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3,124,130

RESPIRATOR WITH SPEAKING DIAPHRAGM

Filed Aug. 28, 1961

Fig. 1.

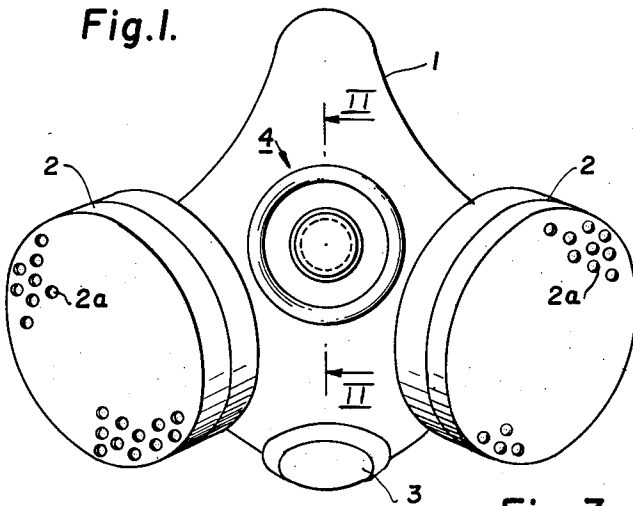


Fig. 2.

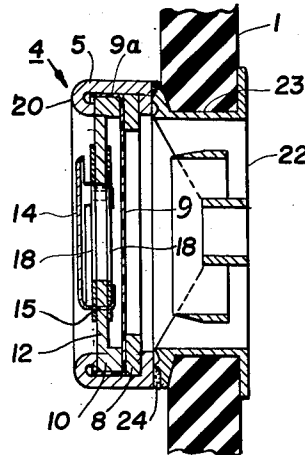


Fig. 3.

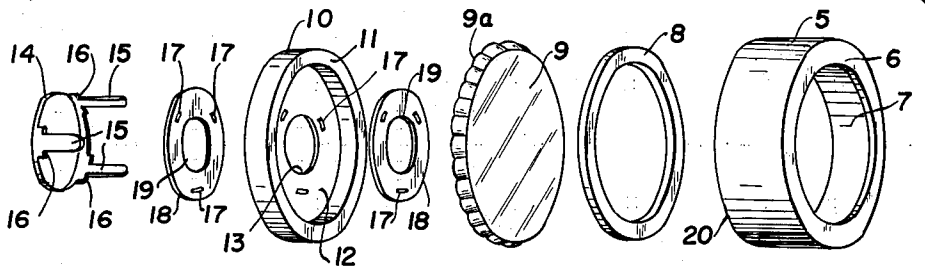
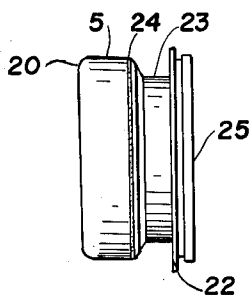


Fig. 4.



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RESPIRATOR WITH SPEAKING DIAPHRAGM

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2 Claims. (Cl. 128—141)

This invention relates to a respirator with a speaking diaphragm assembly and, more particularly, to the construction of the speaking diaphragm assembly.

Industrial respirators are sometimes equipped with speaking diaphragms to permit the wearer to be heard by others while wearing the respirator. An outstanding disadvantage of such diaphragm constructions is the necessity of accurately fitting together the various parts to provide proper tension on the diaphragm and the proper interfitting of parts to provide a gas-tight fit. Often times the workmen will be careless in assembling the parts so that the proper fit is not obtained for gas-tightness and efficiency of the speaking diaphragm.

A further disadvantage is that numerous parts are required making production and maintenance of the unit rather expensive.

An object of the present invention is to provide a novel speaking diaphragm assembly for a respirator, which assembly is devoid of the above named disadvantages and which is comprised of relatively simple and inexpensive parts and which form a unitary assembly which can be discarded and easily and quickly replaced by another unit at very low cost.

A further object of the invention is to provide a speaking diaphragm unit made almost entirely of molded plastic or metal parts which are permanently fitted together in an accurate and gas-tight manner so as to be completely gas-tight and fool-proof, which unit is provided with guards to prevent tampering with or damaging of a speaking diaphragm.

Other objects and advantages of my invention will become apparent from a study of the following description taken with the accompanying drawing therein:

FIG. 1 is a front elevational view of an industrial respirator having a face piece equipped with a speaking diaphragm unit embodying the principles of the present invention;

FIG. 2 is an enlarged, cross-sectional view taken along line II—II of FIG. 1, showing the speaking diaphragm assembly;

FIG. 3 is an exploded view, showing the separate parts forming the speaking diaphragm assembly shown in FIG. 2, and;

FIG. 4 is a side view of the unitary speaking diaphragm assembly shown in FIG. 2.

Referring more particularly to FIG. 1 of the drawing, numeral 1 denotes a conventional face piece of rubber or other flexible material, numerals 2 denote inhalation valve cups provided with air inlet openings 2a, and numeral 3 denotes an exhalation valve, all forming conventional elements of an industrial respirator.

Numerals 4 denotes a speaking diaphragm unit assembly mounted on the front of the face piece 1, preferably forwardly of the face and the mouth of the wearer. The unit 4 comprises a diaphragm holder shell 5 of cylindrical form having a radially inwardly extending flange 6 and an inner surface 7 and made preferably of molded plastic material. As shown more clearly in FIGS. 2 and 3, a diaphragm seal or ring 8 of rubber or other suitable sealing material is rested against flange 6 to provide a dust-tight fit therewith. A speaking diaphragm 9 of disk-shape is provided which may be of vinyl plastic cast film of the order of .004 inch thickness and 1 $\frac{3}{16}$ inch diameter. The perimetrical portion 9a of the diaphragm 9 is bent substantially 90° relative the diaphragm, as shown, and

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snugly encircles a diaphragm guard 10 whose edge surface 11 contacts the peripheral portion of diaphragm 9 and holds it tightly against seal 8 by virtue of crimping, at 20, the outer edge portion of holder shell 5. Guard 10 is provided with an annular flange 12 having holes 17 spaced about the inner opening 13 thereof. A pair of washers 18 are provided, each having holes 17 which are adapted to come into registry with holes 17 of flange 12 when the washers are placed on opposite sides of the flange.

A cover or cap element 14 is provided with stop portions 16 bent at 90° having integral fingers or extensions 15 which are adapted to extend through registering holes 17 of washers 18 and flange 12, after which the end portions of extensions 15 are bent inwardly, as shown in FIG. 2, so as to tightly hold the washers against the surfaces of flange 12. It will be seen therefore that lateral openings are provided between cap 14 and flange 12 to permit the sound to emerge radially outwardly. It will be further seen that a sound chamber is provided, defined by diaphragm 9, flange 12 and cap 14, which chamber greatly improves the clarity of the speech transmitted as the result of vibration of diaphragm 9 caused by voice signals of the wearer.

The speaking diaphragm 4 is mounted on a ring 23 of channel shaped cross-section by means of cement 24, or perhaps it could be an integral part of shell 5. Ring 23 is snugly slipped into a circular hole formed in the front wall of respirator 1 and is provided with integral, radially extending flanges 22 interconnected by integral rings to form an inner guard to protect the diaphragm 9 and at the same time to provide suitable openings to transmit voice signals.

When the unit 4 becomes faulty, it may be easily and quickly replaced simply by pulling on holder 5 so as to dislodge ring 23 from the respirator face piece 1. All the parts of the speaking diaphragm unit shown in FIGS. 2, 3, and 4 may be made of molded plastic material with the possible exception of the seal 8 and diaphragm 9. The parts may also be of metal.

Of course, other diaphragm materials may be substituted and other dimensions thereof may be found suitable.

Thus it will be seen that I have provided an efficient speaking diaphragm assembly of a unitary construction made of simple and inexpensive molded plastic parts which are tightly and accurately held together in an airtight manner and which are so disposed and arranged so as to provide a voice chamber which will greatly improve the clarity of transmitted voice signals; furthermore, I have provided a speaking diaphragm unit with suitable front and rear guards to prevent tampering with and damaging of the diaphragm, also I have provided a relatively small voice transmitting unit which is quickly and easily replaceable by the mere pulling thereof from the respirator face piece.

While I have illustrated and described a single specific embodiment of my invention, it will be understood that this is by way of illustration only, and that various changes and modifications may be made within the contemplation of my invention and within the scope of the following claims.

I claim:

1. In combination with a respirator face piece having a circular opening forwardly thereof, a speaking diaphragm unitary assembly comprising a ring of channel shaped cross-section into the channel of which the face piece portion defining said opening is snugly fitted, a cylindrical shell integral with one leg of the channel of said ring and projecting forwardly of said respirator; a disc-shaped diaphragm mounted coaxially within said shell, a sealing ring for providing a gas-tight seal between said

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shell and the peripheral portion of said diaphragm, a guard element having a radial flange provided with holes and having a central opening, a cap element having finger-like extensions on spaced peripheral portions thereof extending through said holes and bent at the end portions thereof, said finger-like extensions having shoulders to provide a space extending radially outwardly between said cap element and said radial flange to permit voice signals to emerge therethrough, the outer edge of said shell being rolled inwardly against the peripheral portion of said guard element so as to tightly sandwich said diaphragm between said guard element and said sealing ring.

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2. The combination recited in claim 1 together with a pair of washers contacting the outer surfaces of said radial flange and having holes through which said finger-like extensions project.

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