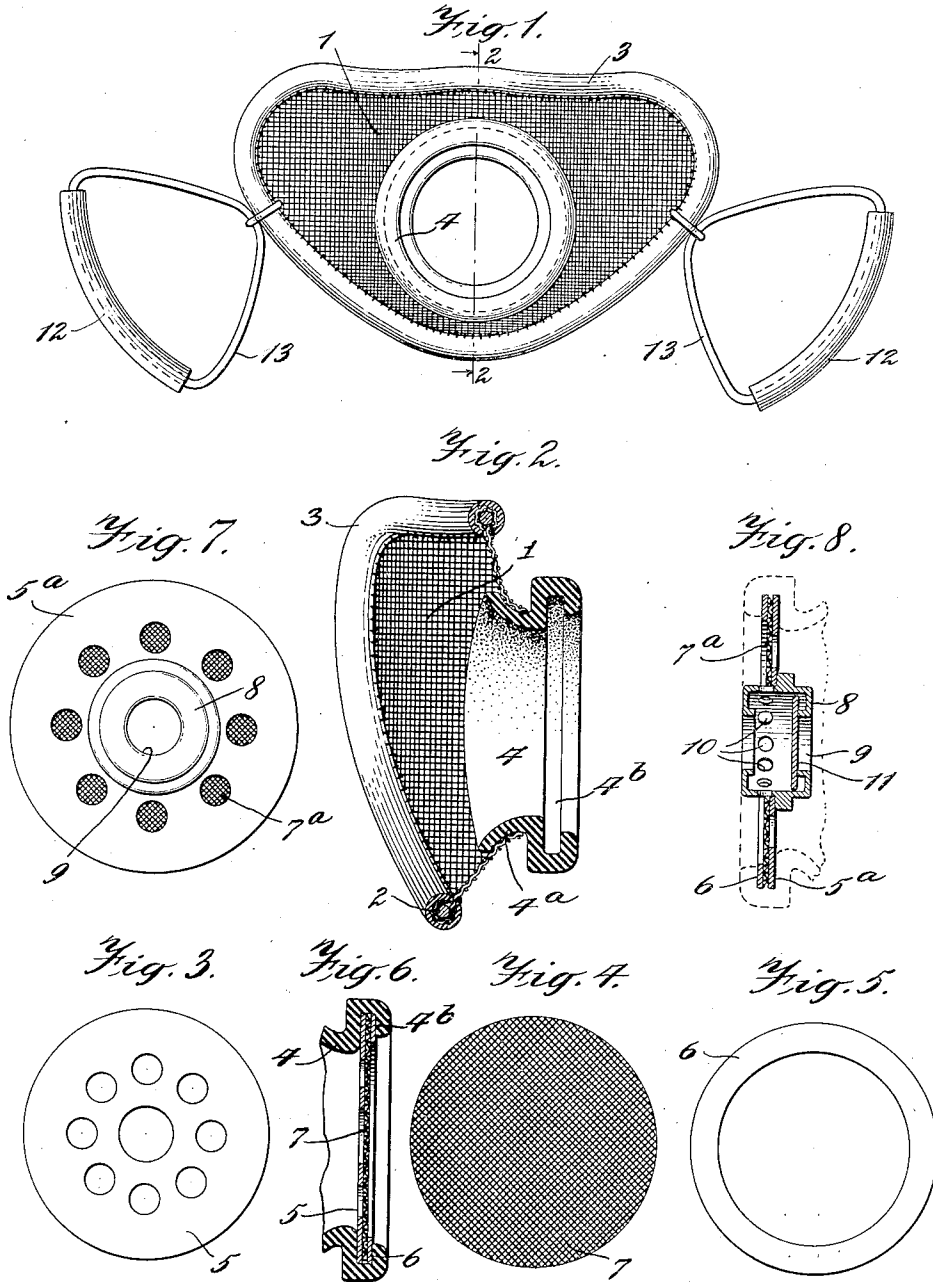


F. W. AND W. G. KING.
RESPIRATOR.
APPLICATION FILED AUG. 7, 1916.

1,359,073.

Patented Nov. 16, 1920.



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UNITED STATES PATENT OFFICE.

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RESPIRATOR.

1,359,073.

Specification of Letters Patent. Patented Nov. 16, 1920.

Application filed August 7, 1916. Serial No. 113,446.

To all whom it may concern:

Be it known that we, FREDERICK W. KING and WALTER G. KING, citizens of the United States, residing at the city of New York, in the borough of Manhattan and State of New York, have invented certain new and useful Improvements in Respirators, of which the following is a full, clear, and exact description.

Our invention relates to respirators, and the general object of our invention is to provide a device of this character which will be simple and inexpensive, as well as effective for the purpose for which it is designed. A more particular object is to combine facility of inserting and removing the filter device with security against distortion of the device when applied to and worn upon the face and thereby causing leakage around the filter device. Another object is to render the device comfortable to the wearer. Still other objects and advantages of our invention will appear from the following description.

Our invention comprehends a suitable face piece or body member provided with a respiratory opening and composed of suitable flexible material to enable it to easily and closely conform to the face of the wearer, and a forwardly-projecting internally-grooved filter-retaining member made of elastic material, together with a rigid filter clamp fitting into the groove. We have found that a suitable material for the body portion is woven wire gauze or screening treated to render it impervious to gases, although any suitable flexible and impervious material may be used.

The filter-retaining member is preferably composed of soft rubber which is expansible and permits the rigid filter device to be easily inserted and removed while forming an effective seal around the clamp against noxious gases. The rigid filter clamp retains the holder in shape and prevents it from being distorted by the strains upon the face member and thereby destroying the seal.

Our invention also comprehends other features of construction and details and ar-

rangements of parts, as will hereinafter more fully appear.

We shall now describe the illustrated embodiment of our invention and shall thereafter point out our invention in claims.

Figure 1 is a face view of a respirator embodying our invention;

Fig. 2 is a sectional view of the same taken on line 2—2 of Fig. 1;

Figs. 3, 4 and 5 are details in elevation of one filter clamp, a filter element, and the cooperating filter clamp, respectively;

Fig. 6 is a sectional detail of the front end of the filter retaining member, and of the filtering device in the retaining groove; and

Figs. 7 and 8 are a rear elevation and central section, respectively, of a modified filter device.

The body member 1 of the device shown in the drawings is generally of triangular shape, having the apex at the bottom, and is large enough to cover a considerable portion of the face of the wearer, preferably covering the mouth and a substantial portion of the nose and cheeks. This body portion is composed of a suitable impervious, pliable, non-elastic fabric, having sufficient rigidity to maintain its shape while in use, but being sufficiently flexible and pliable to permit of its being easily bent and shaped to conform to, and fit accurately upon, the face of the wearer. We have found that very satisfactory material for this purpose is woven wire screening or gauze of fine mesh, which is treated with some material to close up the openings and render it impervious to gases. We have used for this purpose the substance well known on the market under the trade name of "bakelite," the liquid being either applied by a brush to the wire screening or, if desired, the screening may be dipped into the "bakelite." This material, when dried, will not break as the body member is bent to the desired shape, and we have found it, generally, very suitable for this purpose, although conceivably other materials may be used for the purpose.

Additional strength and rigidity is im-

parted to this body member by reinforcing its edge with a suitable, pliable, non-elastic reinforcing member 2, such as copper wire. This reinforcing wire may be secured by turning or beading the marginal portion of the body member over the wire 2, and the reinforced margin may then be secured by a suitable binding 3. We have found rubber tubing very suitable for this purpose, the tubing being split longitudinally and secured in place by stitching or other suitable means. This binding serves to cushion the reinforced margin and to render the device comfortable to wear.

This body portion is provided with a substantially central respiratory opening, and a suitable filter-retaining member is secured in this opening. In the construction shown, this filter retaining member is a soft rubber annulus or tube 4 of proper size to fit tightly in the respiratory opening of the body member 1, and is provided at its rear end with an annular flange portion 4^a, which bears against the rear face of the body member, and forms an effective seal. If desired, this flange portion 4^a may be cemented to the rear face of the body portion.

At its forward end the walls of the tubular member 4 are also thickened and an internal circumferential filter-retaining groove 4^b is formed in this thickened portion as shown in Fig. 2.

The filtering mechanism is of proper size and shape to fit into this groove 4^b, being readily inserted therein and removed therefrom without necessarily removing the respirator from the face, due to the expansibility and elasticity of the walls of the groove. The filtering mechanism, as shown, consists of two clamping members 5 and 6, and a suitable filtering element 7 which is clamped between them. The clamps 5 and 6 are circular, flat, perforated, metallic members, the member 6 being shown as annular, while the member 5 is provided with a plurality of smaller perforations. Any usual filtering element may be clamped between these. For the purpose of illustration, we have shown a circular wire gauze or screening element 7, although manifestly cloth or other porous fabric saturated with a suitable chemical to neutralize acid or other fumes, may equally well be clamped between the clamps 5 and 6, and we use the term "filter" herein to denote any of the various kinds of such elements commonly used for the purpose.

For certain purposes it is desirable to provide means for permitting the breath to be freely expelled while causing the air to be filtered on inhalation. In Figs. 7 and 8, we have shown a filter device which is a unitary structure effecting this result. The

perforated clamping member 5^a and the filter element 7^a are provided with a central orifice, in which is secured a check valve comprising a valve casing 8 provided with a central rear opening 9 and radial perforations 10 near its front end. A sliding valve disk 11 operates to close the opening 9 on inhalation, as shown in Fig. 8, and on exhalation the valve disk 11 is caused to move to a position in front of the perforations and thereby establish free communication between the opening 9 and the perforations 10, permitting the breath to be freely expelled.

The respirator may be held in place by suitable fastening members. We have shown for this purpose fastening devices 12 which fit behind the ears, being of the proper shape for comfort and being attached to the body member by elastic cords 13. The members 12 may be pieces of hollow rubber tubing through which the elastic cords 13 are threaded, and if desired or necessary, the members 12 may be reinforced with a core of stiffening material of suitable shape.

It is obvious that various modifications may be made in the construction shown in the drawings and above particularly described within the principle and scope of our invention.

We claim:

1. In a respirator, the combination of a flexible face conforming body member having a respiratory opening, a tubular filter retaining member having one end joined to the body member, and the other end thereof consisting of expansible elastic material, having an internal retaining groove, and a filter device retained within said groove and comprising a rigid clamping member of a diameter to fit snugly in the groove and a filter element clamped thereby, the wall of the groove remote from the body member having an open central portion whereby the filter device is removable from the tubular member from the side remote from the body member.

2. In a respirator, the combination of a flexible face conforming body member having a respiratory opening, a tubular filter retaining member having one end joined to the body member, and the other end thereof consisting of expansible elastic material, having an internal retaining groove, and a filter device retained thereby, the wall of the groove remote from the body member, having an open central portion whereby the filter device is removable from the tubular member from the side remote from the body member.

3. A respirator having a respiratory orifice and a filter-retaining member communicating therewith, and a filter device in the filter-retaining member comprising two per-

forated filter clamps provided with a central opening and a check valve in the central opening operative to open on exhalation and close on inhalation.

- 5 4. A respirator comprising a head piece adapted to cover the nose and mouth and having a filter therein, an exhalation opening extending through said filter, and an exhalation valve arranged in said opening

and adapted to allow the free outward pas- 10
sage of the exhaled breath, and to prevent the inflow of the outer atmosphere.

In witness whereof we subscribe our signatures in the presence of a witness.

FREDERICK W. KING.

WALTER G. KING.

Witness:

WALDO M. CHAPIN.