Nov. 18, 1958 A. A. CONTI 2,860,632

RESPIRATOR

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FIG. 1.

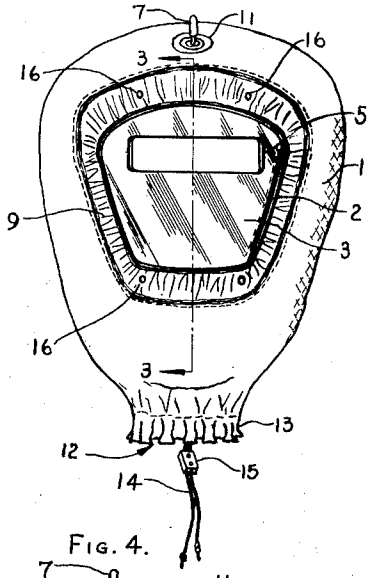



FIG. 2.

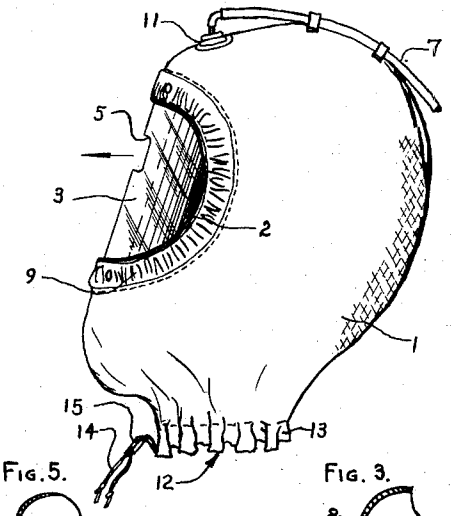



FIG. 4.

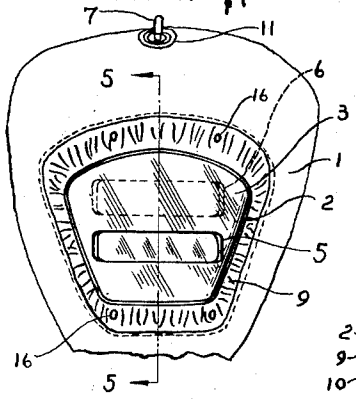



FIG. 5.

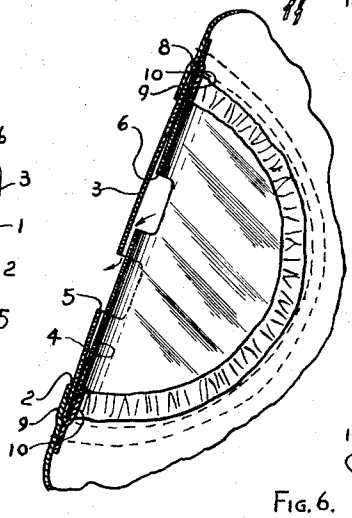



FIG. 3.

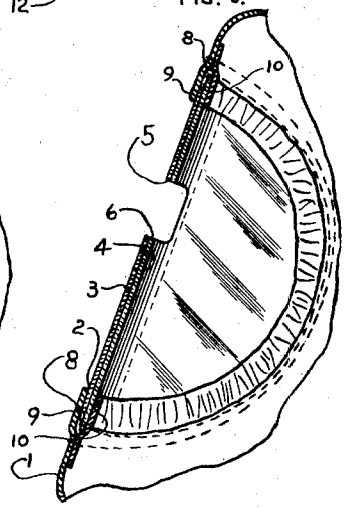



FIG. 7.

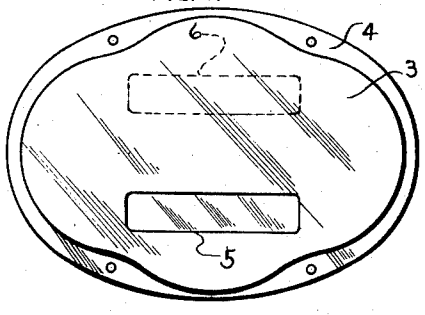
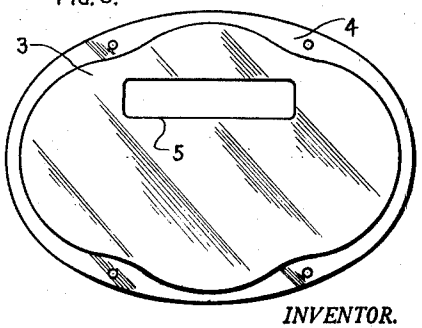



FIG. 6.




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FIG. 8.

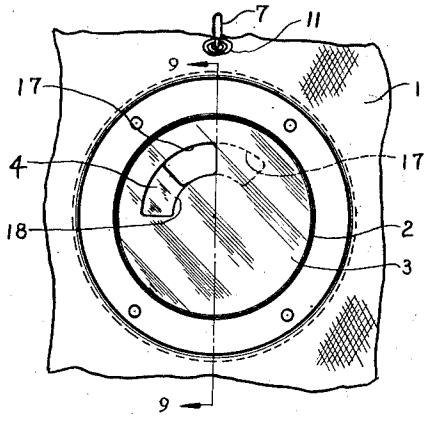



FIG. 9.

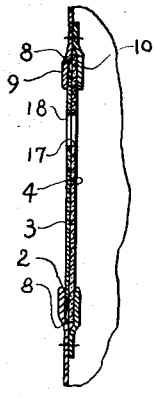



FIG. 10.

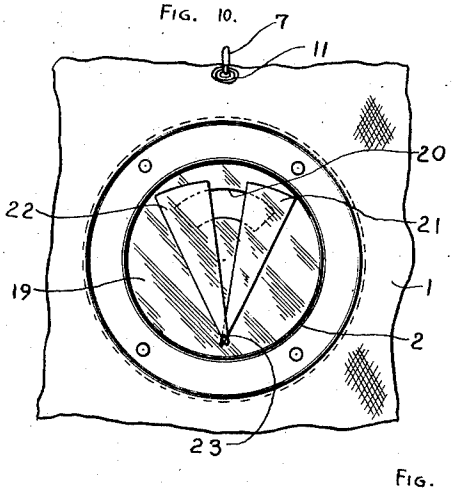



FIG. 11.

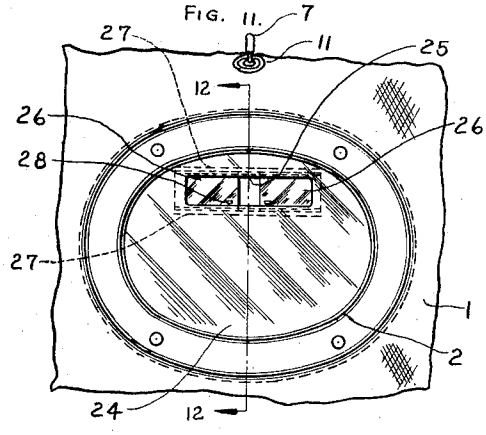
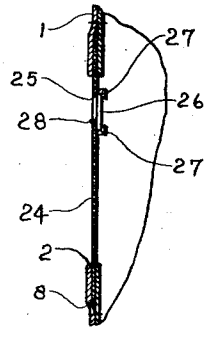



FIG. 12.




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2,860,632

# RESPIRATOR

Angelo A. Conti, Baltimore, Md., assignor to the United States of America as represented by the Secretary of the Army, as trustee

Application November 28, 1950, Serial No. 197,963

8 Claims. (Cl. 128—143)

(Granted under Title 35, U. S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government for governmental purposes without the payment to me of any royalty thereon.

This invention relates to a respirator and more particularly to a hooded mask or helmet-type respirator adapted for use in an atmosphere containing gases, dusts, fumes, mists or other foreign matter that might be injurious to the wearer.

An object of the invention is to provide a hooded respirator that will effectively protect the wearer from injurious foreign matter in the atmosphere and yet afford the wearer adequate vision.

A further object of this invention is to provide a hooded respirator with transparent lenses that will not require frequent cleaning by the wearer when in use.

A specific object of this invention is to provide a hooded respirator wherein air is supplied to the interior of said respirator under pressure and wherein said air is discharged through an opening in the front portion of the respirator and and thereby drives foreign matter away from the wearer's face.

In one embodiment, structure is provided for permitting the opening to be easily covered or uncovered and thereby convert the device from one useful when the wearer is spraying paint or similar substances to one which is useful when the wearer is sanding, grinding or performing any operation wherein the eyes of the wearer require protection from flying particles.

In another embodiment, the device includes structure for varying the size of the opening in the mask and thereby varying the velocity of the air discharged through the opening. This is advantageous because atmospheric conditions vary according to the nature of work being performed, and air at a high velocity is necessary to drive away heavy matter that is present under some working conditions.

Other objects and advantages will become more apparent from the specification and drawings.

In the drawings, wherein like reference characters indicate corresponding parts throughout the several views:

Fig. 1 is a front elevational view of the respirator in position to be used by an operator of paint spraying equipment or the like.

Fig. 2 is a side elevational view of the respirator shown in Fig. 1.

Fig. 3 is a sectional view of a portion of the respirator taken on line 3—3 of Fig. 1.

Fig. 4 is a front elevational view of the respirator showing the lenses converted to position for use by an operator of sanding or grinding equipment or the like.

Fig. 5 is a sectional view of a portion of the respirator taken on line 5—5 of Fig. 4.

Fig. 6 shows the lenses removed from the mask in the position of adjustment shown in Figs. 1–3.

Fig. 7 is a view similar to Fig. 6 except that the lenses are in the position of adjustment shown in Figs. 4 and 5.



Fig. 8 is a front view of a portion of a modified respirator wherein the size of the opening in the lens may be varied.

Fig. 9 is a sectional view of the respirator shown in Fig. 8 taken on line 9—9 of Fig. 8.

Fig. 10 is a front view of a portion of another modified respirator.

Fig. 11 is a front view of a portion of another modified respirator.

Fig. 12 is a sectional view of the respirator shown in Fig. 11 taken on line 12—12 of Fig. 11.

Referring in detail to Figs. 1–3 of the drawings wherein the device is in position to be used by an operator of paint spraying equipment, the respirator comprises a hooded portion 1 of flexible material adapted to envelop the head of the wearer except at the bottom of the hood wherein opening 12 is provided and the front of the hood wherein opening 2 is provided. At opening 2, the flexible material is formed with lips 9 and 10 which form an annular U-shaped channel 8 for accommodating transparent lenses 3 and 4. Outer lens 3 and inner lens 4 are mounted in channel 8. As illustrated in the drawings, opening 2 and the lenses 3 and 4 are so positioned as to afford the wearer an unobstructed view, and cover a substantial portion of the face. Apertures 5 and 6 are provided in lenses 3 and 4 respectively. These apertures are illustrated as being substantially rectangular, however other shapes would be operative. In Figs. 1–3 aperture 5 is aligned with aperture 6 and thereby provides a passage from the interior of the hood to the exterior thereof. Further, when aligned, these apertures are located substantially at eye level so as to give the wearer clear, direct vision. They are made only large enough to permit such vision. Air under pressure is supplied to the interior of the hood through flexible inlet hose 7 which communicates with the interior of the hood through inlet fitting 11. The edge 13 of bottom opening 12 is hemmed and loosely contains shirring cord 14 which projects out of the hem and may be grasped and pulled to tightly draw the bottom of the hood about the neck of the wearer. The cord may be locked in position by locking member 15 after the hemmed portion of the hood has been tightly drawn about the neck of the wearer and is in substantially airtight relation thereto.

The operation of the device illustrated in Figs. 1–3 is as follows: air under pressure enters the interior of hood 1 through inlet hose 7 and the hood is partially inflated. Since the hood is tightly drawn about the wearer's neck at opening 12, air can escape to the atmosphere only through aligned apertures 5 and 6, and it does so in the form of a jet (as indicated by the arrow in Fig. 2). To so operate, these apertures, 5 and 6 (as illustrated by the drawings), must necessarily comprise a minor portion of the lens area. The larger the aperture, the lower the velocity of air through the aperture and the less the protection for a given volume of air. The jet of air clears the area in front of the aligned apertures of foreign matter, and thereby provides a zone of clean air in front of the mask and also prevents contaminated mist or paint from adhering to the transparent lens.

When the wearer is sanding or grinding, the velocity of the flying fragments may be too high for the jet of air to stop and prevent from passing through the apertures in the lenses. In this type of operation, it is necessary to have a mask that will protect the wearer's face from flying particles, however, the problem of paint or mist adhering to the lenses of the mask and thereby rendering the lenses non-transparent is not present. By adjusting outer lens 3 from the position shown in Figs. 1–3 to the

position shown in Figs. 4 and 5, the respirator can be converted to a mask that will accomplish the deisred protective purpose when the wearer is sanding or grinding. As illustrated in Figs. 4 and 5, aperture **5** in lens **3** is out of alignment with aperture **6** in lens **4**, thereby eliminating the direct passage from the interior of the mask to the exterior thereof that exists when the lenses are in alignment, as shown in Figs. 1–3.

The operation of the device when it is adjusted as shown in Figs. 4 and 5 is as follows: air is supplied to the interior of the hood through inlet hose 7 and it slowly seeps out of the hood through the aperture **6**, between the lenses, and out of aperture **5** (as shown by the arrows in Fig. 5). Since there is no direct opening at the front of the mask, none of the flying particles can penetrate the mark and strike the wearer's face. If it is preferred, the hemmed portion of the hood adjacent the neck of the wearer may be left loose, and then it will not be necessary to supply air to the user through the inlet hose.

In the modification shown in Figs. 1–5, the lenses may be made of any known transparent material and may be oval-shaped, circular, or any other equivalent shape. For the purpose of illustration, Figs. 6 and 7 show one form of lenses removed from the hood to more clearly show their configuration. In this arrangement, inner lens **4** is oval-shaped and outer lens **3** is a somewhat irregular oval shape. Irrespective of their shape, the inner lens **4** is secured in fixed position in channel **8** by securing members **16**, which may be snaps or buttons that pass through openings in the inner lens, near the edge thereof. Outer lens **3** may be provided with openings through which securing members **16** also pass, however, this is not absolutely necessary, for the lips **9** and **10** will retain the outer lens in either adjusted position if openings are not provided in the outer lens. Since outer lens **3** is subjected to more wear than the inner lens, it may be made of thinner material than the inner lens, and be disposed of whenever it becomes scratched or coated with foreign matter. As is apparent from Figs. 6 and 7 the upper and lower portions of the lens are symmetrical. (The apparently trapezoidal shape shown in Figs. 1 and 4 is merely the effect of the projection of the sloping, curved surface.) Outer lens **3** is changed from the position of Figs. 1, 2, 3 and 6 to that of Figs. 4, 5 and 7 by lifting flap **9**, removing lens **3**, and re-inserting the latter in the inverted position.

In Figs. 8 and 9 is illustrated a modification wherein the device is provided with structure for varying the size of the opening in the mask. Inner lens member **4** is provided with an elongated, arcuate-shaped aperture **17** and outer lens member **3** is provided with an aperture **18** of similar shape. In this modification, lens members **3** and **4** are circular. Outer lens member **3** is rotatably mounted in channel **8**, whereas inner lens member **4** is fixed therein. By rotating the outer lens member relative to the inner lens member, the size of the amount of aperture **17** that overlaps aperture **18** can be varied, and since this overlapping area constitutes the passage between the interior and exterior of the hood through which the jet of air passes, the velocity of the jet can be varied by varying the size of the passage. Under some working conditions, it is necessary to reduce the size of the passage considerably to develop a sufficiently high velocity jet to repel heavy foreign matter, however, the vision of the wearer is not obscured when the size of the passage is reduced because the lenses are transparent. In this embodiment, the size of the opening may be varied from fully open through all intermediate sizes to completely closed. Therefore, by simply grasping the outer lens member and rotating it, the wearer can vary the velocity of the jet and compensate for any changes in atmospheric conditions.

In the modification shown in Fig. 10, lens member **19** is apertured at **20**. Sector-shaped, transparent lens members **21** and **22** are pivoted at **23** and may be adjusted to



cover a portion of aperture **20** and thereby vary its size. There may be one or two of the lens members, and they may be on the inside or outside of the mask; on either side, they will remain in adjusted position, particularly if on the inside because of the pressure of the air therein.

In the modification shown in Figs. 11 and 12, adjustment of the size of the aperture **25** in lens **24** is accomplished by providing one or two lens members **26** slidably mounted in horizontal, L-shaped guideways **27** (see Fig. 12). If preferred, the guideways **27** may be disposed vertically. The size of the passage between the interior and exterior of the mask can be varied by grasping the knob **28**, which is secured to the lens member, and sliding the lens member in its guideways in a direction to either cover or uncover aperture **25** or any portion thereof.

With regard to the modifications of Figs. 8–12, it is hereby emphasized that a principal advantage of my device is that the vision of the wearer will not be adversely affected when the size of the air passage from the interior to the exterior of the respirator is reduced. This advantage is attained because the lens members are transparent. If the lens members were not transparent, the wearer's vision would be limited to the size of the passage, and under some working conditions it would be necessary to reduce the size of the passage to a point that vision would be impaired in order that the jet of air have sufficient velocity to prevent heavy matter from entering and passing through the passage. By utilizing transparent lens members, I eliminate this problem.

From the foregoing description, the construction and operation of the device and the several modifications thereof, and its advantages will be readily understood by those skilled in the art. Minor changes in the details of construction illustrated and described may be made without departing from the spirit of the invention, as defined by the appended claims.

I claim:

1. In a protective device of the class described, the combination of a hood adapted to envelop the head and to snugly embrace the neck of the wearer in substantially airtight relation thereto, means for admitting air under pressure to the interior of said hood, said hood having an opening at the front thereof, a transparent lens member having an aperture therein mounted in said opening, said aperture comprising a small portion of said lens member area, said aperture being positioned so as to be in front of the eyes of a wearer and sufficiently large to permit unobstructed vision therethrough, but sufficiently small to cause said air to issue therethrough in the form of a jet, and means for covering and uncovering said aperture, comprising a second transparent lens member.

2. A protective device as defined in claim 1 wherein said means for covering and uncovering said aperture are slidably mounted on said first mentioned transparent lens member.

3. A protective device as defined in claim 1 wherein said means for covering and uncovering said aperture are rotatably mounted in said opening.

4. A protective device as defined in claim 1 wherein said means for covering and uncovering said aperture are pivotably mounted on said first mentioned transparent lens member.

5. In a protective device of the class described, the combination of a hood adapted to envelop the head and to snugly embrace the neck of the wearer in substantially airtight relation thereto, means for admitting air under pressure to the interior of said hood, said hood having an opening at the front thereof, a transparent lens member having an aperture therein mounted in said opening, said aperture being located substantially at eye level and vertically offset from the center of said lens member, means for covering and uncovering said aperture comprising a second transparent lens member of identical configuration and containing a similar aperture offset from the center of said second lens member, as the first men-

tioned lens member, said second lens member being positioned continguous with said first mentioned lens member and being adapted to be mounted either in a paint spraying protective position wherein its aperture is in alignment with the aperture in said first mentioned lens member and thereby forms a passage from the interior of said hood to the exterior thereof, or in a sanding or grinding protective position wherein the aperture in said second lens member is out of alignment with the aperture in said first-mentioned lens member.

6. In a protective device of the class described, the combination of a hood adapted to envelope the head and to snugly embrace the neck of a wearer in substantially airtight relation thereto, means for supplying air under pressure to the interior of said hood, said hood having an opening at the front thereof, a first circular transparent lens member mounted in said opening, said lens member covering a substantial portion of the face of the wearer and having an aperture therein, said aperture being positioned so as to be in front of the wearer's eyes and being sufficiently large to permit unobstructed vision therethrough but sufficiently small to cause said air to issue therefrom in the form of a jet, said aperture occupying only a small portion of the area of said lens member, said aperture being arcuate in shape; and means for covering and uncovering said aperture comprising a second transparent lens member having a configuration identical to that of said first lens member, and containing an arcuate aperture substantially identical with that in said first mentioned lens member, said second lens member being positioned contiguous with said first mentioned lens member with the apertures of said lens member in overlapping relationship with each other and thereby forming a passage from the interior of the hood to the exterior thereof, said second lens member being adapted to be rotated relative to said first lens member and thereby vary the amount of the aperture of the first lens member that is in overlapping relationship with the aperture in said second lens and thereby vary the size of or completely close said passage.

7. In a protective device of the class described, the combination of a hood adapted to envelope the head and to snugly embrace the neck of a wearer in substantially airtight relation thereto, means for supplying air under



pressure to the interior of said hood, said hood having an opening at the front thereof, a first transparent lens member mounted in said opening, said lens member covering a substantial portion of the face of the wearer and having an aperture therein, said aperture being positioned so as to be in front of the wearer's eyes and being sufficiently large to permit unobstructed vision therethrough but sufficiently small to cause said air to issue therefrom in the form of a jet, said aperture occupying only a small portion of the area of said lens member, means for covering and uncovering said opening comprising at least one additional transparent lens member pivotally mounted on the first mentioned transparent lens member adapted to cover said aperture or any portion thereof.

8. In a protective device of the class described, the combination of a hood adapted to envelope the head and to snugly embrace the neck of a wearer in substantially airtight relation thereto, means for supplying air under pressure to the interior of said hood, said hood having an opening at the front thereof, a transparent lens member mounted in said opening, said lens member covering a substantial portion of the face of the wearer and having an aperture therein, said aperture being positioned so as to be in front of the wearer's eyes and being sufficiently large to permit unobstructed vision therethrough but sufficiently small to cause said air to issue therefrom in the form of a jet, said aperture occupying only a small portion of the area of said lens member, parallel guideways mounted on said lens member adjacent said aperture and at least one additional transparent lens member slidably mounted in said guideways and adapted to uncover said aperture or to cover it wholly or partly depending on its position in said guideways.


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