cross-sectional view illustrating the noise shield of the invention.

In general, my improved noise shield comprises a flexible mouthpiece of rubber or similar material, in which a microphone is used, supported on the head of the user or otherwise conventionally. In the present instance it is indicated as supported on the mouthpiece itself, for which the invention has peculiar advantages. Connected to this mouthpiece and preferably being a continuation of it, is a cylindrical body which provides a cavity adapted to increase materially the volume into which the user of the device speaks when the mouthpiece is held against the face.

Considering the structure shown in the drawings in greater detail, 10 denotes a substantially annular noise shield body member formed of a rubber-like flexible material, which is preferably shaped at its rear side to fit around the face. This opening may be termed a voice inlet opening. The shield encloses a space which may be termed a voice chamber 11. In the noise shield member therein is mounted in some convenient manner (not shown in full) a microphone 12 lying in spaced relation to the inner surface of the noise shield member. This shield terminates at its forward lower part in a plane at an angle of 45°, more or less, to the vertical as the device is customarily positioned on the face of the user. Connecting with the under side of the noise shield is a tubular thin-walled extension 14 thereof, which has around its inner periphery and throughout its length, a sound-absorbent material 16 of conventional character. The sound-absorbent material is preferably formed with a

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tapered internal shape, as shown in the drawings, increasing in thickness as it extends downwardly to define a conically-shaped air relief passage and sound damping chamber 18, having an appreciable volume. The smaller lower end of the tubular member 14 is formed with a bottom 19 having an exhaust hole 20 forming the outlet of the chamber 18 to the atmosphere, through which air may escape when the operator is using the device.

Prior known sound absorbent materials suitable for use at 16 may include cotton, wool, or other materials, and the surface of the passage 18 may consist of a coarse woven fabric facing 17 forming part of the sound absorbent element, this fabric being extended at its upper end beyond the material 16 and engaged against a collar 21 forming an upper termination of the tubular member 14. The member 14 terminates at a plane which in this instance is at an angle of 45° to the longitudinal axis of the extension, and has a symmetrical collar 21 thereon, the axis of which is nearly or quite normal to the said plane. The collar is set snugly in the neck portion 15 formed around the forward opening of the noise shield, and to hold the extension firmly to the shield a confining wire ring 22 is shown engaged around the neck. The angle of the plane of the collar to the axis of the tubular member 14 may be varied as required.

The volume of the tubular extension should preferably be greater than 30 cubic inches for best results, and when thus constructed, the sound absorbent lining 16 prevents reaction on the voice by standing waves of sound and thus results in much more faithful sound reproduction by the microphone. The exhaust opening 20 has been found to provide preferable results when at least ¼ inch in diameter, larger diameters being permissible. The range of volume may be increased where desirable and practical, and such an absorbent lined structure having a volume of as much as 70 cubic inches with an outlet of ½ inch in diameter will provide for frequencies above about 500 C. P. S. with nearly perfect absorption of all sound radiating from the mouth, and consequently will produce by reflection little reaction on the voice for frequencies above that low-frequency limit. The low-frequency limit is raised if the volume is decreased or the outlet chamber is increased.

The microphone used should preferably have a flat free-field, frequency-response characteristic above the low-frequency limit of the noise shield to the highest frequencies necessary for intelligible speech reproductions and should be deficient in response below the low-frequency limit to prevent accentuation of the lower frequencies by the noise shield.

The relatively large outlet prevents back pressure due to breath but does not result in an inferior signal-to-noise ratio since the absorbent

lining, if suitably made, will absorb, damp, or attenuate incident sound waves, so that immaterial reflections will occur, if any, that will reach the microphone.

It should be noted that the proportions of the noise shield body 10 are such that with the particular angle at which the extension element 14 joins the body 10, the extension hangs substantially in a vertical position, and the dimensions of the body 10 from its rear edges to its front edge are such that the axis of the extension 14 lies actually under the nose of the wearer. Consequently, the weight of the complete assembly is made less noticeable than if it were located outwardly beyond the wearer's nose, and it has a smaller radius of movement when the wearer's head is moved to right or left, minimizing liability of striking nearby objects. This is made possible by forming the junction of the element 14 and body 10 so that it defines a plane as before mentioned, its lower part very close to the chin of the wearer, while the upper part lies slightly beyond and below the tip of the nose of the wearer. This plane thus is spaced quite close to and before the lips of the wearer, and the microphone is so mounted that it lies within the plane mentioned, with the principal voice-intercepting portion at the center of the voice chamber.

Since the body 10 is adapted to fit over the nostrils of the user, benefit is obtained from nasal sounds, which contribute materially to the intelligibility of speech.

The rearwardly extending lower edge portion of the body 10 is very gradually tapered in thickness from near the thick inner part adjacent the collar 21 to the very thin extreme edge. A considerable portion of this lower part of the device is thus made extremely flexible so as to accommodate itself to individual under-jaw contours with minimum pressure and at the same time be yieldable to speech movements of the jaw with a minimum of interference. The lower part of the body 10 is extended downwardly at an angle less than 90 degrees to the part of the body encircling the collar 21, and is then curved rearwardly and finally upwardly a substantial distance in its free state, so that it may engage very yieldingly under the chin of the wearer, while the forward part of the chin rests against the last-mentioned downwardly extending thicker part. The attenuated part is the principal portion which must be moved by the jaw in the course of voice articulation and is the most easily deformed in such movements, as will be readily understood.

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

Having thus described my invention, what I claim is:

1. An article of the character described comprising a noise shield body for a microphone having a voice chamber with a voice inlet opening, a microphone member mounted in the noise shield and means for increasing the volume of the noise shield, said means comprising a pendant tubular extension of the chamber beyond the microphone distant from said voice inlet opening, its axis being substantially in a vertical plane with the axis of said voice inlet opening, said extension having sound absorbent material as a lining therein, said extension constituting a downward substantially vertical continuation of the space within said noise shield, said lining having a conical clear passage therethrough transversely coextensive with the space in the shield at its junction with the latter, reduced in diameter at its distal end, and having a clear opening at said reduced end to the atmosphere of sufficient area for substantially unimpeded passage of breath.

2. The structure of claim 1 wherein said noise shield is a substantially annular body member shaped at its rear side to receive and fit conformingly and yieldingly a portion at least of the face of a person, its forward side terminating with an opening of large diameter approximating that of the larger end of said passage and having a continuous forward annular edge in an inclined plane spaced a distance forwardly from the rear edge so that said plane extends from closely adjacent the chin of the wearer upwardly and forwardly near the nose of the wearer, means to support a microphone in said body rearwardly of said plane before the lips of the wearer, said extension comprising an outer pendant case having its end inserted in said opening of the noise shield, said noise shield being fitted thereon for support of the extension.

3. The structure of claim 1 wherein the volume within said passage is at least approximately equal to that of the said shield, and in excess of 30 cubic inches.

4. The structure of claim 1 wherein the volumetric content of said passage approximates 70 cubic inches.

5. In a noise shield for telephones and the like, in combination, a substantially annular shield body constructed of pliable elastic material to fit and yield to the face of the user at its rear side and extended forwardly and formed with a forward open termination at a plane inclined forwardly from the lower part of the device beyond the chin and nose of the user to constitute a voice chamber, a microphone therein, and a downward extension from the shield at said plane beyond the microphone distant from the position of the face of the user having an elongated conical chamber therein of a diameter coextensive with the shield at its junction with the shield and open to the atmosphere at its distal smaller end, said chamber having a wall of sound absorbent material.

6. The structure of claim 1 wherein a body of sound-absorbing material is fixed intimately around said passage lining as a virtual continuation of the said lining radially, its thickness being increased progressively from adjacent the microphone toward the extremity of said continuation.

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