Oct. 19, 1954 F. T. WALLIN 2,691,977

ARMPORT FOR RESPIRATORS AND THE LIKE

Filed June 10, 1952 2 Sheets-Sheet 1

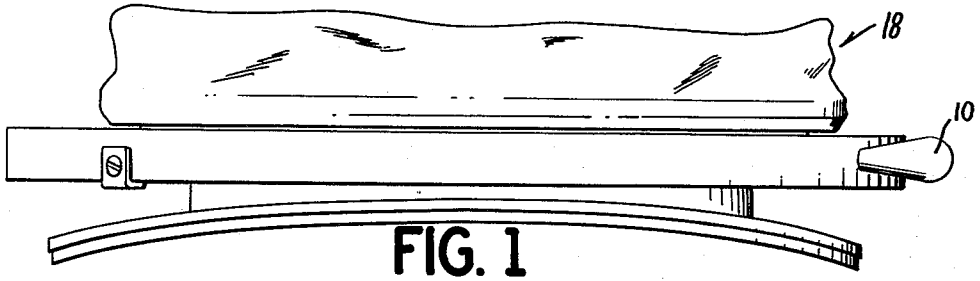


FIG. 1

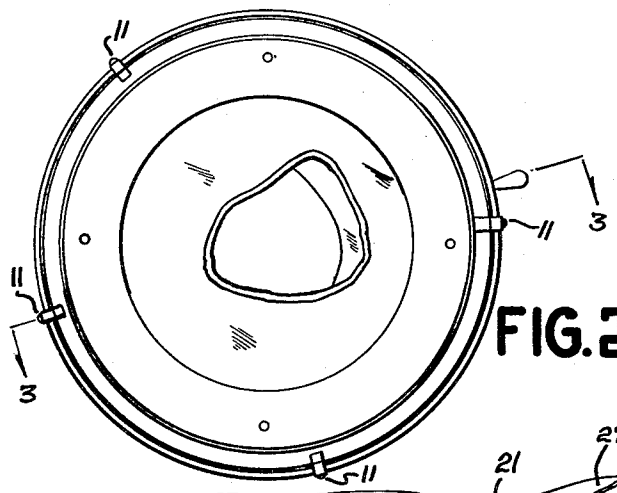


FIG. 2

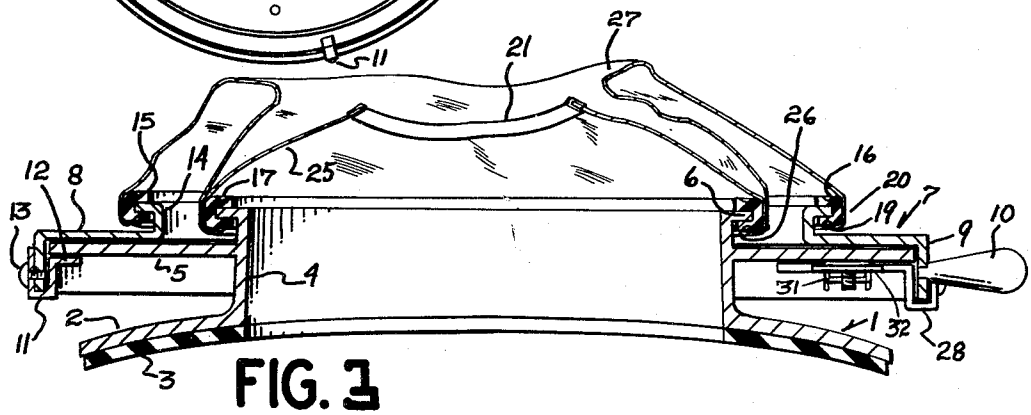


FIG. 3

INVENTOR.
Francis T. Wallin
BY Ezekiel Wolf
his Attorney

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ARMPORT FOR RESPIRATORS AND THE LIKE

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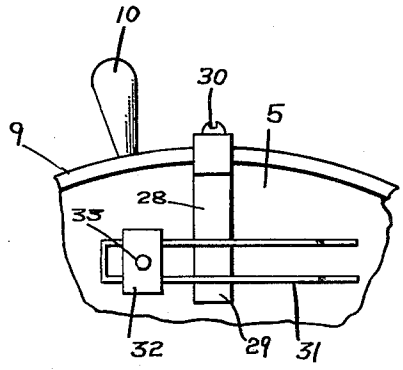


FIG. 6



FIG. 5

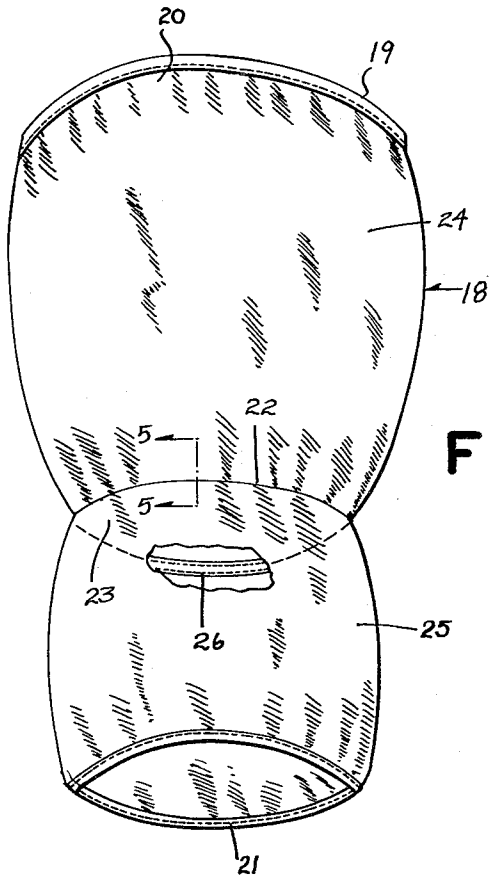


FIG. 4

INVENTOR.
Francis T. Wallin
BY
Ezekiel Wolf
his Attorney

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ARMPORT FOR RESPIRATORS AND THE LIKE

Francis T. Wallin, Brookline, Mass.

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8 Claims. (Cl. 128—30)

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The present invention relates to an armport for a respirator or for any other type of device where there is a wall opening which must be substantially sealed at times but which must provide easy access without exposing the opening to any great degree when the seal is opened and the arm is inserted in the opening.

While the present invention finds great application to respirators and other such devices, it will be noted that it is useful in any type of device where the functioning of the device as is described is desired. It may be used for a port in an enclosed container in experimental laboratories, or in a wall which has different fluid pressures on each side and in a wider application it may be used as an adjustable collar for a great number of purposes.

One of the chief advantages of the device of the present invention is that it is simple to operate and does not interfere with a person's arm freedom even though it surrounds the arm and seals itself about the arm.

A further advantage of the device herein disclosed is that it may readily be renewed or that the flexible sleeve element may be readily renewed or removed for cleaning and other purposes.

Other merits and advantages of the present invention will be more clearly seen from the description in the specification below, when taken in connection with the drawings showing an embodiment of the invention, in which:

Figure 1 shows an elevation of the present invention.

Figure 2 shows a plan view of the device of Figure 1 on a reduced scale, and

Figure 3 shows a section on the line 3—3 of Figure 2.

Figure 4 shows in perspective a view of a flexible sleeve forming a part of the invention.

Figure 5 shows a section on the line 5—5 of Figure 4, and

Figure 6 shows a plan view of a detail.

Referring to the drawings, 1 represents a port plate which has a flange 2 formed to fit the wall of the respirator which is provided with suitable clamping screws or nuts, not shown, which preferably go through the wall of the respirator and threads into the flange by means of which the whole arm port assembly is held to the respirator. A suitable air tight gasket 3 may be placed between the clamping flange 2 and the side wall of the respirator or other device to which the arm port is attached. The arm port is also provided with a collar or neck 4, which may be integral

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with the flange 2 and which extends backward from the flange. This sleeve has attached to it and also formed as an integral part, an outwardly extending flange or ring plate 5 positioned between the back end of the sleeve or port 4 where it joins the flange 2 and the forward end of the sleeve 4 which terminates in an outwardly extending small flange or rib 6.

This assembly just described is permanently fixed in position when it is attached to the respirator or wall to which the port plate is clamped.

Rotatably mounted on the flange 5 is a ring plate 7 which comprises a plate ring section 8 concentrically positioned with respect to the port opening or sleeve 4, facing and fitting on the flange 5. The ring plate 7 is provided with a downwardly extending rim 9 substantially at right angles to the plane of the ring or plate 8, which rim may be provided with one or more handles 10, by means of which the ring plate 7 is turned, for the purpose of closing the arm port. The ring plate is retained in place by means of a plurality of spaced retaining fingers 11 which are formed with a channel section terminating in an inwardly projecting finger or arm 12 bearing against the underside of the ring 5. A suitable machine screw 13 passing through the outside portion of the channel 11 and threaded into the rim 9, holds the clamping element 11 in place. The ring section 8 terminates at its top end in a channel 14 which is provided with a flange 15 extending outwardly substantially parallel with the ring plate section 8 although this flange may be turned upward or downward without altering its utility in operation. The same also applies to the flange 6. There are fitted over both of these ring flanges which are concentric one with the other, rubber shells 16 and 17 which hug the flange, forming a protective layer and also providing a frictional surface.

The opening of the flange 17 is substantially the same as that of the port opening 4, while the opening of the flange 16 is somewhat larger.

All of these rubber channel rings are fitted with a plastic sleeve or shell 18. This plastic sleeve or shell may be made of any suitable durable, flexible plastic material such as a vinyl sheeting or it may be made of a woven fabric made air tight by plastic impregnation, or it may be made of thin rubber sheeting or rubberized cloth. The purpose is that the sleeve shall have great flexibility, be light in weight, easy to handle and preferably should have a reasonable amount of stretch without permanent deformation. This sleeve or shell is constructed in the following

manner, as more clearly indicated in Figures 4 and 5.

At one end there is attached by stitching, cement, or other suitable process, an elastic tape or band 19 which may be rubberized elastic tape such as used in garment construction for garters and so forth or any other tape or strip elastic material which is durable and capable of reasonably stretching without deformation in a ratio of approximately two to one or more. The tape 19 is stretched around one end of the sleeve 18 in such a manner that the material is covered as indicated by the covering 20. This covering should be such as to provide approximately at least double the opening without stretching the plastic sleeve or sheeting. The sleeve is also covered at the other end and finished with a suitable elastic tape 21 to a size which is smaller than that of the tape 19. The opening of the tape 21 may be anywhere from one-half the diameter of the opening of the tape 19 up to approximately three-quarters or a little more of this size. One of the chief tests is that the tape 19 when snugly assembled should fit snugly over the rubber channel member 16 in such a manner that the end will not slip or readily be pulled out even when the port is turned up tightly as will be explained below.

Between the ends 19 and 21, the sleeve is gathered as indicated by the gatherings 22 and 23. In fact the sleeve portion 24 from the gathering 20 to the gathering 22 may be a separate sleeve section from the portion 25 extending from the gathering 23 to the tape 21 in which case the sleeve section 25 may be made slightly smaller in diameter if desired. The gathering at 22 and 23 is effected by means of an elastic tape 26 which pinches the sections 22 and 23 together in such a way to form a gathering or pleating. The elastic tape 26 may be stitched or cemented in any of the usual ways about the sleeve. The provides a stretchable section at tape 26 which acts similarly to the finishing tape 19 at the top end. The normal diameter of the sleeve in the section where the sleeve is gathered at the tape 26 is less than that in the top section where the tape 19 is. The sleeve at the tape 26 is adapted to hug snugly the inner rubber covering channel 17 over the end of the sleeve or collar section 4. When the plastic sleeve is put over the arm port, the taped opening indicated by 21 in Figure 4 is free. The tape 26 inbetween the ends of the sleeve goes over the inner fixed sleeve opening by hugging the outside of the channel member 6 and the tape member 19 hugs the outer rubber flange covering 16.

As will be noted in Figure 3, the tape 21 at the end is not attached to the other flange and this part is therefore free. The middle section however between the tapes 26 and 19 stands upwards in the region 27 so that when the handle 10 is rotated with respect to the fixed ring 5, this section will reduce in size and finally close, securely sealing the whole port opening.

When it is desired to reach in the opening, as for instance, a respirator, the handle 10 is turned, opening up the sleeve and then the operator inserts his arm through the opening at the tape 21 which will temporarily seal the port when the arm is inserted through this ring. The round opening formed by tape 21 for that reason should be of such an opening size that it will hug the arm when put through it.

The section 25 should be sufficiently long so as to permit the arm to move freely inside the respirator.

If desired the handle 10 may be turned to close the section 27 over the arm, if greater air sealing is necessary. However the seal effected by the tape 21 is sufficient for most purposes when the arm is put through the port.

A clamping tab 28 attached to the rim 9 by means of a screw 30 has an extending arm 29, which when the movable plate 8 is turned, will pass under the U-shaped spring finger 31 which is attached to the underside of the flange plate 5 by means of a small clamping plate 32 with a screw stud 33 which screws into the underside of the plate 5. This will hold the port in closed position wherein the section 27 comes together at the center of the port forming a complete closure for it.

Having now described my invention, I claim:

1. An arm port for a respirator or the like, comprising a port plate, a second plate rotatably positioned with respect thereto, each plate having concentric openings, a yielding flexible sleeve member having one end fitting closely around one opening, a section between the ends fitting closely around the other opening and the other end free said other free end having elastic means tending to contract its opening.

2. An arm port for a respirator or the like, comprising a port plate adapted to be fixed over an arm opening in a respirator, a second plate rotatably secured with respect to the first plate, each plate having concentric openings, a yielding, flexible sleeve member having open ends gathered with an elastic flexible binding tape and a section between the ends similarly gathered with an elastic flexible binding tape, the section between the ends fitting closely around the opening in the port plate and the binding tape at one end fitting closely around an opening in the second plate.

3. In an arm port for a respirator, a yielding, flexible sleeve member having open ends gathered with flexible elastic binding tape and a section between the ends similarly gathered with a flexible binding tape, the section between the ends adapted to fit closely around the opening in the port plate of the respirator and one of the other ends adapted to fit around an opening in another plate of the arm port.

4. In an arm port for a respirator, a flexible, yielding plastic sleeve member gathered at each end with an elastic binding tape forming a smaller opening than the normal diameter of the sleeve and a third elastic binding tape gathered about a section between the ends also binding the sleeve in said section to normally smaller diameter than the normal diameter of the sleeve.

5. A flexible, yielding, plastic sleeve as described in claim 4, in which one end opening has normally a larger diameter than the other end opening and also a larger diameter than the bound section of the sleeve between the two open ends.

6. An arm port for a respirator or the like, comprising a port plate having a flange member attachable to the respirator and a sleeve member terminated on the outside with a small outwardly extending flange, a second port plate member, means for rotatably mounting said two members concentrically one with the other, said second port plate member having an outwardly extending flange concentric with the flange in the first port plate member, a yielding, flex-

ible sleeve member having open ends, each gathered with an elastic, flexible binding tape and a section in between the ends similarly gathered with an elastic flexible binding tape, said section between the ends fitting over the opening in one end of the first mentioned sleeve member and one of the flexible sleeve members fitting over the opening in the other of said port plates.

7. An arm port for a respirator or the like, comprising a port plate consisting of a sleeve having at one end a flange fitting against the respirator, the other end of said sleeve terminating in a short flange, a second outwardly extending flange extending outwardly from said sleeve between the previously mentioned flanges, a second port plate having a flange ring fitting over the last mentioned outwardly extending flange and resting thereon, said flange ring having a short sleeve section with a terminating

flange concentrically positioned with respect to the first short flange means retaining said second port plate in rotatable movement with the first port plate and a yielding flexible sleeve member having the opening at one end secured around one of said short terminal flanges and another section of the flexible sleeve secured around the other of said short terminal flanges.

8. A device as set forth in the preceding claim in which locking means are provided between the first port plate and the second plate for locking the two plates together when the flexible sleeve member has closed the port opening.

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