

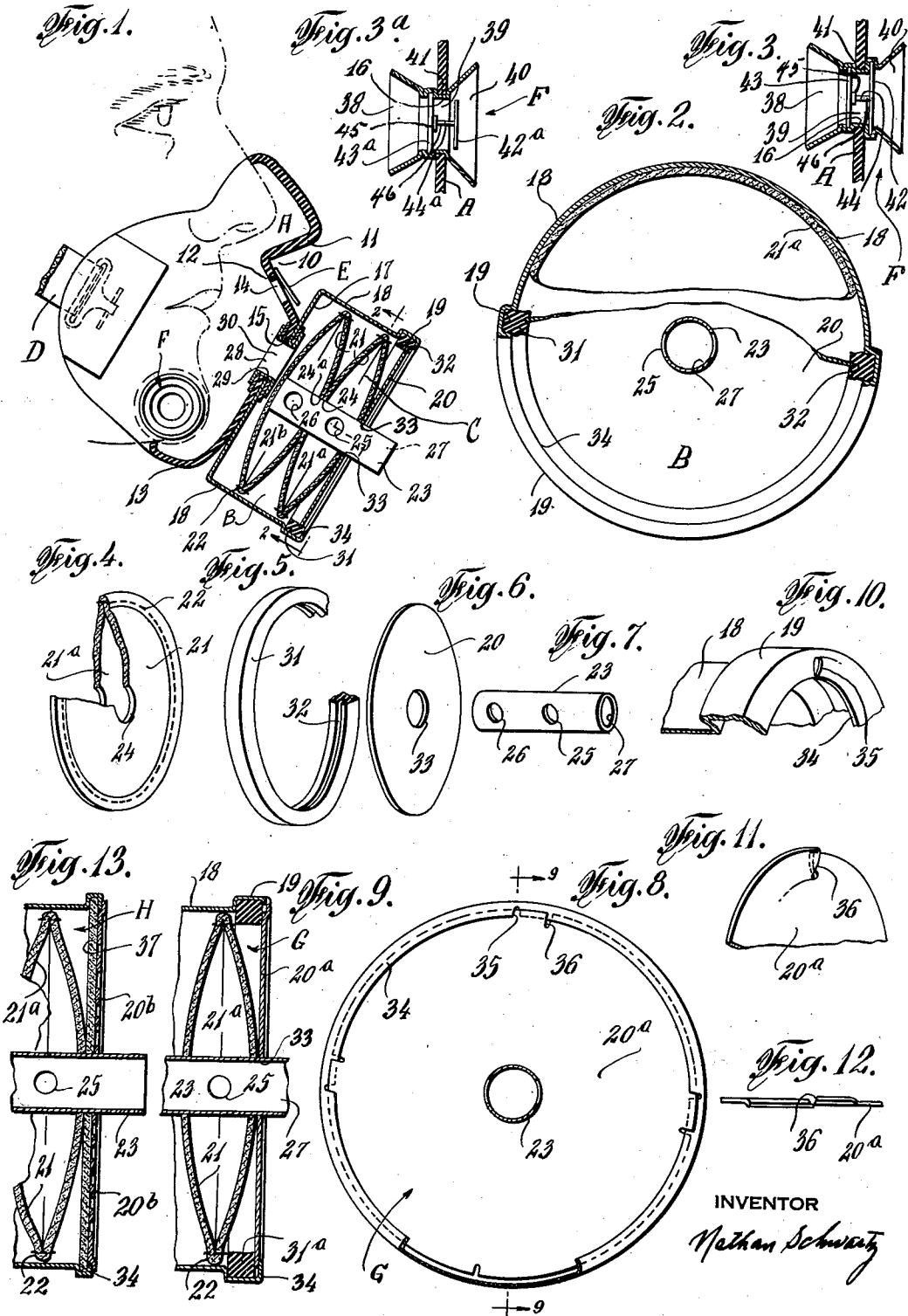
March 18, 1941.

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2,235,624

FILTER UNIT FOR RESPIRATORS

Filed July 30, 1938



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UNITED STATES PATENT OFFICE

2,235,624

FILTER UNIT FOR RESPIRATORS

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Application July 30, 1938, Serial No. 222,139

3 Claims. (Cl. 183-44)

This invention relates to filter type respirators adapted to cover the nose and mouth of the wearer for the purpose of protection against dust fumes and gases, and also to provide loud speaking facilities, and is a modification of my co-
 5 pending application for Respirators, filed March 2, 1938, Serial No. 193,417, and application of February 9, 1937, Serial No. 124,851, and application of January 25, 1937, Serial No. 122,169,
 10 and application of February 6, 1937, Serial No. 124,372, now Patent No. 2,114,358.

The object of this invention is to provide a simplified filter unit construction wherein the loss of surface filtration area is minimized and
 15 where the parts of the said unit is easily replaceable and where the face piece has attached thereto a speaking tube containing an amplifier.

Another object is to provide a new and useful filter unit which is readily and removably inserted into a casing adapted for the said insertion. The construction of the said unit is simple and permits of varied shapes and sizes to provide a large surface filter area in a small casing or separator.

Another object is to provide means for loud speaking for the wearer, by having a speaking tube attached to the face piece.

Another object is to provide means for amplifying the sound transmitted by the said speaking tube which will be fully explained later on.

With these and other objects in view the invention consists of certain novel features of construction as hereinafter shown and described and
 35 then specifically pointed out in the claims.

In the drawing:

Figure 1 illustrates the respirator, showing the face piece with the speaking tube and filter holder or container attached thereto.

40 Figure 2 is a front view in section on line 2-2 of Figure 1.

Figure 3 is a section on line 3-3 of Figure 1.

Figure 3a is like Figure 3 in modified form.

45 Figure 4 is a perspective of felt filter unit partly broken.

Figure 5 is a perspective of the rubber rim support.

Figure 6 is a perspective of outer plate support element.

50 Figure 7 is a perspective of filter support tube element.

Figure 8 is another form of this invention showing a marginal outer flange showing slits for interlocking with the edges of the outer support plate.

55 Figure 9 is a section on line 9-9 of Figure 8.

Figure 10 is a perspective of the modified form illustrating interlocking method at outer margin
 60 of casing.

Figure 11 is a perspective of plate support element showing interlocking slit.

Figure 12 is a peripheral view of support plate in the modified form.

Figure 13 is another modification showing a filter pad in covering relation to the plate support which has apertures and in the outer marginal groove the edges of a filter pad replace the rim.

Referring to the drawing by character of 10 reference, A designates the face piece of the respirator, B the casing, C the filter unit, D the head band, E the exhalation valve, F the loud speaker, G the modified casing and H another
 15 modified casing.

The face piece A is preferably of molded elastic rubber or its equivalent and has a recess 10 below the nose line which recess is formed by a substantially horizontal nose covering portion and an angular downwardly directed mouth
 20 covering portion 12, and a chin covering portion 13. There is an aperture 14 at the mouth covering portion and an aperture 15 in the chin covering portion, and an aperture 16 at the side of the face piece. The face piece A is a sub-
 25 stantially cup shaped hollow mask body adapted to cover the nose, mouth, chin and part of the cheek of the wearer. The said face piece is adapted to have an exhalation valve attached at the mouth covering portion 12, and a separator
 30 attached to the chin covering portion 13, and a speaking tube attached at the side of the face piece.

The casing B or filter holder is preferably of a light aluminum metal and has a rear wall 17,
 35 a circumferential wall 18, and an outer marginal groove 19 which is adapted for engaging an outer disc or plate filter support element 20. The support element 20 is preferably of aluminum metal but may be card board or other
 40 equivalent material.

The filter unit C has filter material 21 of felt or other equivalent material which may be processed cotton, paper, wool, silk rayon or other fabric. The filter material or pad 21 is con-
 45 structed by having the fabric cut in disc like forms and stitching one to another at the marginal edges 22. There are two such pads 21 and the forward one 21a has two layers each with a central aperture 24 which is adapted to be at-
 50 tached to the supporting tube element 23. The rear filter pad 21b is constructed like the forward one except that only one layer of the pad is apertured. Namely the forward layer has an aperture 24a which is attached to the tube 23.
 55 The tube 23 has apertures 25 and 26 and an outer opening 27. The unfiltered air enters at the outer opening 27 and passes to apertures 25 and 26 as indicated by arrows, to be filtered by the pads 21, and then enters the face piece by
 60

way of connecting aperture 28. The connecting aperture 28 is formed by an eyelet 30 joining the aperture 15 of the face piece and the aperture 29 which is located in the rear wall of the casing.

The outer marginal construction of the casing may be made in three forms. The first form as illustrated in Figure 1 has a marginal inwardly opening groove 19 enclosing an elastic rubber rim washer 31, which has an internal annular depression 32 for engaging the support disc element 20. The stiff disc 20 readily engages in the depression 32 due to the elastic quality of the rim 31. The disc element has an aperture 33 at its central portion, which is attached to the tube 23, in adjacent position with the filter pad 21.

In the second form of the marginal construction, illustrated in Figures 8, 9, 10, 11, and 12, the engagement of the disc plate 20 at the groove 19 is as follows: The groove 19 has an outer flange 34 which flange is provided with slits 35. Preferably four such slits 35 are provided. Also the disc plate 20 has similar slits 36 located at its edges. The two sets of slits are formed to register, one with another, in an interlocking manner. The tube 23 is attached to the disc 20 at its aperture 33 and the outer extension of the said tube is used as a thumb rest to manipulate the disc 20 to cause a proper air tight interlocking. A rubber rim washer support 31a aids the said air tight formation. As the disc 20 is interlocked at its edges the elastic rim washer support 31a permits the interlocking and thereupon it tightens against the joint formation thereat, whereby due to its elastic support quality, a leakproof joint is provided. The rubber rim 31a engages the flange 34 of the groove 19 and extends inward to engage the marginal portion of the plate or disc filter support 20a thereby insuring a leakproof joint.

In the 3rd form of this invention the marginal arrangement of the outer casing part of a similar interlocking construction. In this instance the disc filter support 20b is provided with apertures and has a filter pad 37 at its rear aspect, which pad extends into the inwardly opening groove 19b. This form is illustrated in Figure 13. The filter pad 37 acts as a filter and also as a washer at the interlocking joint, filling in at the interlocking slits of the flange 34 and the disc 20b. The filter pad 37 has a central aperture and is attached to the tube 23 at that point, by means of cement. Otherwise the casing and filter unit is like in the two previous forms.

In Figure 3 is illustrated a speaking tube F. The tube has an inner voice receiving chamber 38, a central vacuum chamber 39 and an outer transmitting chamber 40. The tube F has an outer groove about centrally located to receive and engage the face piece at the side portion. Due to the face piece being of elastic molded rubber and the rubber aperture is made smaller than the diameter of the groove, a leakproof joint is provided. Additional precaution may be had if the aperture and groove is cemented. The central vacuum chamber is formed by having an outer metal diaphragm 42 and an inner parchment diaphragm 43. The vacuum is formed by heating the area before cementing in situ the inner parchment diaphragm. A tickler or hammer 44 joins the diaphragms 42 and 43. A transmission of the speaking voice is thus created. The voice is received at the chamber 38 and the said voice waves pound against the diaphragm 43

and the hammer 44 conveys the sound to the outer diaphragm which is carried by the outer transmitter 40. This speaking tube makes it possible for the wearer of the respirator to speak distinctly and also loudly. While heretofore that was not possible. The voice is muffled and indistinct when one is trying to speak with a respirator having no speaking tube provision.

Transmission of voice may be provided without the creation of a vacuum in the speaking tube. This method is simpler and also provides a good transmission. The arrangement of the diaphragms in the modified form is as follows: The tube arrangement is the same as in the first form above described, and the outer metal diaphragm 42a is also the same. The inner diaphragm 43a is a stiff fibrous material or may be cardboard, plastic, hard rubber or metal. As shown in Figure 3a the inner diaphragm is attached by means of a tickler or hammer to the outer diaphragm. The said tickler 44a is centrally located and may be a wire or made of ivory or bone material. The periphery of the outer diaphragm 42a is free of any attachments. The diaphragm 43a receives the sound wave which is amplified in the process of transmission to the outer diaphragm 42a by means of the tickler or hammer 44a.

It is to be noted that the tube 23 extends outwardly from the disc element 20. The purpose of the outward extension is to be able to manipulate the disc 20 when inserting or removing the same from its attachment with the casing at its outer marginal groove 19.

It is to be noted that the hammer 44 has a base 45 and a handle 46, and that it is attached to the outer diaphragm at its base portion, and to the inner disc or diaphragm at its handle part.

What is claimed is:

1. A filter holder for filter type respirators including a casing having an intake port with filter means comprising a hollow filter pad with an aperture, a disc like filter pad having a marginal edge and an opening which opening registers with the said aperture, and means provided at the said intake port whereby the said disc like pad (at its marginal portion) is removably mounted thereat, and the said hollow pad being located within the said casing rearward to the said disc like pad, its aperture being disposed anteriorly whereby unfiltered air enters thereat during inspiration of the wearer.

2. A separator for filter type respirator including a casing having an intake port with filter means comprising a hollow filter pad with an aperture, a tubular element for the said pad located within the said aperture and containing an opening for air passage and means to secure the said pad to the said port comprising a supporting plate mounted in confronting and associated relationship with the said pad and the edges of the said plate being removably secured at the said intake port, and the said pad is located within the said casing.

3. A separator for filter type respirators comprising a container with an inlet aperture, a hollow filter pad with an opening; a disc like filter element having edges and a perforation, a tubular member connecting the said hollow filter pad with the said filter element by being mounted at the said opening and the said perforation, and the said element being associated in confronting relation with the said pad and mounted at the said aperture at its edge portion, and the hollow filter pad being located within the said container.

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