

Oct. 13, 1931.

R. MALCOM

1,827,028

RESPIRATOR

Filed Nov. 30, 1928

Fig. 1.

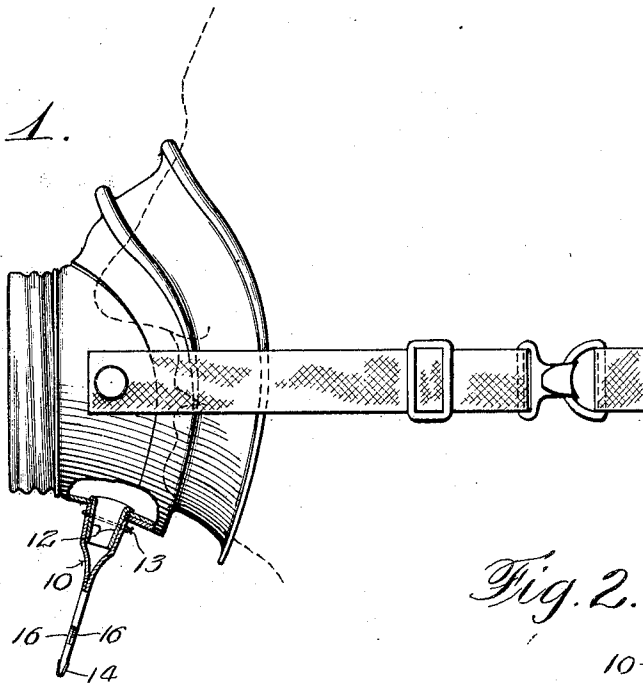


Fig. 2.

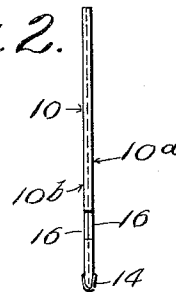


Fig. 3.

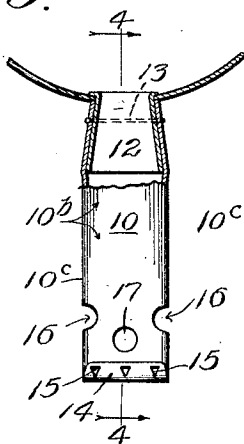


Fig. 4.

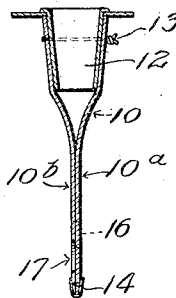
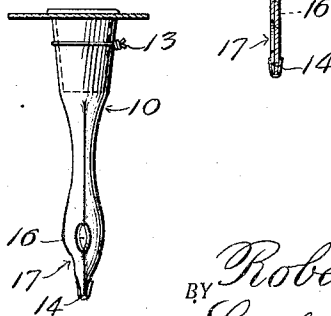


Fig. 5.



INVENTOR.

BY *Robert Malcom*
Luther Johns
ATTORNEY.

UNITED STATES PATENT OFFICE

ROBERT MALCOM, OF CHICAGO, ILLINOIS

RESPIRATOR

Application filed November 30, 1928. Serial No. 322,683.

These improvements relate to inhalation devices usually called respirators, with specific relation to the exhaust means, usually called the exhaust valve, therefor.

Such respirators are designed to protect the nose, mouth, throat and lungs from the effects of dangerous atmospheres, for example such as contain dust, poisonous gases or fumes. It is immaterial to the present invention what the particular type, form or general kind of the respirator may be since these improvements are directed solely to means for conducting to the outer air the products of exhalation from the lungs.

The object of the present invention is to provide a simple, low-cost exhaust valve or exhaust device applicable to the mask or respirator in the usual way or in any approved way and which will effectively and reliably close, as an automatically-operating valve, on the inspiration of air by the user while permitting the desired free expiration of lung contents therethrough.

In the drawings Figure 1 shows a well-known type or form of respirator having these improvements applied thereto and shown partly in section, parts of the mask body being also broken away;

Fig. 2 is an edge view of the exhaust device on a larger scale as it appears before application to the mask;

Fig. 3 is a side view of the exhaust device as applied to the mask, the same being broken away and with a fragment of the mask body sectionally shown;

Fig. 4 is a section showing the structures of Fig. 3 on the line 4—4 thereof; and

Fig. 5 shows the device in edge view as it appears upon an exhalation from the lungs.

The valve or exhaust device body 10 is of soft, thin, flexible rubber, and is formed as a tube, but with the sides 10a and 10b thereof lying face to face and flat, one upon the other. It is vulcanized in the flat shape shown by

Fig. 2, and its tendency is therefore to return to that shape when distended by air pressure within. The material may be made in substantially long strip form and cut to the short lengths desired, these lengths being open at each end.

In the past it has been the practice to take a piece or length of such flat rubber tubing open at both ends and apply one open end upon a nipple as 12 issuing from the body of the mask, the rubber piece being held thereon as by a twisted wire 13. In the older practice as just described the sides of the rubber structure would spread apart on the exhalation and open at the normally lower or free end thereof, permitting the lung contents to escape. On the ensuing inhalation dependence was had upon the tendency of the rubber to provide such substantial closeness of the two sides as 10a and 10b to each other as would prevent the intake of air at the free end. The results have not been satisfactory, however, especially after considerable use of the device and also after the passage of time. Repeated use has caused the rubber to become flabby and distended at the free end portion, while time operates to lessen the elasticity of the rubber, permitting an open permanent set to develop.

The present improvements thus include as its body structure much in quantity that is old and well-known. One novel feature herein shown is the clamping and closing element 14 at the bottom of the body 10 extending laterally from edge to edge thereof, the same conveniently being in the form of sheet metal, say tin plate, folded substantially U-shaped in cross view, encompassing the lower and open edge portions of the body, the clip 14 being pressed tightly thereupon and secured thereto as by the indentations 15 in the metal.

The next feature of novelty and importance is the provision of preferably a pair of openings 16 at the edge portions 10a and opening into the hollow interior when such hollow interior occurs, namely on an expiration, these holes 16 being formed by simply cutting through both layers of the rubber material at the sealed marginal edges 10c thereof.

The exhaust air escapes through these openings 16, as is readily to be observed from Fig. 5 showing how the sides of the body 10 have expanded outward under the effects of the exhalation and how the openings 16 then lead directly into the hollow interior.

I may have auxiliary openings, as 17, should it be desired to provide for further convenience of air escape; but in actual practice, in a mask of the kind illustrated, the openings 16 have ample capacity.

5 By holding the lower ends of the body together, which may be done by other means than the clip illustrated, the tendency of the body to change its desired flat condition with the sides lying flat, one upon the other, is
10 greatly reduced if not entirely overcome. The flexibility of the rubber to permit exhaust is not interfered with. When the inspiration takes place and suction occurs at the openings as 16 or 17 the sides as 10a and
15 10b return to flat-lying position not only through the natural tendency of the parts to regain the shape in which they were vulcanized, but this tendency is increased by the fact that the expansion, as shown by Fig. 5,
20 is against resistance offered by the clamping element 14, so that the return to normal condition is by virtue of an added factor. In the older construction the turned-over edges at
25 10c were the factors chiefly making for a return to flat form, while according to the present invention there is a third factor, acting similarly, and with even added effect.

This added effect arises, for one thing, from
30 the fact that the body 10 is held to its full normal width at the bottom. The edges 10c may not approach each other there; and the influence of this extends upward into the rubber body. The tendency of the body to become narrower is therefore greatly reduced,
35 and, conversely, its tendency to retain its flat shape is greatly increased.

Advantageous results according to these improvements may be had by vulcanizing or
40 otherwise sealing the lower end of the valve body, but substantially the construction shown is preferred. The bottom may have other shapes. The relative position of the vents, as 16 or 17 is not particularly critical,
45 but they should be in the lower general area. Their positions as illustrated are entirely satisfactory in the structure shown.

In the original drawings submitted herewith the illustrations of Figs. 2, 3, 4 and 5
50 are substantially to scale.

I contemplate as being included in these improvements all such changes, variations and departures from what is thus specifically illustrated and described as fall within the
55 scope of the appended claim.

I claim:

A respirator exhaust valve of the character described comprising a piece of thin, soft and flexible material in tubular form with its
60 sides lying face to face one upon the other, one end of said piece being open and adapted to be secured operatively to the respirator body and the other end thereof having a substantially stiff clip compressed thereon and
65 holding the sides together substantially from

lateral edge to lateral edge thereof at the bottom of the body, with a vent in the vicinity of said sealed end adapted to open and provide exhaust therethrough on expiration into the valve body at the respirator.

ROBERT MALCOM.

70

75

80

85

90

95

100

105

110

115

120

125

130