May 29, 1934. R. MALCOM 1,960,544

MASK

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Fig. 1.

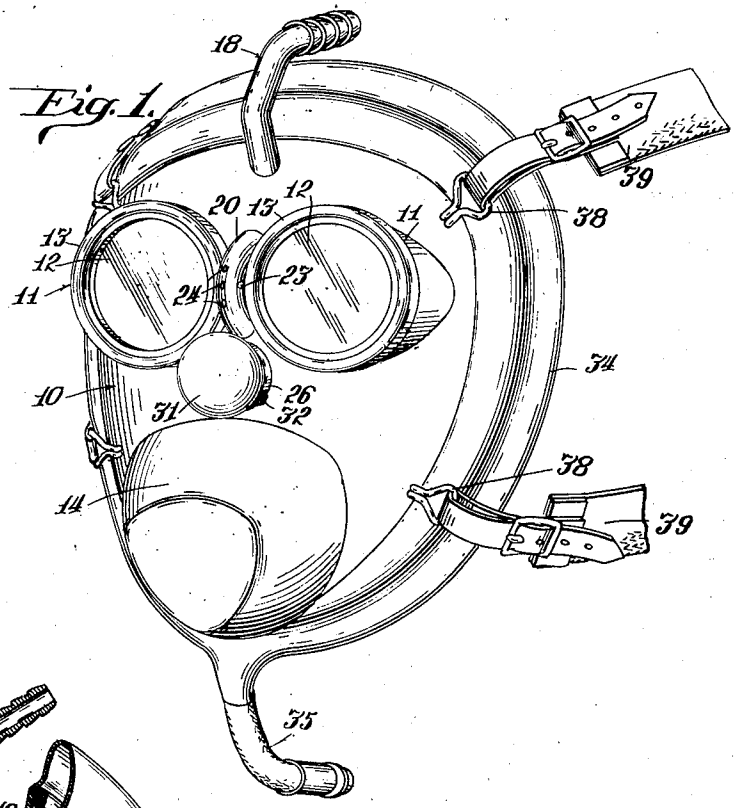

Fig. 2.

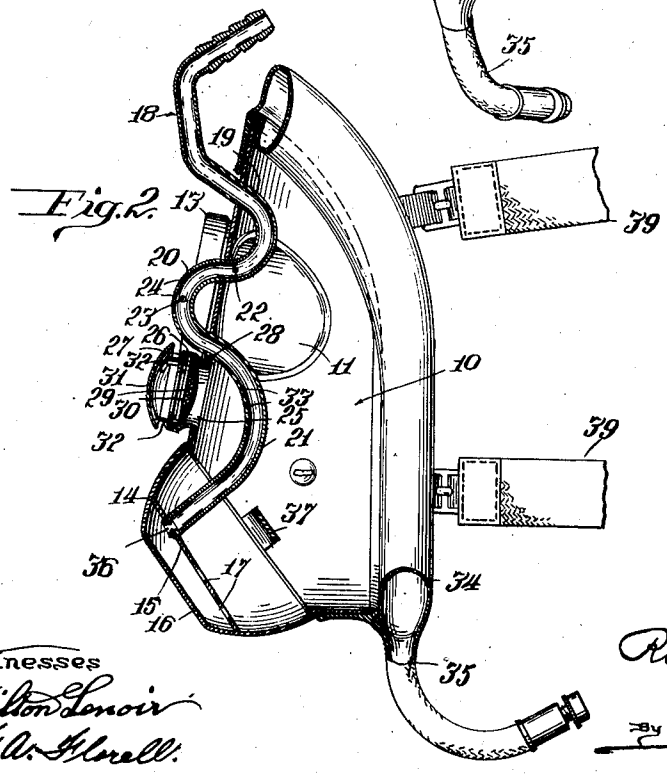

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Fig. 3.

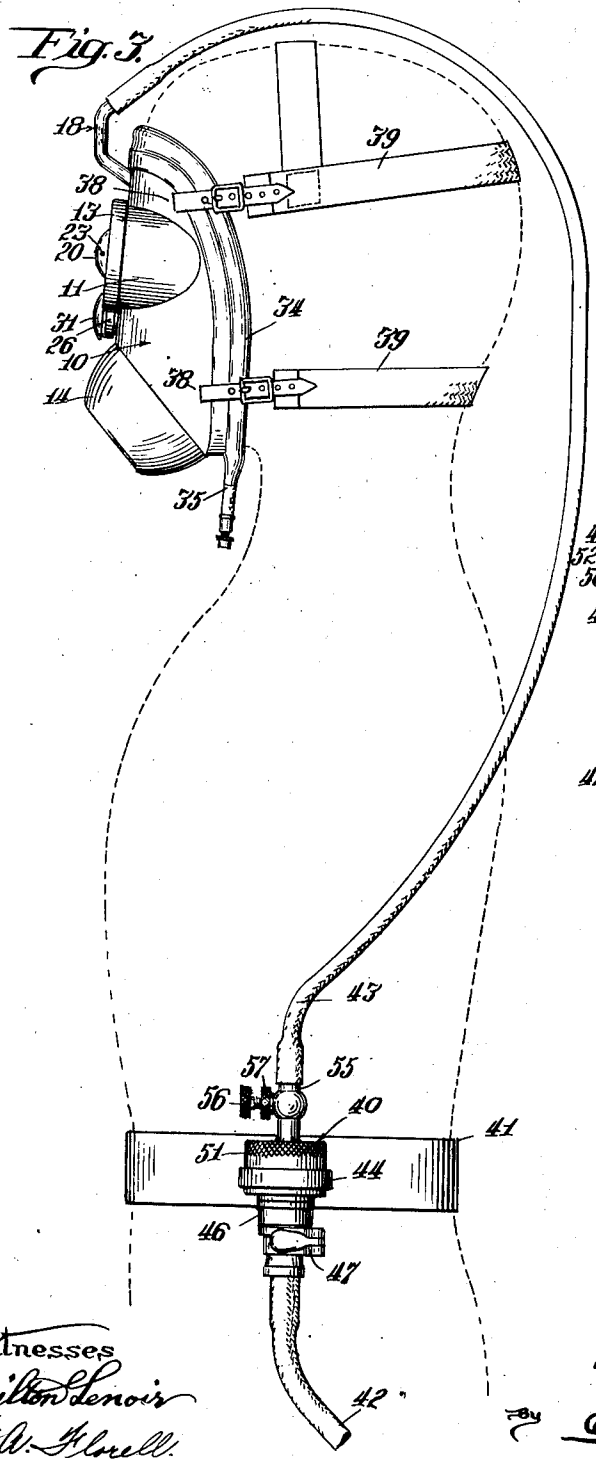
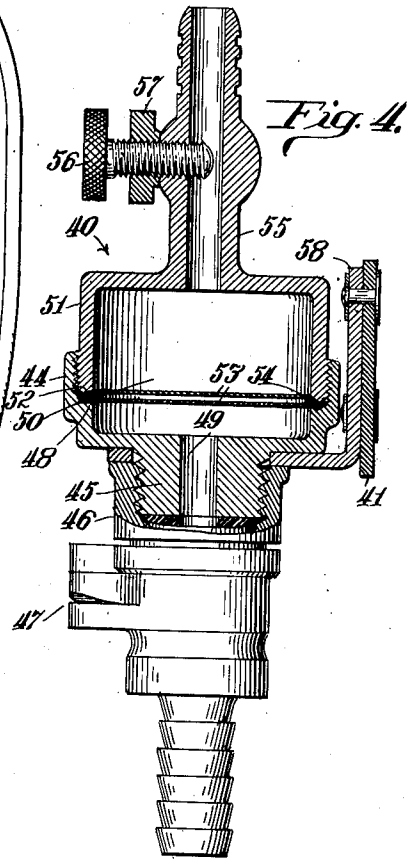


Fig. 4.



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Patented May 29, 1934

1,960,544

UNITED STATES PATENT OFFICE

1,960,544

MASK

Robert Malcom, Chicago, Ill.

Application June 6, 1932, Serial No. 615,584

4 Claims. (Cl. 128—141)

My invention relates to masks more especially intended for use in sand blast operations and therefore to be used in conjunction with an outer hood or helmet adapted to cover the entire head of the user.

The object of the invention is to provide a mask of rather simple construction, whereby pure air from an air supply will be suitably delivered to the mask interior for respiratory purposes; while at the same time delivering jets of air across the lenses of the mask both interiorly and exteriorly so as to prevent steaming or fogging of the lenses and also to maintain the lenses free of vision obstructing dust.

The invention has for its object the provision of single air conveying means adapted to accomplish the objects just mentioned and to also provide suitable air jets on the mask exterior adapted to be directed toward the sight openings in the usual hood intended to be worn with the mask when engaged in sand blast or similar operations.

The invention also has for its object a mask provided with a suitable exhalation outlet arranged to be easily accessible and having a protecting shield; the single air conveying conduit or means being also arranged to deliver suitable jets of air outwardly through said outlet so as to prevent ingress of dust and also prevent clogging of said outlet.

The invention contemplates arrangement of the air conduit or means so that the air will not be delivered in direct and uncomfortable contact with the eyes and face of the user, but will be delivered into a chamber which is adapted, if desired, to contain any suitable filtering medium.

The invention also contemplates means for filtering the air in advance of its discharge into the mask and whereby the user may control the amount of air flow while the device is in use.

The above enumerated objects of the invention, as well as advantages inherent in the construction, will all be readily comprehended from the following detailed description of the drawings, wherein:

Figure 1 is a perspective view of my improved mask.

Figure 2 is a vertical sectional view thereof.

Figure 3 is a side view of a head and part of a body with my improved mask applied.

Figure 4 is a partial sectional and elevational view of my improved air filtering and control means employed in the air line of the mask.

In its specific exemplification, the mask involves a main body portion 10, preferably made of sheet metal, shaped more or less to the general contour of the face so as to extend across the forehead, along the sides of the face and dished or cupped at the bottom to fit beneath the chin.

The body portion adjacent the upper end is provided with a pair of sight openings having outwardly extending circular walls or eye-cups 11, 11, which are integrally secured in the openings. These eye-cups 11 are formed to receive suitable eye protecting lenses 12; the outer ends of the eye-cups 11 being shown provided with lens holding flanged rings 13 which are preferably firmly secured in place against accidental movement.

The lower part of the body portion, at a point adapted to come opposite the mouth of the user, is built outwardly into the cup portion or enlargement 14 shown preferably tapering into the lower chin receiving portion of the mask. This enlargement 14 constitutes the inhalation air chamber of the mask and is provided with an inner wall or diaphragm 15 preferably integrally secured to the walls of the enlargement, in spaced relation with the outer end wall 16 so as to provide an air receiving chamber therebetween. The inner wall 15 is provided with a number of suitable sized openings, as at 17, spaced apart throughout the wall 15 to permit easy egress of the air delivered into the chamber.

Air from a suitable source of compressed air supply is delivered to the mask by the single conduit 18, the upper end whereof preferably curves or extends rearwardly over the top of the mask to receive the air tube leading from the air supply.

The conduit 18 preferably consists of a single metallic tube bent into the somewhat serpentine manner shown in Figure 2 so as to extend through the main body 10 preferably at the vertical axis and in a plane slightly above the plane of the eye-cups, as shown at 19; thence outwardly through the mask at a point between the eye-cups where it is bent into the loop form shown at 20 and again passes through the body portion 10 to the interior, providing the loop portion 21 extending downwardly on the mask interior and the lower end integrally secured in an opening in the inner wall or diaphragm 15 of the air or inhalation chamber, so as to discharge air into the chamber intermediate of the outer wall 16 and the inner wall or diaphragm 15; the air flowing from this chamber through the holes 17 in diaphragm 15 for inhalation by the user.

The tube 18, at the points of passage through

the main shell 10, is preferably soldered in place so as to prevent ingress of dust laden air into the mask.

The interior loop portion 19 of the conduit or tube 18 adjacent the lower end of the loop 19 and hence in proximity to the inner sides of the lenses 12, namely at opposite sides of the loop 19, is provided with minute air discharging ports, one of which is shown at 22 in Figure 2.

These ports will direct jets of air across the inner faces of the lenses 12 and prevent "steaming" or fogging of the lenses.

The outer loop 20 of the conduit or tube 18 on opposite sides, substantially in line with the transverse axis of lenses 12, is also provided with small ports 23, one of which is shown in each figure. These ports will discharge small jets of air across the outer faces of the lenses 12 and hence will prevent accumulation of dirt or dust on the lenses.

As the mask is especially designed for use in sand blasting operation, at which time the operator also employs a head covering or hood over the mask, the loop portion 20 is also shown provided with a number of small ports shown at 24 adapted to direct small jets of air forwardly toward the sight openings in the hood. The sight-openings in the hood may be provided either with glass or a fine mesh screen and the jets of air discharging through ports 24 will prevent accumulation of dust and moisture on the inner surface of the glass or will pass forwardly through the screens of the hood sight openings and prevent accumulation of dust particles on the screen and hence maintain clear vision for the operator.

The mask 10, intermediate of the sight openings and the enlargement 14, namely at a point in proximity to the nostrils of the users, is provided with an exhalation discharge opening 25.

This opening is preferably provided with a surrounding wall 26 which is provided with an inturned flange 27 at the outer end while the side wall 26 is bowed inwardly as shown at 28 the flange 27 and portion 28 providing means for holding the screen 29 in place. The outer end of the housing or surrounding wall 26 is shown slightly larger in circumference than the seat portion 28, to permit insertion of the small screen 29 therethrough and to permit insertion of the expander ring or spring 30 which holds the screen 29 on its seat; the expander ring 30 expanding into frictional relation with the wall 26 and held from accidental removal by the flange 27 of the wall 26.

In order to protect this exhaust opening and prevent too easy accummulation and entry of dust, I provide the opening with a small hood or covering member 31 which is preferably removably secured in place and held in spaced relation with the outer orifice of the exhaust opening by a plurality of small spring fingers 32, the free ends whereof snap beneath the flange 27 of the wall portion 26, as shown in Figure 2.

The lower inner loop 21 of the conduit or air tube 18, is shown provided on its forward side with a number of small ports 33 which will direct jets of air through the outlet 25 inducing more free exhaustion through the opening. These jets of air will strike the hood or shield 31 and by reason of its concaved construction will cause the air to be deflected and spread more or less uniformly towards the perimeter of the hood or shield and thus also be more effective in preventing entrance of dust through the exhalation outlet 25.

The perimeter of the mask body is preferably provided with a well known type of inflatable air cushion 34 having the usual valved tube 35. This not only prevents contact of the face with the perimeter of the metal shield or body of the mask, but also shapes itself to the contour of the face and provides an air seal about the mask.

In order to induce proper outflow of some of the air in tube 18 through the different ports heretofore described, the tube 18 below the ports 33 should be provided with a slight restriction or dam, or the lower end of the tube at its orifice made slightly smaller, as shown in Figure 2 at 36.

The inner side of the mask at the inhalation cup portion or enlargement 14, is preferably provided with a reenforcing cross-bar 37, spaced from the inner diaphragm or wall 15, as shown in Figure 2. In addition to reenforcing the mask, this bar 37 is intended to hold a suitable filtering medium—treated sponge or cotton—in place between the bar and the inner wall 15, so that the incoming air discharged into the chamber between walls 16 and 15 will be made to pass through the perforations 17 and through the filtering medium before it is inhaled by the user.

Opposite sides of the shield or body portion of the mask 10 are shown provided with loops 38 to which the straps of the head gear are secured; portions of these head straps being shown at 39.

In Figures 3 and 4 I illustrate my improved air filtering and controlling means. This improved means is generally shown at 40 in Figure 3 and secured at a convenient place to the usual air tube holding waist-band or belt 41 strapped about the body of the workman. The filtering and control means 40 is interposed in the main air line; the section of line 42 connecting with the air supply, while the section 43 connects with the upper free end of the conduit or tube 18.

The means 40 involves a lower cup member 44 having a depending nipple 45 shown externally threaded to receive gland-nut and coupling member 46 to which the air line section 42 is attached by means of a well known type of eccentric clamp generally indicated at 47.

The interior of cup member 41 is provided with an annular shoulder 48 arranged in a plane above the bottom of the cup as shown in Figure 4 and therefore in a plane above the air inlet port 49. This shoulder 48 is preferably provided on its upper surface with an annular groove as shown at 50 in Figure 4.

The upper end of the cup member 44 above the shoulder is shown internally threaded to receive the externally threaded inverted cup member 51. The lower peripheral face of the cup member 51 is shown provided with an annular rib 52, preferably somewhat V-shaped in cross-section and adapted to register with the groove 50 in the lower cup member. The purpose of the groove and rib is to firmly clamp the filtering discs 53 in place and hold them taut.

These discs 53 may consist of suitable filtering paper; the two discs being held in slight spaced relation by a small wire ring indicated at 54. As is apparent, the incoming air from port 49 is first allowed to expand in the chamber between port 49 and the filtering discs, thus allowing its force to become somewhat dissipated; and any dust particles that might possibly pass through the first filtering disc 53 would fail to pass through the second disc 53 because of the spaced relation between the discs 53, and hence

such dust particles would lodge in the intervening space.

The upper cup member 51 is provided with the outlet stem or nipple 55 which receives air line 43 leading to the mask conduit 18. The nipple 55 is provided with a suitable finger operated valve 56, whereby the amount of compressed air flow to the mask may be controlled by the mask wearer. The valve 56 is preferably of a type which will prevent complete shut-off, so that a certain amount of air will at all times be available to the user while the mask is in place; while on the other hand excessive flow or flow in greater quantity than desired may be regulated or controlled.

In order that the valve 56 may be held in the desired adjusted position, I provide the valve-stem with a lock nut 57 which will prevent accidental operation or closing of the valve.

The air filtering and controlling means is immovably secured to the band or belt 41 by the angle bracket 58 whose one leg is riveted or otherwise suitably secured to the belt; while the horizontally disposed side or leg of the bracket is apertured to receive the inlet nipple 45 of the lower cup 44 which is clamped in place by the coupling member 46.

With the air introducing tube 18 discharging forward of wall or diaphragm 15, the wearer is not subjected to the discomfort which would result from a direct contact with the injected air; the injected air is discharged against the wall 16 and thereby deflected and spread and its force dissipated before reaching the face of the wearer.

My improved mask, as shown, involves a single piece main body formed with an integral nose and mouth-receiving enlargement and a single air conveying conduit for supplying air indirectly to the wearer, as well as for directing a number of differently disposed and discharging jets for maintaining clear vision and assisting in foul air exhaustion; namely a mask of simple construction and great efficiency. At the same time, assurance of air free from dust particles is ensured by simple means involving a readily adjustable valve whereby the amount of air discharging into the mask is under easy control of the wearer of the mask regardless of the air flow in the supply line coming from the source of compressed air supply.

The exemplifications are believed to be simple embodiments of the invention and have been described in terms employed merely for purposes of description and not as terms of limitation, as modifications are possible and may be made without, however, departing from the spirit of my invention.

What I claim is:

1. A mask of the character described comprising a face covering body portion provided with sight openings, an exhaust opening and a forwardly disposed enlargement; and a single air conveying tube disposed through the front wall of the mask and secured thereto, said tube entering the body portion adjacent the top and having an intermediate portion disposed through said body portion between the sight-openings, with said intermediate portion having ports for directing air transversely of the sight openings and in a forward direction, while other portions of the tube within the body portion have ports for directing air across the inner side of the sight openings and into said exhaust opening, respectively, with the discharge orifice of said tube disposed in said enlargement and adapted to discharge the air toward the side wall of said enlargement away from the face of the wearer.

2. A mask of the character described comprising a face covering shield provided with lens carrying sight openings, a forwardly disposed enlargement provided with imperforate walls, a perforated diaphragm in the enlargement spaced from the end wall thereof and an exhaust opening; and an air conduit arranged in a sinuous manner through the front wall of the shield and secured thereto with the discharge end disposed into said enlargement and through said diaphragm so as to discharge the air into the space between the end wall of the enlargement and the diaphragm, the tube intermediate of its ends having ports adapted to discharge separate jets of air against opposite sides of the lenses of said sight openings and in a direction forward of the shield and also into said exhaust opening.

3. A mask of the character described comprising a face shield portion having lens carrying sight openings and an exhaust opening, the shield being provided with an outwardly extending and integrally united enlarged portion having imperforate walls; and a single conduit disposed through the upper part of the shield and extending downwardly into said enlarged portion, said conduit being provided with an air flow restriction adjacent the discharge end, said conduit being secured to the shield with an intermediate portion thereof communicating with the outer side of the shield intermediate of the sight openings, the conduit being provided with a plurality of ports at prearranged points adapted to discharge jets of air across the inner and the outer sides of the lenses and jets of air into the exhaust opening; means within said enlarged portion whereby the discharge orifice of the conduit is held in spaced relation with the imperforate wall of the enlarged portion; and a deflector spacedly secured across said exhaust opening.

4. A mask of the character described comprising a face receiving shield having lens carrying sight openings, an outwardly disposed integral, closed enlargement at the lower end, an exhaust opening intermediate of said enlargement and the sight openings and provided with a filter or screen holding seat and a removable deflecting member, and a single air conduit disposed through the upper front wall of the shield and extended downwardly within the shield and into said enlargement, with a portion of the conduit curving outwardly through the shield between said sight openings, the conduit within the shield adjacent the sight openings and adjacent the exhaust opening having parts whereby jets of air will be discharged across the inner surfaces of the lenses and through said exhaust opening, while the portion of the conduit disposed on the shield exterior between the sight openings is provided with ports arranged to discharge jets of air across the outer surfaces of the lenses, the end of the conduit within said enlargement being provided with a restricted orifice.

ROBERT MALCOM.