

1,288,647.

2 SHEETS—SHEET 1.



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RESPIRATOR MASK.
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2 SHEETS—SHEET 2.

Fig. 2.

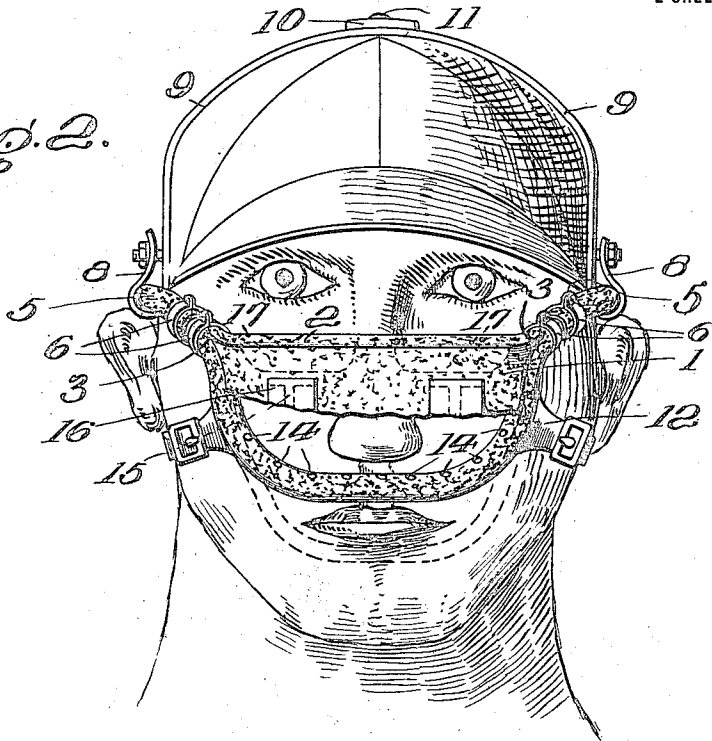


Fig. 3.

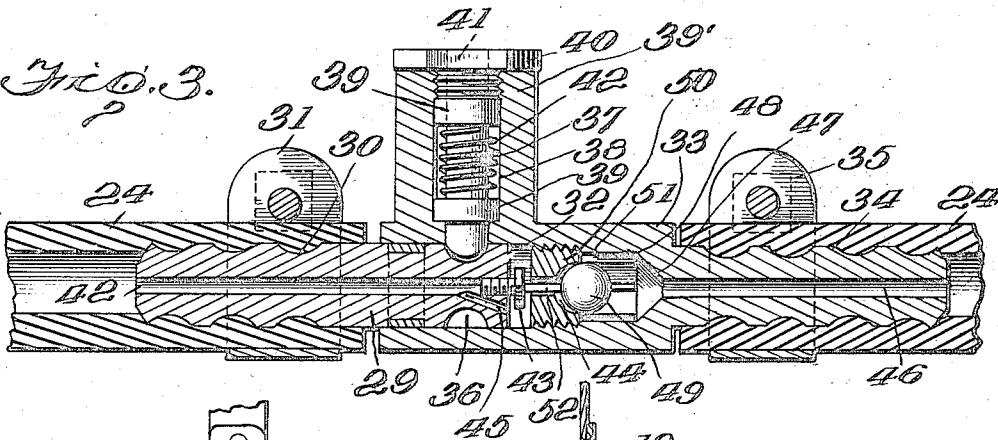


Fig. 4.

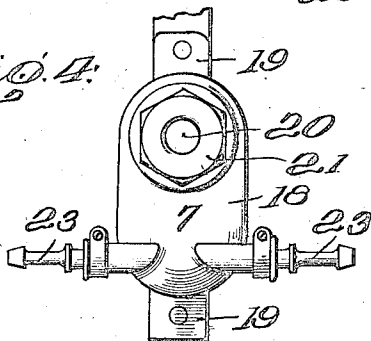
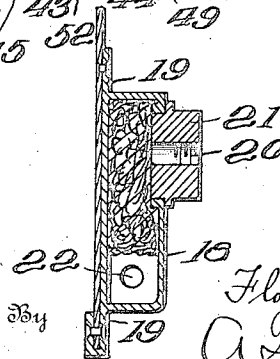


Fig. 5.



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UNITED STATES PATENT OFFICE.

FLOYD L. MILLER, OF IDAHO SPRINGS, COLORADO.

RESPIRATOR-MASK.

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To all whom it may concern:

Be it known that I, FLOYD L. MILLER, a citizen of the United States, residing at Idaho Springs, in the county of Clear Creek and State of Colorado, have invented certain new and useful Improvements in Respirator-Masks, of which the following is a specification, reference being had therein to the accompanying drawing.

My invention relates to improvements in respirator masks, and more particularly to such a device adapted to be worn by the operator of a high speed mining drill. When a high speed rock drill is run under dry conditions in a mine, a suffocating dust is generated which has made work heretofore in many instances impossible. Furthermore, the dust and gases generated in mining operations in most metalliferous mines is poisonous resulting in a large number of fatalities, especially where copper, silver, lead, and arsenical minerals are being mined. The invention herein is adapted to supply fresh air from the surface for the operator of the drill which is free from dust and poisonous gases.

Another object of the present invention is to devise a respirator mask having its air supply constructed and arranged in such a manner that it is readily attachable to the air supply of a pneumatic rock drill.

The mask and air supply pipes, hereinafter to be described, may be connected to a strong, light tank filled with air at high pressure, which may be carried by a miner, the entire outfit being adaptable for use in exploring mines where recent explosions have occurred for rescue work, etc.

Other objects and advantages of the present improvement will be set forth in detail in the following description and drawings, in which.

Figure 1 is a side elevation of my improved mask showing its application to the cap and face of the user and the attachment of the air supply pipe to a pneumatic rock drill.

Fig. 2 is a front elevation showing the mask applied to the face of the user.

Fig. 3 is a vertical sectional view of a hose coupling arranged in the air supply pipe of the mask and serving the purpose of a safety valve.

Fig. 4 is an end elevation of an air filter arranged in the air supply-pipe to the mask.

Fig. 5 is a vertical sectional view of Fig. 4.

Fig. 6 is an enlarged perspective view, partly in section, of a plug carried by one end of the air supply pipe and serving as an attachment means to a pneumatic rock drill.

Referring now to the drawings in detail in which like reference numerals designate similar parts throughout the several figures, 1 represents a mask composed of rubber which is of a size to extend across the face and from below the eyes to a point just above the mouth of the wearer. In some instances, where breathing is done through the mouth, the mask may be longer and extend to a point below the mouth as is shown in dotted lines in Fig. 1.

The edges of the rubber mask 1, are formed of small rubber tubing 2, which meet at the two uppermost corners of the mask at the point 3, to form one short section of tube 4. A pipe 5 is connected at one end to the short section of the tube 4, by means of clamps 6, the other end of the pipe 5 being connected to a filter 7, hereafter to be described. The pipe 5 passes through an eye 8, formed in a U-shaped bracket 9, which fits on top of the cap of the wearer. The filter 7 is mounted upon a piece of band metal 10, which is connected at the point 11, to the center of the top of the U-shaped member 9. It is to be understood that there are two pipes 5, one extending along each side of the face of the wearer, as is clearly shown in Fig. 2. Due to the arrangement of the U-shaped member 9 and the member 10 on the cap of the wearer, the pipes 5 being carried thereby and connected to the upper corners of the mask form one means for holding the mask in position on the face of the wearer. Leather straps 12 having their ends connected to the lower corners of the mask 1, are buckled together by a strap 13, which passes around the back of the neck of the wearer and serves as an additional means for holding the mask 1 in place.

The portion of the rubber tubing 2, which passes around the bottom edge of the mask is provided with a plurality of openings 14, which feed air inside the mask 1 and to the nose of the wearer. Slits 15 are made in the mask on each side of the nose of the wearer forming exhaling openings. These openings are covered with a covering 16 sewed or made fast to the mask at its upper and lower edges, the side edges being un-

secured and providing an outlet for the air exhaled through the slits 15. In order that the air fed to the mask may be moistened to a slight degree, sponges 17 are fitted within the mask in the depressions between the nose and cheek of the wearer. These sponges also serve as pads to make the mask fit more comfortably upon the face of the wearer. Due to the fact that there are two sections of hose 5, between the filter 7 and the mask, should one of these hose break, in an emergency, the end of the broken hose could be plugged and air supplied to the mask through one pipe 5. In such a case the mask is held in place upon the face by means of the straps 12 only.

The filter 7 consists of a box-shaped body-portion which has extending flanges 19 at its top and bottom edges which form attaching means to the band metal support 10. The interior of the filter is filled with an absorbent substance, preferably of sponge for the purpose of filtering oil and other foreign substances from the air which passes therethrough on its way from the air-supply to the mask 1. Air enters the filter through an opening 20, formed in a bushing 21, fitted into the back of the filter. The filtered air passes out through pipes 22, arranged adjacent the lower edge of each side of the filter. The pipes 22 are each provided with hose couplings 23 for connection with one end of each hose 5.

A long air-supply pipe 24 has one end 25 fitted within the opening 20 communicating with the interior of the filter, and its other end provided with a screw threaded plug 26, which is tapped into the main air supply 27 of a pneumatic high speed drill 28. As air is supplied to the drill for operating it, air is also supplied to the pipe 24, which feeds air through the filter 7 and pipes 5 to the mask 1, which is worn by the operator of the drill. In this way, though the atmosphere around the drill and its operator may be charged with dust and poisonous gases, the operator may work in comfort being always supplied with fresh, clean, air from the surface above the mine in which he is working.

As is well known to those skilled in this art, drills of the character herein referred to are provided with a telescopic air feed and in operation the drill steels often break and the drill is then shot upward to the full stroke of its feed which moves the drill casing, to which the air supply is connected, a considerable distance. In such a contingency should the air supply pipe 24 by any chance, be, beneath the feet of the operator, encircling the drill casing or taut for any reason, the sudden upward thrust of the drill casing would either break the pipe 24 or, perhaps, seriously hurt the operator. To avoid such an accident, the air-

supply pipe 24 is cut and a detachable connection is fitted between the severed ends. This connection comprises a cylindrical member 29, having one of its ends provided with coarse threads 30, which are threaded within one end of the air supply pipe 24 and held therein by means of a hose clamp 31. The other end of the cylindrical member 29 fits within an opening 32 made in a tubular casing 33, which is provided on its other end with coarse threads 34, which are threaded within the other end of the air supply pipe 24 and held therein by means of a hose clamp 35. A frictional connection is made between the cylindrical member 29 and the casing 33, which comprises a groove 36 cut around the end of the member 29, which projects within the casing 33. A vertically movable spline 37 has one end fitting within the groove 36 and is slidably movable with a guideway 38 formed in a tubular extension 39' made integral with the casing 33 and extending radially thereto. A collar 39 is made integral with the spline 37 adjacent its lower end for limiting the downward movement of the spline. A screw threaded adjusting nut 40 having an opening 41 therethrough to receive the upper end of the spline 37 is screwed within the upper end of the tubular extension 39'. A coil spring 42 surrounds the spline 37 between the collar 39 and the lower end of the adjusting nut 40. By screwing down on the nut 40 the spring 37 is put under varying tension and thereby regulating the tension of the frictional contact between the spline 37 and the groove 36. An air passage 42 is formed through the center of the cylindrical member 29, which communicates at one end with the pipe 24 and at its other end is plugged with an adjusting screw 43, having an extension 44, the purpose of which will be hereafter set forth. A diagonal bypass 45 is made in the member 29 connecting the passage 42 and the interior of the opening 32, within the cylindrical housing 33. An air passage 46 is formed through the center of the extended end of the casing 33 having one end communicating with the air supply pipe 24, and at its outer end communicating with a reduced portion 47 of the opening 32, within which is fitted a hexagonal cored ball support 48 to receive a ball 49, held in place by a screw-plug 50 having a semispherical ball valve seat 51 in one end thereof. The tightness of the fit between the ball 49 and its seat may be regulated by the screw plug 50. The ball 49 is normally held unseated by means of the extension 44, which passes through an opening 52, made in the plug 50, and engages the ball 49 holding it away from its semi-spherical seat 51.

The ball 49, its adjustable seat 51 and the adjustable unseating mechanism 43 together, form a pressure regulating valve for the

purpose of regulating and reducing the air under high pressure that is supplied through the pipe 24 from the air supply 27 to the drill. Were it not for this pressure reducing valve, the air under very high pressure for operating the drill would be fed to the mask 1, which of course would be a great shock on the wearer, and in order to reduce the pressure of this air to the proper degree, the ball 49 and its cooperating parts are provided. Attention is called to the fact that the adjusting nut 43 is readily accessible for adjustment when the two telescoping members 29 and 33 are separated.

The separable connection, above described, in detail, operates as follows: Air is fed from the drill 28 to the pipe 24, which conveys the said air through the passage 46 in the casing 33, and past the unseated ball valve 49, through the openings 52, 32, bypass 45 and opening 42 into the pipe 24, which feeds the air to the filter 7 and thence to the mask 1. The amount of air passed through the detachable connection is regulated by the distance the ball 49 is held unseated as is readily understood. Should the drill steel break and a heavy strain be put upon the pipe 24, the end of the cylindrical member 29 will be pulled out of the opening 32, within the casing 33, forcing the spline 37 upward against its spring, and breaking the air connection between the passages 42 and 46. As soon as the member 29 is detached, carrying the ball unseating extension 44 with it, the air pressure in the passage 46 will seat the ball 49 and prevent air from escaping. As soon as the drill 28 is repaired and set up for further operation, the member 29 is fitted within the opening 32 in the casing 33, the spline 37 dropping into the groove 36 and holding the two members 29 and 33 together. At the same time the extension 51 unseats the ball 49 and air is at once supplied through the passage heretofore described, to the filter 7, and thence to the mask.

When the mask herein described is to be used for mine rescue work, the plug 26 carried by one end of the air supply pipe 24,

is tapped into a light air tank containing compressed air, which tank is carried by the user of the respirator.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. A respirator comprising a flexible mask arranged to cover the nose of the wearer, a flexible air supply pipe extending along one edge of the said mask and having perforations therein for supplying air inside of the mask, and means for holding the mask in position upon the face of the wearer.

2. A respirator comprising a flexible mask arranged to fit close to and cover the nose of the wearer, an air supply pipe attached to the mask along one edge thereof and having openings therein for supplying air to the interior of the mask, a supporting member attached to the head of the wearer, said air supply pipe attached to the said support, and means for holding the mask in position on the face of the wearer.

3. A respirator comprising a mask arranged to cover the nose of the wearer, a pipe attached to the upper edge of the mask, a pipe attached to the side edges and bottom edge of the mask, said pipes meeting at the two upper corners of the mask and joined into one pipe forming an outlet at each corner of the mask, the pipe extending along the bottom edge of the mask being provided with a plurality of openings, a supporting member attached to the head of the wearer, two air supply pipes attached to the said support and having one of their ends connected to the upper corners of the mask, a filter carried by the supporting member, the other ends of the said pipes communicating with the said filter, a source of air supply and a pipe connecting the air supply and the filter, the parts arranged as and for the purpose described.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

FLOYD L. MILLER.

Witnesses:

ROBERT E. BOHANNA,
V. M. WARREN.