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2,835,250 5/1958 Austin..... 128/142.4

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[54] **RESPIRATOR HAVING SOUND DIAPHRAGM
 PROTECTIVE CAVITY**
 7 Claims, 1 Drawing Fig.

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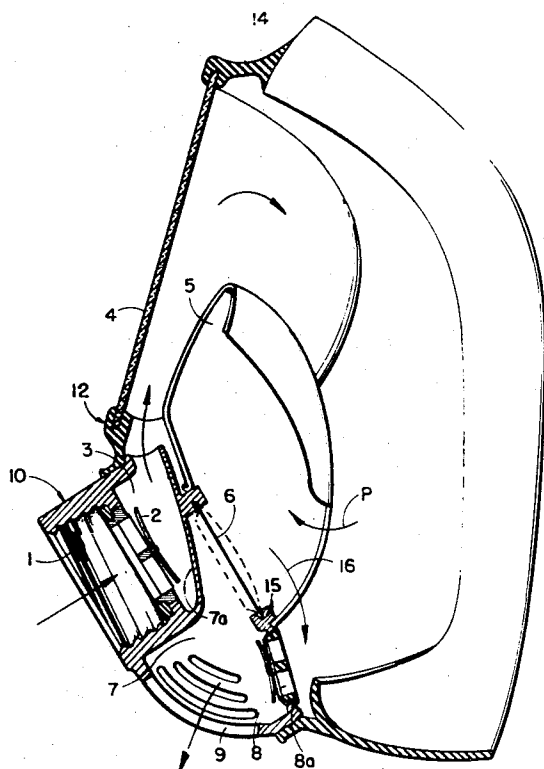
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142.7, 146, 146.2, 146.3, 146.5, 141, 141 A

[56] **References Cited**

UNITED STATES PATENTS

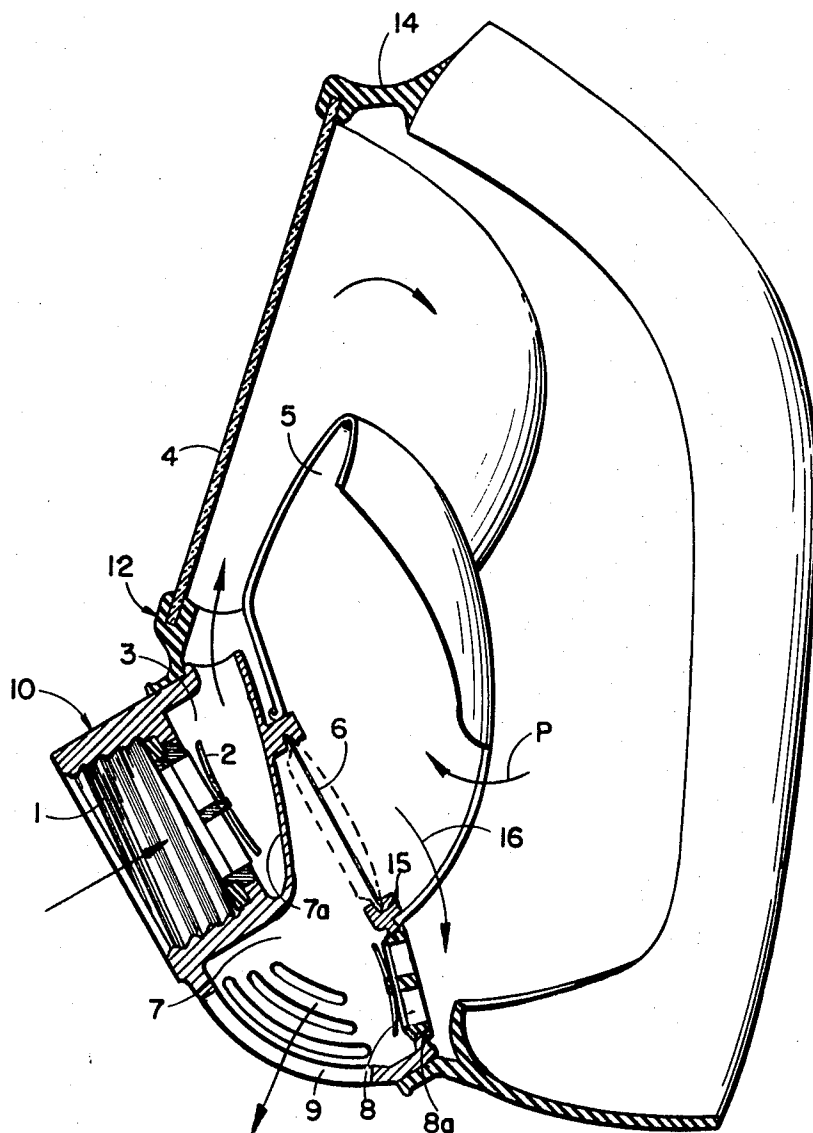
2,326,650 8/1943 Husted..... 128/141

ABSTRACT: A respirator or gas mask includes an inlet with an inlet check valve permitting flow of inhalation air in the mask body past a front viewing window. An inner auxiliary mask is formed within the mask body in a central area of a size accommodating the nose and the mouth of the wearer. The inner mask is provided with a vibration diaphragm or speaking membrane which permits the transmission of the sound of the speech of the wearer to the outside. The membrane is located over an external cavity which is formed directly adjacent the inlet of the mask. An outlet valve is arranged to receive exhalation air from the auxiliary mask cavity inside the mask and to discharge it in the vicinity of the antechamber or cavity adjacent the speaking membrane and the inlet passage.



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RESPIRATOR HAVING SOUND DIAPHRAGM PROTECTIVE CAVITY

SUMMARY OF THE INVENTION

This invention relates in general, to the construction of respirating devices and, in particular, to a new and useful respirator or mask having a speaking membrane located within an interior cavity or auxiliary mask and discharging into an exterior antechamber which is bounded by a wall forming an inlet passage and by a wall carrying the speaking membrane and an outlet valve.

When a person breathes with a respirator mask over his face, the exhalation valves generally do not close immediately, but close after some delay which is called "slip." In order to prevent exhaled air from getting back into the mask which may be caused by this slip or by the leakage of the mask, it is a known practice to provide the exhalation drive with an antechamber formation adjacent its discharge end. In this manner, after exhalation, a certain quantity of exhalation air will remain behind the valve within the mask and this will be inhaled with the next inhalation in case of valve slip, but no exhalation air will get into the interior of the respirator. This is particularly important when the masks are used in radioactive dust or the like.

Respirators are known which include speaking membranes or speaking diaphragms which transmit the sound vibrations of the wearer to the exterior in order to achieve better communication between the individual wearers of the masks. Generally, specially designed housings are provided for such membranes and the membranes are usually made of a very thin plastic foil which are inserted within the housings. The housings for the valves are located at suitable points in the mask body, preferably in the vicinity of the mouth. Alternatively, the speaking membrane housings may form a structural unit with the mask connection piece. In order to protect such membranes against damage from the exterior, it has been proposed that protective grids be arranged on the outside of the respirator at a spaced location from the membrane to provide a protective rib or enclosure therefor.

In accordance with the present invention, the structural form of the known respirators is improved by providing one having a protective chamber formed directly adjacent the inlet passageway by the partition wall forming the passageway. In addition, the speaking membrane and the exhalation valve are arranged in a chamber wall bordering an antechamber formed between the partition wall and this chamber wall. The exhalation valve or valves are thus arranged in a protective space bordering the antechamber or protective cavity for the speaking membrane. The invention affords the advantage of a very simple structural form since the antechamber of the exhalation valve provides a protection chamber for the speaking membranes. The whole structure is incorporated into a mask connection piece which includes a threaded inlet opening adjacent the inner mounting for the inlet valve and wherein the wall dividing the inlet opening from the exhalation discharge forms an antechamber for the speaking membrane and the exhalation valve.

Accordingly, it is an object of the invention to provide an improved respirator construction which includes a speaking membrane and wherein the connection piece for the mask is advantageously divided by a wall to form a protection cavity around the speaking diaphragm which also provides a protection for an exhalation valve, the inlet passage being partially defined by a partition wall separating the inlet and the protective cavity.

A further object of the invention is to provide a respirator which is simple in design, rugged in construction and economical to manufacture.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For better understanding of the invention, its operating advantages and

specific objects attained by its use, reference should be had to the accompanying drawings and descriptive matter in which there is illustrated and described a preferred embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWING

In the drawing:

The only FIGURE of the drawing is a transverse sectional view of a respirator mask constructed in accordance with the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawing, in particular, the invention embodied therein comprises a respirator or mask having a mask connection piece generally designated 10 which includes a cylindrical internally threaded inlet portion 1 having an internal ledge mounting an inlet valve 2 and including a partition wall 7a which partly defines a flush channel 3 having a discharge opening oriented to direct the inhalation air upwardly alongside a window or viewing glass 4. The connection piece 10 is mounted to the mask body 12 in an airtight manner and the body includes the usual head encircling outer band portion 14.

In accordance with the invention, an inner auxiliary mask or cavity forming member 5 is secured around a wall member 14 at the upper end thereof in order to provide a mask portion which is adapted to seal around the nose mouth and cheek of the wearer. The auxiliary mask 5 prevents the exhalation air from getting to the window pane directly and, at the same time, permits the transmission of sound outwardly through a speaking diaphragm or membrane 6 which is mounted in the wall 14 at a location directly in front of the normal position of the wearer's mouth. The wall 14, together with the partition wall 7a, defines an antechamber 7 and the sound waves transmitted through the diaphragm 6 pass into the antechamber and out through the openings in the protective grid 9 at the exterior of the cavity 7.

The inhalation air enters the auxiliary mask area from below, approximately at the level of the arrow P, and is drawn into the respiratory organs. The air which is exhaled leaves the inner auxiliary mask 5 and moves downwardly as indicated by the arrow 16 and through the exhalation valve 8 which is mounted in the wall 14. The air which is exhaled leaves the interior of the mask through the valve 8 and passes into the antechamber 7 and is discharged through the openings in the grid 9.

In some instances, it is desirable to fit the inner auxiliary mask 5 with additional control valves for the entrance and exit of respiration air, but in such an arrangement, the inner auxiliary mask 5 would cover the exhalation valve 8. It is also possible, of course, to do away with the auxiliary mask 5 in those instances where it is not desirable or necessary.

The exhalation valve 8 is advantageously located below the mask connection thread or the inlet part 1. The speaking membrane 6 is arranged above the exhalation valve 8 and the antechamber 7 forms a protective chamber for the speaking membrane and an exhalation chamber for the valve 8. It is also possible to arrange two exhalation valves 8 on the respective right and left sides of the mask inlet connection 1 in order to provide a dual flush channel arrangement. This would be particularly desirable where two viewing windows 4 are employed.

The respiration valves 2 and 8 are advantageously mounted into an elastic valve holder 8a which forms a unit with the exhalation valve disk. This structural unit 8 can then be pushed into the sockets or openings defined in the associated wall portions of the connection piece 10 in order to form a self-enclosed unit. The arrangement simplifies assembly and makes easy exchange possible.

A further advantage of the invention is that the arrangement of the membrane 6 within the antechamber 7 of the exhalation

valve impedes the access of surrounding air to the outside of the membrane to an extent that it is practically precluded.

What is claimed is:

1. A respirator mask, comprising a mask body, means defining an inhalation passage through said mask body, said body having wall means defining an interior body wall and an exterior wall spaced from said interior body wall and defining therewith an exterior protective antechamber on said body having an exterior discharge opening, a speaking membrane mounted on said interior body wall and communicating with the interior of said mask body on its one side and with said protective antechamber on the opposite side thereof, and an exhalation valve mounted on said interior body wall and communicating on its one side with the interior of said mask body and on its opposite side with said protective antechamber.

2. A respirator mask, according to claim 1, wherein said means defining said inhalation passage includes a tubular portion, said exterior wall including as a portion thereof said tubular member.

3. A respirator mask, according to claim 1, wherein said exhalation valve includes an outer elastic valve holder mounted on said interior body wall and a valve body carried in said holder.

4. A respirator mask, comprising a mask body including a portion adapted to fit around the wearer's head and a window-viewing portion, a connection piece fitted to the forward end of said mask body and including a tubular inlet having inlet valve means for the inflow of air and arranged adjacent said window-viewing means, means in said body adjacent said connection piece defining a generally centrally located auxiliary mask adapted to surround the nose, mouth and cheeks of the wearer, said connection piece including a wall adjacent the in-

terior of said auxiliary mask, a speaking diaphragm mounted on said wall, said wall together with said tubular inlet defining an exterior protective chamber therebetween having an exterior discharge opening, and exhalation valve means connected to said body arranged to discharge into and being enclosed by said protective chamber.

5. A respirator mask, according to claim 4, wherein said exhalation valve is mounted in said connection piece wall, said tubular inlet including a curved wall spaced outwardly from said speaking membrane and defining on its opposite side a flow passage directed upwardly against said window-viewing means.

6. A respirator mask, according to claim 5, wherein said protective chamber includes an exterior grid covering having the discharge opening therethrough for the passage of exhalation air.

7. A respirator mask, comprising a mask body including a portion adapted to fit around the wearer's head and a window-viewing portion, attachment means associated with said body for attaching said body to a person's head, a connection piece fitted to the forward end of said mask body and including a tubular inlet having inlet valve means for the inflow of air and arranged adjacent to said window-viewing means, an auxiliary mask defined within said mask body, a wall adjacent the interior or said auxiliary mask, a speaking diaphragm mounted on said wall, wall means spaced from said wall and defining with said wall an exterior chamber and grid, covering said diaphragm, and exhalation valve means connected to said body and arranged to discharge into and being enclosed by said protective exterior chamber.

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