Oct. 4, 1932. F. J. HULL 1,881,192

SAND BLAST HELMET AND VENTILATING MEANS

Filed Oct. 7, 1927 3 Sheets-Sheet 1

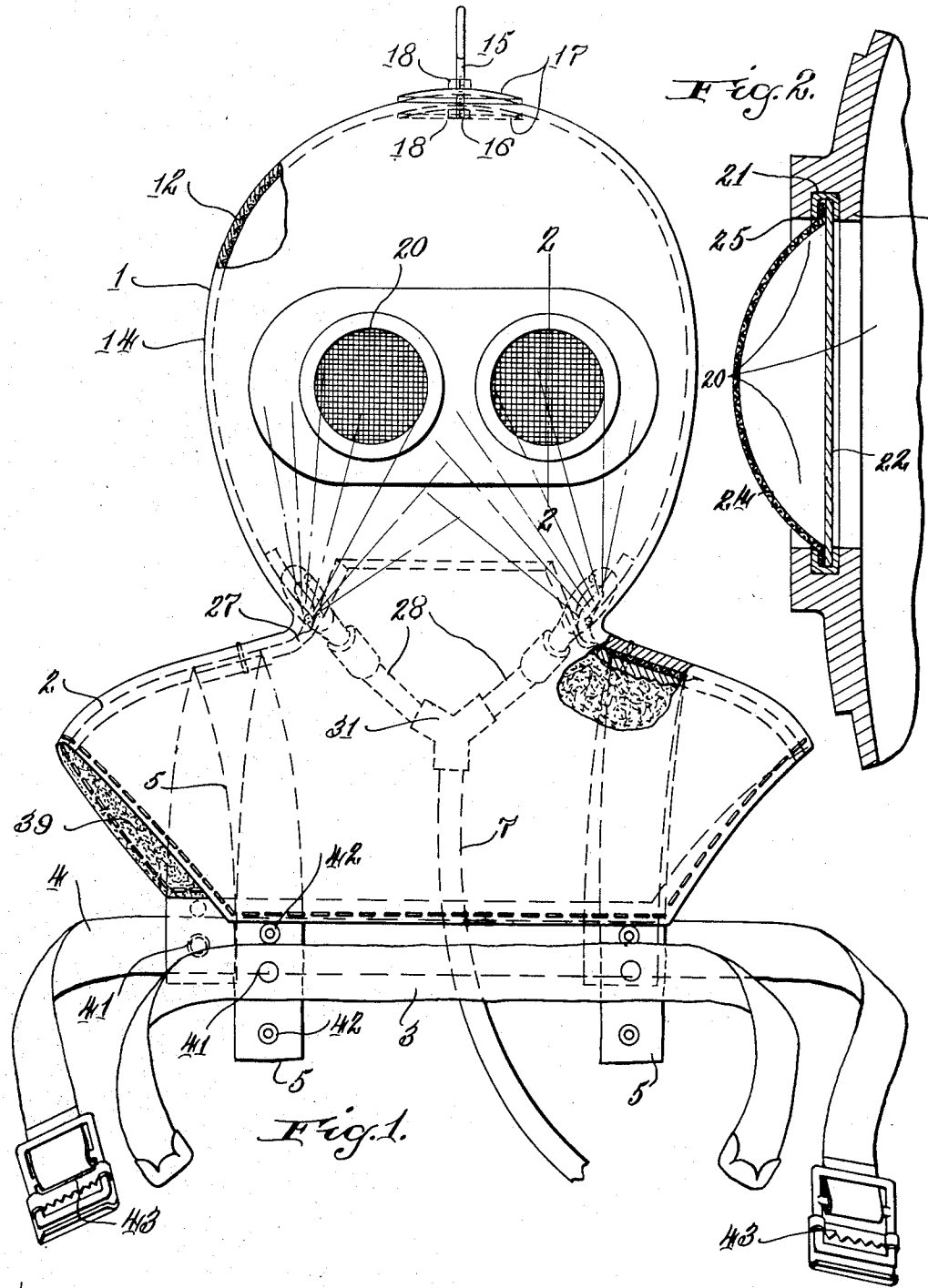


Fig. 1.

Fig. 2.

Witnesses
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Oct. 4, 1932. F. J. HULL 1,881,192

SAND BLAST HELMET AND VENTILATING MEANS

Filed Oct. 7, 1927 3 Sheets-Sheet 2

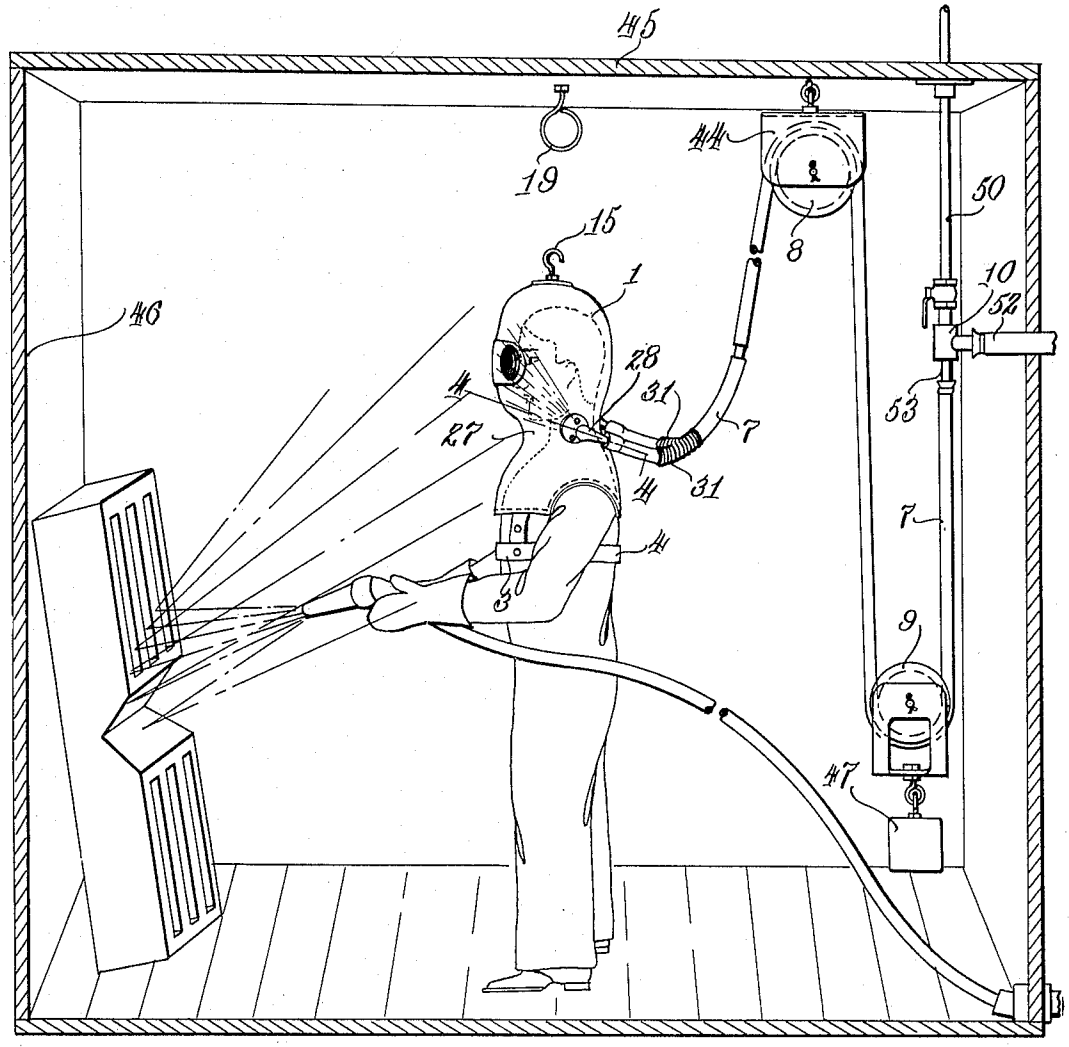


Fig. 3.

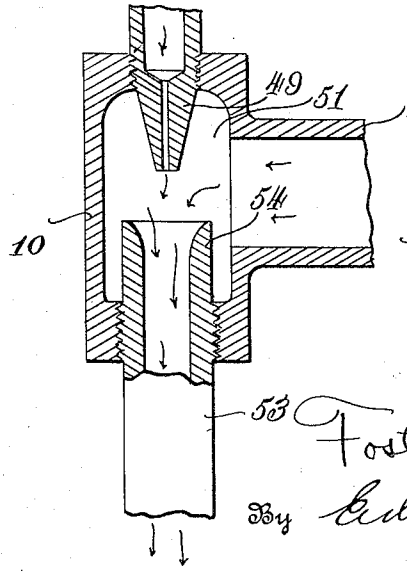


Fig. 9.

Witnesses
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Oct. 4, 1932. F. J. HULL 1,881,192

SAND BLAST HELMET AND VENTILATING MEANS

Filed Oct. 7, 1927 3 Sheets-Sheet 3

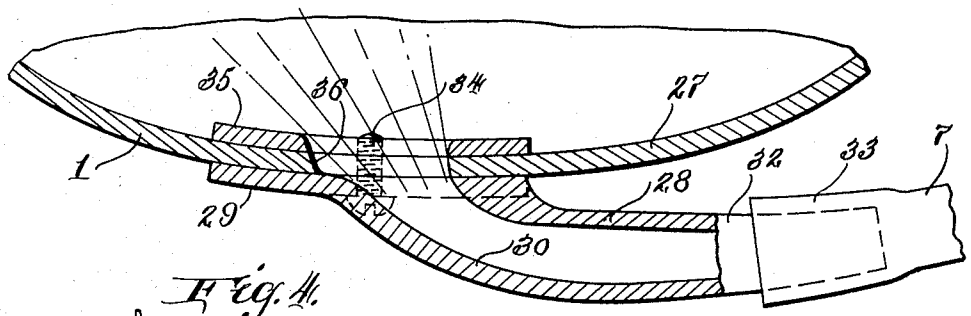


Fig. 4.

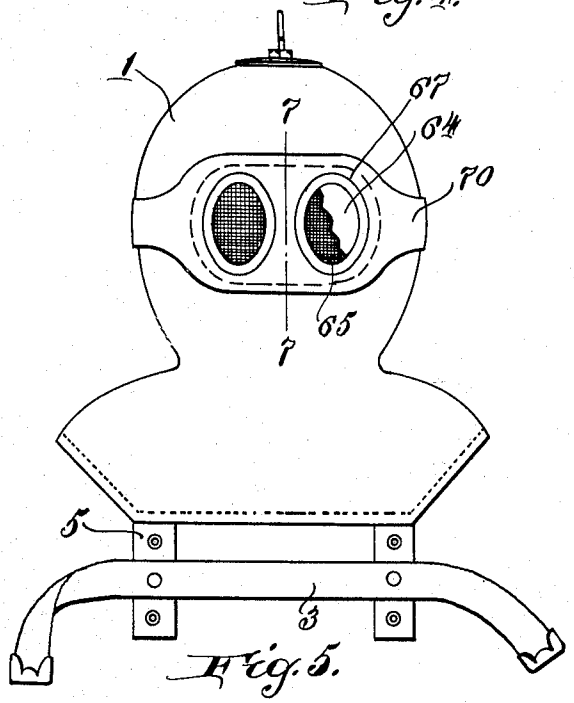


Fig. 5.

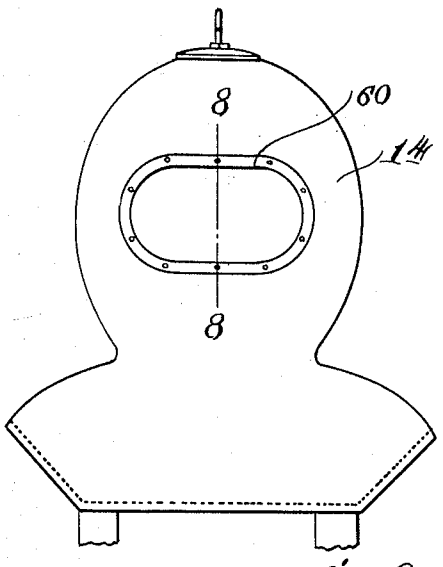


Fig. 6.

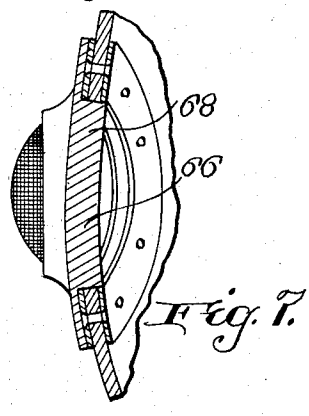


Fig. 7.

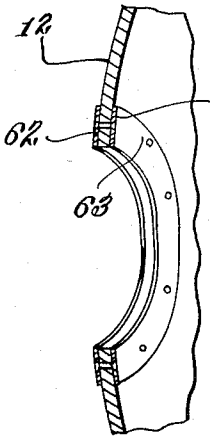


Fig. 8.

Witnesses
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Patented Oct. 4, 1932

1,881,192

UNITED STATES PATENT OFFICE

FOSTER J. HULL, OF HAGERSTOWN, MARYLAND, ASSIGNOR TO PANGBORN CORPORATION, OF HAGERSTOWN, MARYLAND, A CORPORATION OF MARYLAND

SAND BLAST HELMET AND VENTILATING MEANS

Application filed October 7, 1927. Serial No. 224,587.

The invention relates to a head gear for use in a sand blast chamber or room and for other similar purposes, to protect the sand blast operator from injury due to the flying abrasive and from other sources and to furnish an adequate ventilation and a healthful air supply. The apparatus, as shown, includes a helmet, an air hose with means for supporting and coiling the hose, and means for controlling the air supply and mixing outside air or medicated air with the air under pressure, whereby outside air or medicated air at low pressure and velocity is passed through the hose to the helmet.

The apparatus of the invention not only furnishes adequate and healthful ventilation whereby the air supply serves to cool the operator in addition to furnishing him fresh pure air for breathing at all times, but the air is further directed in a manner to prevent condensation on the glass or other transparent material covering the sight openings.

Other advantages of the improved construction are that it is formed of soft rubber as to the most exposed wearing portions, being preferably of a fabricated material as to which the rubber serves as a coating and filler, the rubber serving to resist wear and providing for quick, easy and inexpensive repairs, the rubber which is used being similar to that which is used for inner tubes of pneumatic tires, which may be repaired with the ordinary repair kit and material used for this purpose.

The helmet is supported on the shoulders, freeing the head of the operator from this load and the shoulder and collar portion is lined with soft material which not only serves as a pad, but prevents the entrance of dust and also provides a convenient exit for the ventilating air.

The ventilating hose is also attached to the helmet in a manner providing for a quick detachment therefrom, and means is further provided not only taking up the slack of the hose but for counter balancing it and supporting it on the chamber structure so that the operator's shoulders are to a large extent relieved of this burden.

The observation or sight openings are so constructed that the transparent members are conveniently removed, which, in conjunction with the quick detachability of the ventilating hose permits the user to walk beyond the confines of the sand blast enclosure or other enclosure without the necessity for removing the helmet.

In the preferred form, the sight openings are provided with flexible annular recesses to permit the insertion of the transparent members, which may or may not be protected by a screen. In the secondary form the transparent members are externally placed and supported by means of a strap.

In the accompanying drawings I have illustrated a protecting and ventilating apparatus including a head gear or helmet embodying the features of my invention in the preferred form.

In the drawings:

Figure 1 is a front view of the helmet and shoulder covering or collar.

Figure 2 is a section on the line 2—2 of Figure 1.

Figure 3 is a view showing in section a sand blast chamber with the operator therein equipped with the apparatus of the invention, shown on a reduced scale.

Figure 4 is a section on the line 4—4 of Figure 3 showing the ventilating air nozzle and the manner of connecting the same to the helmet.

Figure 5 is an elevation of the helmet showing a modified form of sight opening and transparent closure or goggles.

Figure 6 is a similar elevation with the transparent closure removed.

Figure 7 is a section on the line 7—7 of Figure 5 showing the transparent closure or goggles in place.

Figure 8 is a similar view with the transparent closure removed, the same being taken on line 8—8 of Figure 6.

Figure 9 is a section showing the manner of mixing the outside air with compressed air and propelling the mixture by means of a jet of compressed air.

Referring to the drawings by numerals, each of which is used to indicate the same or similar parts in the different figures, the ap-

paratus, as shown, comprises the head covering or helmet proper 1, a shoulder portion 2 by which the helmet is supported, strap fastenings formed in front and rear portions 3, 4, and shoulder straps 5. The apparatus also includes ventilating air pipe 7, supporting pulley 8, counter balance pulley 9 and the mixing injector 10.

The helmet is preferably constructed of fabric 12 coated and combined with soft rubber 14, particularly as to the external surface and wearing parts where the rubber offers the most tenacious resistance to the action of the abrasive and is easily and inexpensively repaired by means of a vulcanizing mixture of raw rubber or the usual inner tube repair material and after the well known manner of repairing inner tubes.

The helmet, as shown, is provided with a hook 15 at the top center. This hook is shown as having a threaded shank 16 which is passed through washers 17 on the inside and outside of the helmet fabric, being secured by means of nuts 18 engaging the threaded shank 16 and locked above and below the washers 17. The hook 15, in the form shown, engages an eye 19 or other hanger in the ceiling of the chamber suspending the helmet and connected member when not in use.

The observation or sight openings 20, in the preferred structure shown in Figures 1 and 2, are formed with an annular circumferential recess 21 in which the edges of the glass 22 and screen 24, by which the glass may be protected, are seated. This recess is to the best advantage formed of flexible portions of fabric and rubber 25, 26, on the outside and inside, which may be, and to the best advantage are, integral with the fabric and rubber structure forming the helmet or head portion 1 of the apparatus. The portions 25 and 26 surrounding the opening are so flexible that the edges of the glass 22 and screen 24 may be inserted therein and removed therefrom easily and conveniently and, in fact, instantaneously at the will of the operator, the said members 25 and 26 which, in fact, form an encircling frame for the glass and screen, being easily flexed and even stretched for this purpose, admitting and releasing the glass and screen.

In the form of the invention shown, the parts to be referred to being best illustrated in Figures 1 and 4, the ventilating or air pipe 7 is connected to the helmet 1 at the neck portion 27 on each side, though the exact construction shown is not essential to the invention.

This manner of connection has important advantages, as the air is first brought in contact with the neck of the workman in the vicinity of the large arteries and veins through which the blood supply to the brain passes, so that the workman is thus relieved by the cooling contact at this point of the otherwise oppressive effect of the apparatus which necessarily completely encloses the head and neck of the wearer in a covering which is essentially impervious to the usual and natural cooling and ventilating agencies.

In the form of the invention shown, there are two air nozzles or connections 28 by which the air supply, to be further described and discussed, is led to and introduced into the helmet, preferably as to the neck portion as already stated.

The said nozzles, in the form shown, are flanged at 29 at the outer or discharge end and the nozzle passage 30 is inclined to the plane of the flange directing the air from the pipe 7, which is at the rear, forwardly and upwardly in contact with the wearer's neck, as already pointed out, and the arrangement of the nozzle passage is such that it further directs the air supply into contact with and across the respiratory organs of the wearer and against the inside surface of the transparent material which closes the sight openings, preventing condensation at this point whereby the vision of the wearer would otherwise be obscured.

In order to supply the two nozzles 28, the air pipe 7 is formed at its delivery end with a branched or Y portion 31 whereby the two nozzles 28 are connected as to their shank portion 32 with the pipe 7, the shanks 32 being, as shown, inserted in the ends of the pipe at 33, which ends are expanded by the insertion of the nozzles, forming a tight closure around the nozzle shank.

The nozzles 28, in addition to being inclined to the flanges 29, which are secured to the helmet walls, are expanded in cross sectional area at the outward end, reducing the velocity of the discharge and producing an expanding jet which covers substantially the entire face portion of the helmet. The nozzle flanges 29, as shown, are secured to the walls of the helmet by means of bolts 34 passing through the flanges 29 and seated at their inner ends in washers 35 which underlie the helmet fabric on the inside, surrounding the nozzle openings 36.

The helmet, as shown, is provided with shoulder portions or sections 2 lined with wool-like material 39, which may to advantage be sheep skin with the wool side turned inwardly against the wearer's shoulders. This has the effect not only of forming a soft contact with the wearer's shoulders, but also of preventing the entrance of the abrasive material and dust and providing for the exit of the ventilating air. It will be understood that the external layer of the shoulder portion is, to the best advantage, composed of fabric or fabric and rubber which may be formed integrally with the head portion.

The shoulder portion 2 of the apparatus is shown as formed with shoulder straps 5

secured thereto and extending downwardly at the front and back at each side of the apparatus, i. e., each shoulder, and the shoulder straps 5 are secured in any suitable manner to the front shoulder strap 3 and the rear shoulder strap 4, respectively, at the front and rear ends of the straps 5 and this securing means 41 is preferably arranged with a plurality of points of attachment 42 so that the straps may be adjusted to suit the operator, a desirable securing device being like or similar to the snap fasteners used on automobile curtains.

In operation the apparatus is secured to the workman in an obvious manner, the helmet being placed in position and the shoulder portions resting on the shoulders, the straps 3 and 4 are buckled together at the ends beneath the operator's arms, as shown particularly in Figure 3, the buckles being indicated by reference character 43.

The air pipe 7 is supported by means of pulley 8 mounted in a suitable housing 44 and supported in any suitable manner as by swinging the housing from the ceiling 45 of the chamber 46 and the hose 7 is counter balanced by means of a pulley 9 and counter balance weight 47 connected to the pulley in any suitable manner, the preferred form being as illustrated.

Ventilating and cooling air is, in accordance with the preferred form of the invention shown, supplied to the hose 7 by means of the injector mixer 10 illustrated in detail in Figure 9. In accordance with the illustration the injector nozzle 49 is supplied with compressed air from any suitable source by way of the pipe 50. This nozzle 49 discharges into the injector or mixer chamber 51 to which pure air from the outside or medicated air is supplied, entering the side of the chamber by way of air supply passage 52. The air pipe 7 is connected to a discharge fitting 53 seated in chamber 51 and of an internal diameter many times as large as the nozzle, the same being placed directly opposite the nozzle so that the nozzle is directed into the end of the discharge pipe 53, which is funnel flared at its intake end, as shown at 54, and spaced away from the nozzle to provide for the entrance of pure air or medicated air from the chamber 51 supplied by way of passage 52 at the side.

It will be understood that the velocity of the jet from the nozzle 49 will create a vacuum in the chamber 51, drawing in the air by way of passage 52, and that this air will become mixed with the air projected by the jet and a portion of the velocity of the jet being imparted to it, the mixture will pass through the pipe 7 to the helmet with a considerably reduced velocity as compared to the velocity of the jet, and at a comparatively low pressure as compared to the compressed air supply.

This manner of introducing a large volume the velocity of the jet, and at a comparatively small quantity of air under pressure has obvious advantages in the way of economy and convenience, the necessity for pumping a large volume of air at low pressure being thus dispensed with, it being understood that the high pressure air ordinarily supplied for various purposes in manufacturing plants and machine shops would not be desirable for this purpose except for the provision of the mixing device described, whereby the pressure and velocity are reduced and the volume of air discharged is greatly increased.

In Figures 5, 6 and 7 I have illustrated a modified form of sight opening and glasses. In this instance a single sight opening 60 is provided, so located and formed as to overlie both eyes of the operator. This sight opening, in the form shown, is encompassed on both the inside and outside of the helmet wall 12 with frames 61 and 62 of thin spring metal which may be secured together by rivets or other suitable fasteners 63, giving a slight degree of stiffness to the helmet fabric at this point. In the preferred construction of this modification the eye glasses 64 and netting 65 are mounted on a rubber or similar block 66 having the eye openings 67 formed therein, each being surrounded by a suitable recess similar to the recess 22, Figure 2. This block to the best advantage has a central thickened portion 68 surrounding the sight openings. This portion fits in the opening 60 in the helmet. The block 66 is shown as provided with straps 70 secured thereto at the end edges, which straps 70 are passed around the outside of the helmet and secured or connected to each other in any suitable manner.

The manner of operating and using the apparatus has been fully brought out in the preamble and in connection with the description. The walls of the neck and head portions of the helmet are so flexible and the neck is of such proportions that the helmet is easily put on and taken off by passing the head through the neck portion and in this position is held by means of the straps 3, 4 and shoulder straps 5, as already described, the position of the straps 3, 4, relatively to the shoulder straps being varied to suit the operator by changing the position of engagement of fastenings 41 and 42.

In operation, as illustrated in Figure 3, the air hose 7 is supported by the pulley 8, the slack being taken up by the counter balance pulley 9 and weight 47. The air draft is preferably directed as shown and described, being introduced at the sides of the neck in the vicinity of the large arteries and veins where the air has the greatest cooling effect, serving to overcome the lack of radiation incident to wearing of the hel-

met and shoulder covering. The draft is also directed forwardly and upwardly to the respiratory organs and in contact with the transparent members, i. e., the screen and glass preventing condensation and consequent obscuring of the vision.

It is of interest to note that the helmet, i. e., the head portion of the apparatus, is supported on the shoulder portion 2 which rests on the shoulders of the operator. The neck portion 27 is of comparatively large diameter so that the operator's head may be turned freely. The supporting of the helmet on the shoulders, as described, with the hose connected to the neck, cause the stresses incident to dragging the hose to be taken up entirely by and on the operator's shoulders, relieving the head therefrom. The strapping of the shoulder piece to the operator, as shown, beneath the operator's arms, contributes to this result. The supporting pulleys 8 and the counter balance pulley 9 also assist in taking the weight of the hose from the operator and disposing of the slack.

An important advantage consists in the provision of a supply of pure outside air or medicated air at, or substantially at atmospheric pressure which is introduced by means of the air pressure injector 10, as already described, the velocity incident to the release of the air under pressure through the nozzle 49, much reduced on account of the increased volume, being imparted to the outside air admitted through the passages 52 and 53 to the hose 7.

Another advantage of the apparatus, as already pointed out, consists in the provision of removable transparent coverings for the sight openings 20 and 60 and a conveniently removable connection as at 32, 33, which permits the operator to go outside the chamber at will, removing the covering of the sight opening and disconnecting the hose without taking off the helmet. This is necessary for various purposes, as removing and bringing in the work, in the form of castings or the like to be treated with the sand blast.

I have thus described specifically and in detail a sand blast helmet or head gear and ventilating apparatus therefor, the description being specific and in detail in order that the construction and manner of using and operating the apparatus of the invention may be fully understood, however, the specific terms herein are used descriptively rather than in a limiting sense, the scope of the invention being defined in the claim.

What I claim as new and desire to secure by Letters Patent is:

A helmet having eye openings with transparent closures and means for supplying air thereto comprising an air hose and nozzle, means for supplying an air draft through the hose and nozzle, the nozzle being connected to the neck portion of the helmet at the sides and directed upwardly and forwardly toward the eye openings supplying breathing air and preventing condensation on the transparent members, the helmet being adapted to release quantities of air corresponding to the quantities introduced to prevent the building up of pressure within the helmet.

Signed at Hagerstown, Maryland, this 3rd day of October, 1927.

FOSTER J. HULL.