

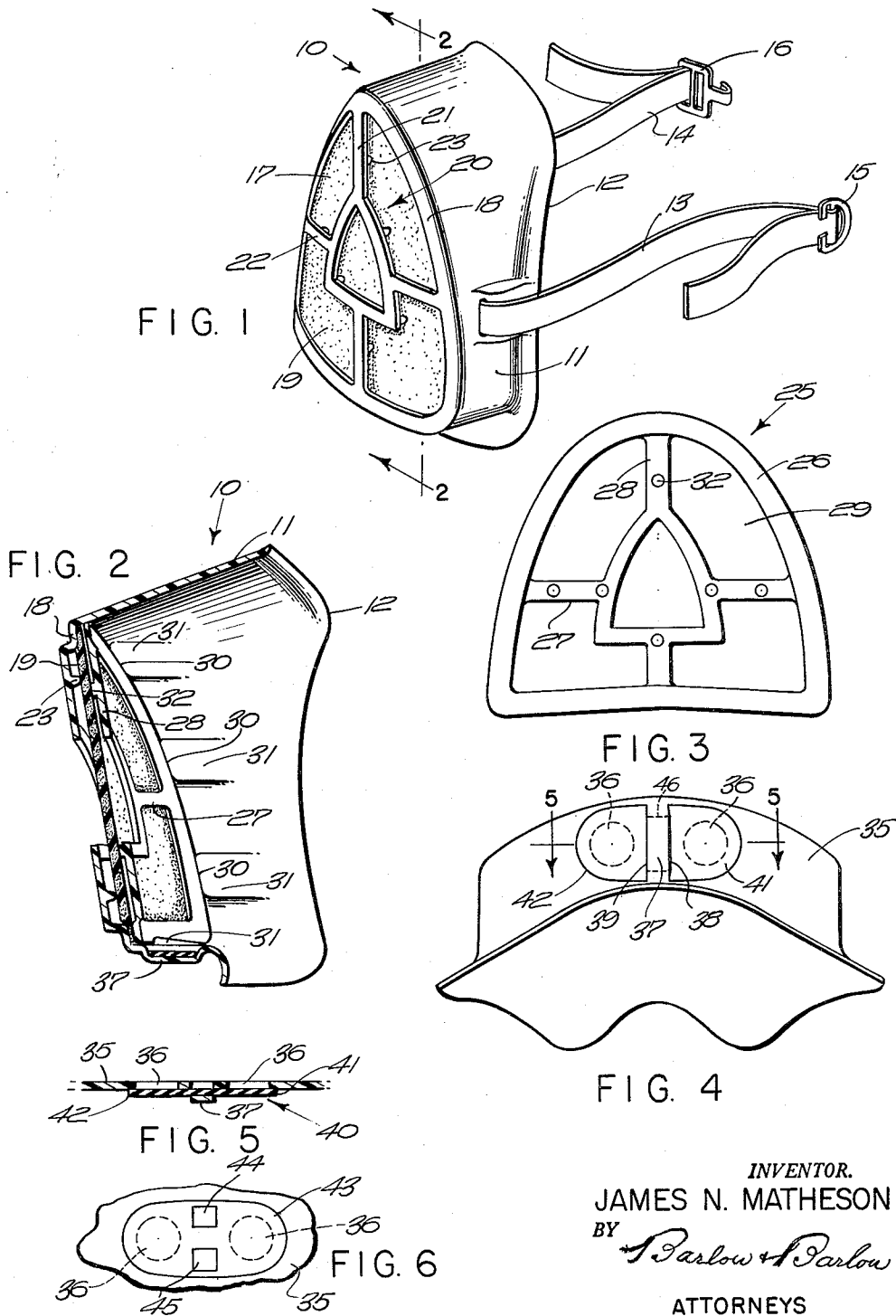
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RESPIRATOR

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3,014,479

RESPIRATOR

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5 Claims. (Cl. 128-146)

This invention relates to a respirator of the type to cover the nose and mouth of a person and provide an air seal by the pressure of the edges of the respirator against the cheeks under the mouth and above the nose of the wearer.

One of the problems which has been existent in respirators of this general type is that of providing an effective seal of a removable filter medium where it engages the body of the respirator.

Another object of the invention is to provide an effective seal of the filter medium and yet provide for interchange of the filter medium so that a filter which has collected a predetermined amount of solid particles may be removed and discarded from the respirator and a fresh, unused filter put in place.

Another object of the invention is to provide for a simple construction by which the parts may be separated for removal of the filter and may be again assembled with the fresh filter in place without undue complexity.

Another object of the invention is to provide the parts for locking the filter in place as integral with two portions of the respirator which may be snapped together for assembly.

Another object of the invention is to provide a respirator which will expose a maximum area of the filter medium for operation in the respirator.

Another object of the invention is to provide a simple and efficient exhalation valve for the respirator.

With these and other objects in view, the invention consists of certain novel features of construction as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawings:

FIGURE 1 is a perspective view of the respirator showing the same ready for mounting upon the face of the user;

FIGURE 2 is a central sectional view through the respirator;

FIGURE 3 is a plan view of the separate retaining frame for holding the filter in place;

FIGURE 4 is a bottom view of the respirator illustrating the air exhalation valve;

FIGURE 5 is a fragmental sectional view on line 5-5 of FIGURE 4; and

FIGURE 6 is a view similar to FIGURE 4 but showing a slightly modified construction.

In proceeding with this invention, I have provided a body member having a rearwardly extending portion, the edge of which encircles an area of the face including the mouth and nose and contacts therewith in sealed engagement with the face. Extending inwardly from the forward edge of this encircling portion, there is a lip against which the peripheral edge of a filter engages while there is a general framework of material extending diametrically from lip to lip for supporting the filter against movement toward the face. The filter is inserted from the rear of the body against the lip and a separate frame having a peripheral portion corresponding with the shape of the lip is used to force the filter against the lip and be itself retained, while there is some sort of an interlocking or interengaging means between the frame and the body so as to hold the filter compressed at its peripheral edge and provide an effective seal. The lower portion of the body which extends rearwardly beneath the mouth is

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provided with an exhalation valve of a simple type which may be easily inserted or removed from the body. Thus, essentially I provide a body into which a filter may be inserted and retained by a separate frame inserted in the body following the filter, while also the exhalation valve may be easily inserted in place or removed for replacement.

With reference to the drawings, 10 designates generally the respirator body which has a flange 11 extending rearwardly in a size to encircle the nose and mouth of the user. The edge 12 of this flange is irregularly shaped and flexible so that it may be drawn against the face to engage the cheeks, a portion of the face below the lower lip of the mouth, and the nasal portion about the nose adjacent the eyes. The flexibility of the edge and its general shape enable the body of the respirator to be drawn tightly against the face by elastic straps 13 and 14 which have buckled portions 15 and 16 to clasp back of the head and hold the body of the respirator snugly against the face. The front portion of the respirator is generally open as at 17 and about the peripheral edge of this opening and extending inwardly from the flange 11, there is a lip 18 which encircles this opening and extends from the flange inwardly a short distance possibly a quarter of an inch and provides a seat against which a sheet-like filter material or medium may be placed.

The filter medium is designated generally 19 and comprises a suitable synthetic spongy sheet which is capable of removing a high percentage of contaminant from the air which may be drawn therethrough for breathing. Various filter mediums may be provided depending upon the contaminant to be removed, but in general the filter mediums will be in sheet-like form and substantially an eighth of an inch thick. They will be shaped substantially the shape of the interior of the flange 11 so as to overlie the inner surface of the lip 18 and rest thereagainst. In order to support the filter on its outer surface across the openings 17 inwardly of the lip 18, I have provided a framework designated generally 20 which comprises bars 21 and 22 extending diametrically, vertically and horizontally across the opening 17 with some design shape worked into the center of the bars. Extending rearwardly from these bars there are projections 23 which engage the filter 19 and maintain it spaced from the bars, although in a supporting relation with reference thereto.

In order to retain the filter in this position, I have provided a separate frame 25 shown by itself in FIGURE 3 which comprises an outer peripheral margin 26 of a shape corresponding to the shape of the lip 18 and of a width substantially the same as the width of the lip 18, while bars 27 and 28 extend diametrically, horizontally and vertically across from margin to margin and leave open spaces 29 between the bars and the margin. Likewise, there is a design portion in the center of this frame which corresponds to the design of the frame 20. This separate frame 25 follows in back of the filter 19 and is positioned from the rear of the respirator so that its marginal edge 26 engages the filter and when pressure is applied, forces it so as to be in compressed relation to about one-half its thickness, squeezing the filter between the lip 18 and this marginal edge 26. The separate frame 25 as it is forced inwardly snaps beyond the abutting surface 30 of lugs 31 which extend inwardly from the flange 11 at intervals, there being three along the side flange and two along the bottom flange of the respirator. These lugs 31 taper down into smooth relation with the flange 11 and as the separate frame is forced inwardly, it is flexed until it snaps past the abutment edge 30 of each of these lugs when it then straightens out and holds the filter in a compressed relation at its peripheral edge so as to seal it against the passage of air at this location. This separate frame 25 is also provided with projections

32 extending forwardly from the bars 27 so as to engage the filter and space it from these bars, thus affording a maximum surface of the filter for passage of air and collection of contaminant. It will also be noted that the projections 32 are staggered with relation to the projections 23 so as to again better provide for surface area for the operation of the filter.

The lower portion of the flange 11 also designated as 35 is provided with a pair of openings 36 with a strap 37 formed by slits 38 and 39 in spaced relation between the two openings 36. A rubber-like valve 40 is inserted through the slits 38 and 39 and beneath this strap 37 with the notches 46 securing the strap so that it will be held by this strap at its center and prevented from endwise or sidewise movement while one portion 41 will cover one of the openings and another portion 42 will cover another of the openings so that as air is inhaled, the pressure within the respirator will be reduced and air will pass through the filter and draw the valves closed, but as it is exhaled, the valve 40 will be of such flexibility that it will be of less resistance to the passage of air outwardly than is the filter so that the air will pass out through the openings 36 as the flaps 41 and 42 open and thus reduce the exhalation effort necessary. In some cases instead of having a generally rectangular shape valve as at 40, the valve 43 may be provided with openings as at 44 at either side and tongues 45 raised from the stock of the flange 35 will pass through these openings and overlies a portion of the valve 43. The action would be the same, the retaining means being slightly different.

I claim:

1. A respirator to cover the nose and mouth comprising a body member having a rearwardly extending encircling flange, the rear edge of which is for engaging the face to have sealing engagement therewith, a peripheral lip extending inwardly from the forward edge of said

flange, and an open frame extending generally diametrically from lip to lip and secured thereto, a filter shaped to conform to the interior shape of said flange engaging on its front side said lip and open frame, a separate radially non-collapsible retaining frame also shaped to conform to the interior of said flange with a peripheral margin of a shape and size substantially like said lip, and lugs having abutment surfaces with a taper leading there-to carried by the interior of said flange back of which said separate frame may be forced along said taper to lock the separate frame against said filter and seal it at its periphery to said body.

2. A respirator as in claim 1 wherein said separate frame has openings registering with the open frame of the body and supports the filter between said frames.

3. A respirator as in claim 1 wherein said body and flange is more flexible than said separate frame to flex as said separate frame is forced into sealing position with said filter.

4. A respirator as in claim 1 wherein said separate frame has cross bars set back from its peripheral margin with forward projections on said bars extending forwardly toward said filter to engage the same.

5. A respirator as in claim 1 wherein said separate frame has cross bars set back from its peripheral margin to space said bars from the filter.

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