May 29, 1945. R. BAKKE 2,377,122

WELDING HELMET

Filed March 26, 1943 2 Sheets-Sheet 1

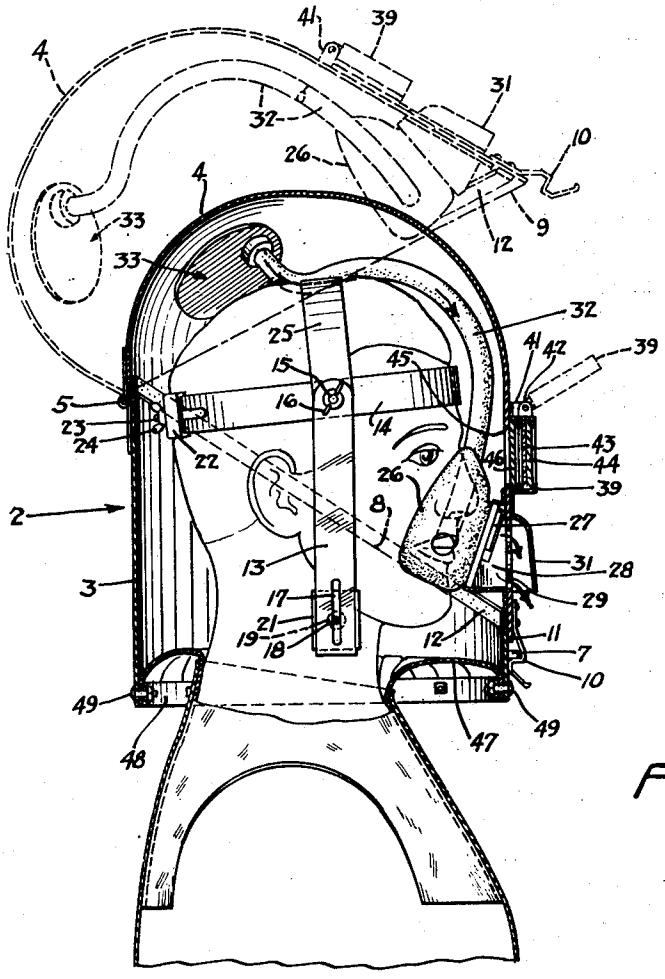


FIG. 1

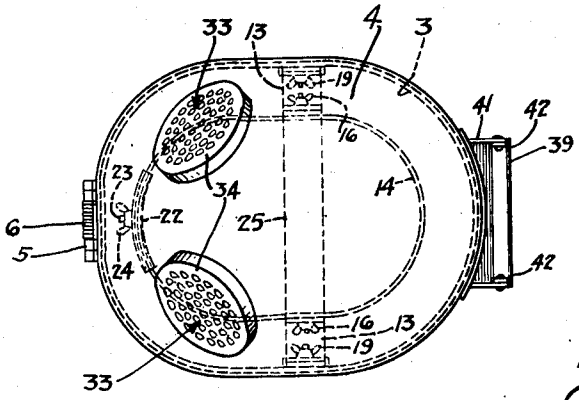


FIG. 2

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WELDING HELMET

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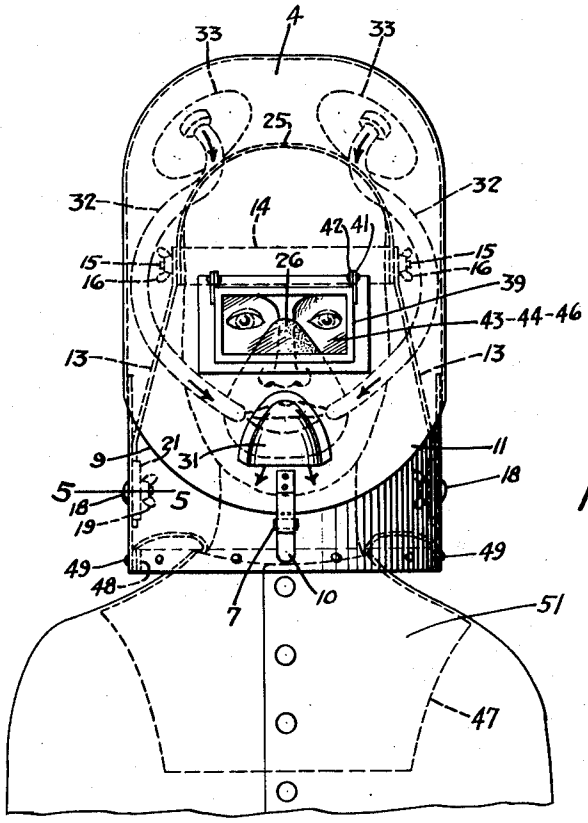


FIG. 3

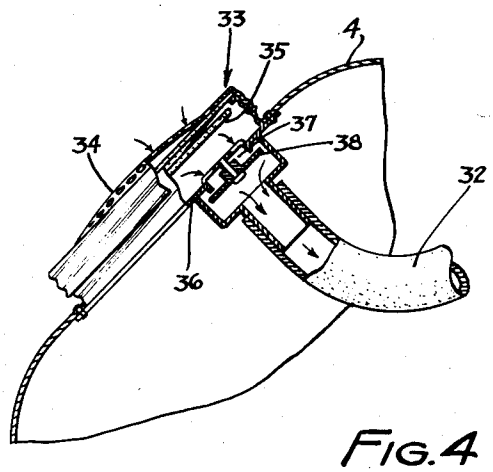


FIG. 4

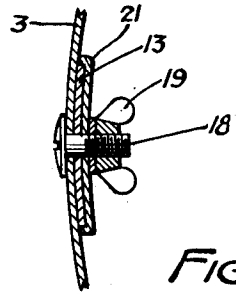


FIG. 5

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2,377,122

WELDING HELMET

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Application March 26, 1943, Serial No. 480,635

7 Claims. (Cl. 128—142)

This invention relates to new and useful improvements in welding helmets.

Welding helmets of the general type now commonly used by welders do not offer the utmost in protection, particularly against noxious gases and fumes which may be injurious to the wearer or the operator. Most such helmets are designed more particularly for preventing sparks and molten particles of the metal from striking the operator's face. I have found that while it is important to protect the face against flying sparks and molten particles of metal, it is also highly desirable that the helmet be so constructed as to prevent toxic gases and other foreign particles which may be injurious to the operator's breathing organs and to the surface of the skin, from entering the helmet, and it is therefore an important object of the present invention to provide a welding helmet which is so constructed that the operator's entire head and neck are fully protected against all foreign matter, such as noxious gases and fumes which may be harmful and injurious to the health of the operator, and also whereby his head, face and neck are protected against flying sparks and particles of molten metal, and whereby moths, flies, and other insects cannot enter the helmet and annoy the operator while performing welding operations, whereby the operator may do his work with much greater comfort and without danger of jeopardizing his health, and in much less time than would be possible with a conventional helmet under like condition.

A further object is to provide a helmet comprising a lower section having means for supporting it in operable position upon the wearer's head, and having an upper section hinged thereto and carrying a respirator which is automatically brought into position against the wearer's face, each time the upper hinged section of the helmet is swung into closed position and secured to the lower section.

A further object is to provide a welding helmet comprising a suitable hood having a flexible skirt suitably attached to the lower marginal edge of the hood and adapted to fit over the operator's shoulders, under the usual welding jacket commonly used by welders, and whereby noxious gases and fumes arising from the work, and other foreign molten matter cannot enter the hood or helmet and cause discomfort and/or injury to the operator.

A further object of the invention is to provide a welding helmet comprising two sections hinged together at the back of the helmet and having means at the front thereof for securing the upper hinged section in operative position, when the helmet is attached to or mounted upon the operator's head, said upper hinged section having a window in its front wall thru which the operator may view the work during the welding operation; and said window comprising a hinged door in which is mounted a suitable filter lens or glass against the outer side of which is mounted a suitable clear glass as a protection for the filter lens, and a second clear glass being provided in the opening formed in the wall of the helmet which latter glass is retained in fixed position and affords the operator a clear vision, when the hinged door carrying the filter glass is swung upwards to an inoperative position, whereby it is not necessary for the operator to remove the helmet from his head when adjusting the work or tools preparatory to or between welding operations.

Other objects of the invention reside in the unique construction of the helmet, including the skirt or cape attached to the lower edge thereof, which provides a complete closure for the lower open end of the helmet hood; in the pivotal mounting of the upper section of the hood whereby it is preferably retained in open inoperative position by spring means, and which, when open, exposes the entire face of the operator so that he may readily view his work or adjust it without removing the helmet from his head; in the mounting of the enti. respirator means in the hinged upper section of the helmet, whereby the usual nose and mouth piece is always in proper position to engage the operator's face, when the hinged section is swung into closed position; in the unique means provided for supporting the helmet upon the operator's head and whereby it may readily and conveniently be adjusted thereon to cause the nose and mouth pieces of the respirator to properly engage the operator's face; in the provision of the hinged window in the front wall of the helmet whereby the filter means or glass may be quickly swung out of operative position, when the operator desires a clearer vision; and in the unique design of the shoulder-engaging skirt or cape, and the manner of removably attaching said skirt to the lower marginal edge of the hood, whereby the skirt cooperates with the helmet supporting means to retain the helmet in proper position upon the operator's head.

Other objects of the invention will appear from the following description and the accompanying drawings and will be pointed out in the annexed claims.

In the accompanying drawings there has been

disclosed a structure designed to carry out the various objects of the invention, but it is to be understood that the invention is not confined to the exact features shown, as various changes may be made within the scope of the claims which follow.

In the drawings:

Figure 1 is a sectional elevation showing my improved helmet in position upon an operator's head, the dotted lines indicating the position of the upper section of the hood when in open position;

Figure 2 is a top view of the helmet showing the air inlet filters for the respirator;

Figure 3 is a front view of Figure 1, showing the helmet in operative position;

Figure 4 is an enlarged detail sectional view showing one of the air inlet filters for the respirator; and

Figure 5 is an enlarged detail sectional view on the line 5—5 of Figure 3, showing the adjustable connection between the lower ends of the relatively stiff straps which support the lower section of the helmet upon the head gear or band.

The novel helmet herein disclosed is shown comprising a hood, generally designated by the numeral 2, including a lower section 3 and an upper section 4. The upper section 4 is hinged to the lower section 3 at the rear of the helmet by means of a suitable spring hinge 5, shown in Figure 1. The hinge 5 embodies a suitable spring 6, indicated in Figure 2, which is so constructed and positioned as to constantly urge the upper hinged section 4 of the helmet into its open position, indicated in dotted lines in Figure 1. A suitable spring actuated keeper 10 is shown secured to the lower front edge portion of the upper section 4 of the hood and is adapted to engage a projection or stud 7, fixed to the front wall of the lower section 3, as shown in Figure 1, thereby to secure the upper hinged section 4 in operative position with respect to the lower section 3.

The upper edge 8 of the lower hood section 3 is preferably disposed at an incline, as best shown in Figure 1, and the lower edge 9 of the upper hood section 4 is correspondingly shaped and preferably over-laps the upper edge portion of the lower section, as shown at 11 in Figure 1. A suitable resilient gasket 12 is shown secured to the wall of the upper section 4 adjacent to its lower edge 9, and is adapted to engage the upper edge 8 of the lower section when the hood is closed, thereby to provide substantially a leak-tight joint between the two hood sections, when the upper section 4 is in its operative position, shown in full lines in Figures 1 and 3.

The hood or helmet 2 is shown supported upon the operator's head by a pair of suitable strap members 13, which are preferably more or less non-flexible, and have their upper ends adjustably secured to a head band 14 by suitable bolts 15, shown provided with wing nuts 16. The lower ends of the straps 13 are provided with slots 17 adapted to receive bolts 18, mounted in the wall of the lower hood section 3. Suitable wing nuts 19 are received in threaded engagement with the bolts 18 and engage suitable clamping elements 21 which are apertured to receive the bolts 18. The clamping elements 21 are seated against the lower ends of the straps 13, as best shown in Figure 5. By loosening the wing nuts 19, the lower section of the helmet may be raised or lowered with respect to the operator's head, as result of the slots 17 in the straps 13. The hood 2 may also be adjusted in fare-and-off direction, when the wing nuts 19 are loosened, thereby to properly position the hood with respect to the operator's head.

The head band 14 may be of more or less conventional design, and is preferably split at the back of the operator's head. The two ends of the band are over-lapped and adjustably secured together by suitable clamping elements 22 and a bolt 23 provided with a wing nut 24. By loosening the wing nut 24, the band 14 may be expanded or contracted to fit the operator's head, as will readily be understood.

A vertically disposed strap 25 has its ends secured to the band 14 by bolts 15, and passes over the top of the operator's head, as shown in Figure 1, thereby to prevent the band 14 from sliding downwardly upon the operator's head.

Another important feature of the present invention resides in the provision of respiratory means in the upper section 3 of the helmet which serves to purify all air inhaled by the operator, when the helmet is operatively supported on his head.

As best shown in Figures 1 and 2, the respiratory means above referred to comprises a nose and mouth piece, generally designated by the numeral 26. This nose and mouth piece may be of conventional design, and is preferably constructed of a soft pliable rubber molded to fit the contour of the front of the face. A suitable air outlet 27 is provided in the nose and mouth piece 26 thru which the operator exhales into a small chamber 28 which is in communication with the exterior of the helmet thru suitable apertures 29 provided in the wall of the hood section 4. A small shield 31 is secured to the wall of the hood section 4, over the apertures 29, to prevent foreign matter from entering the chamber 28 thru the apertures 29. Suitable valve means, not shown, is provided in the nose and mouth piece 26 to establish one-way air circulation therethru, and whereby the operator cannot inhale air thru the apertures 29. The nose and mouth piece 26 being of conventional and well known construction, it is deemed unnecessary to herein further describe the same in detail.

Fresh air is drawn into the nose and mouth piece 26 thru a pair of conduits 32, having their lower ends in communication with the interior of the nose and mouth piece, and having their upper ends connected to a pair of air filters or cleaners 33, mounted in the upper rear wall portion of the upper section 4 of the helmet. The air filters 33 may be of conventional design and each comprises a perforated cap 34 and suitable filter elements 35. The bottom wall 36 of the air filters 33 are each provided with an air opening 37 adapted to be closed by a suitable valve 38 which are so constructed as to permit the operator to readily inhale atmospheric air thru the air filters 33 and conduits 32, into the nose and mouth piece 26. The operator thus breathes in atmospheric air thru the filters 33 at the upper rear portion of the helmet, and exhales thru the air apertures 29 provided in the front wall of the upper section 4 of the helmet.

The respiratory means including the nose and mouth piece 26, the air filters 33, and the air conduits 32 are suitably mounted in the upper section of the hood, whereby they swing as a unit therewith, so that when the upper section 4 is swung upwardly to an inoperative position, as indicated in dotted lines in Figure 1, the nose and

mouth piece **26** is swung out of engagement with the operator's face, and leaves his entire face exposed so that his vision is not impaired.

This is an important feature of applicant's invention in that once the helmet has been properly fitted to a certain operator's head, the nose and mouth piece will always be brought into proper contact with the operator's face, whenever the upper section **4** is lowered into operative position, as shown in full lines in Figure 1. Also by thus hinging the upper section of the helmet, and supporting the respiratory means therein, it is unnecessary for the operator to remove the entire helmet from his head when he desires unobstructed vision, as when adjusting or positioning the work for welding, or picking up tools or other equipment.

Another important feature of the invention resides in the provision of a hinged window provided in the front wall of the upper section of the helmet, as shown in Figures 1 and 3. This window comprises a frame **39** which is hinged to a fixed frame **41** by suitable hinges **42**, shown in Figures 1 and 2. The fixed frame **41** is secured to the front wall of the upper hood section **4**, over an opening **45** in said wall, by suitable means not shown in the drawings. A suitable spring, not shown, is provided for holding the hinged window frame **39** in either open or closed position.

The hinged frame **39** has mounted therein suitable filter lens or glass **43** which is protected from the exterior by a clear glass **44**, also mounted in said frame. A clear glass panel **46** is mounted in the fixed frame **39** to provide a permanent closure therefor. Thus when the operator is performing a welding operation, and desires to have a clearer vision of the work or to facilitate picking up tools or a welding rod, he simply swings the window frame **39** upwardly out of his line of vision, as indicated in dotted lines in Figure 1, whereupon he has a clear vision thru the glass panel **46**, and at the same time his eyes and face are protected by the glass **46**.

Another important feature of the invention resides in the provision of means at the bottom of the hood or helmet for preventing the entrance of foul air and gases into the hood. There are numerous metals which, when heated to a high temperature, as during a welding operation, give off noxious gases and fumes which may be very irritating and injurious to the operator's skin, and often to his breathing organs, and such noxious gases may therefore cause the operator considerable discomfort, and may even impair his health, if permitted to enter the hood, particularly when the operator is working in warm temperatures and is perspiring.

To prevent such toxic gases, fumes, and other foreign elements such as fine dust, insects, etc., from entering the hood **2**, I provide a suitable flexible skirt **47** at the bottom of the helmet which has its upper marginal edge portion suitably secured to the lower marginal edge of the lower hood section **3**, by such means as a clamping band **48**, and a plurality of suitable securing elements such as screws or bolts **49**. The skirt **47** is preferably of tubular form, and is sufficiently flexible to permit it to be readily slipped over the operator's head in the operation of mounting the helmet thereon. The skirt is then fitted over the operator's shoulders, as shown in Figures 1 and 3, whereby the operator may button his conventional welding jacket **51** over the lower portion of the skirt **47**, whereby it is substantially impossible for any foreign matter to enter the helmet thru the lower portion thereof. Welders are frequently called upon to perform welding operations at night when there are numerous moths, flies, and various other flying insects, which are attracted by the brilliant light of the welding arc or flame, and may swarm about the operator's head while performing a welding operation. When using a conventional helmet having an open bottom, these pests frequently enter the helmet thru its open bottom and may annoy the operator to the extent that he must temporarily interrupt his work and remove his helmet to drive the insects from the interior thereof. When this becomes necessary, valuable time may be lost.

The novel helmet herein disclosed is so constructed that it is impossible for insects or flies to enter the helmet while in use. Its construction is also such that welding operations may be performed in places which heretofore were considered practically impossible to work in. For example, welding operations must sometimes be performed in enclosed places where the air may be extremely foul and full of smoke and foreign matter. In such places it has heretofore been impossible for a welding operator to work for a long period without interruption, because of the foul condition of the air, thereby greatly increasing the cost of the welding operation.

The novel helmet herein disclosed has made it possible for an operator to work in such foul air laden places for relatively long periods without interruption, and without discomfort, because when wearing the novel helmet herein disclosed, his head and breathing organs are completely and entirely protected against foul air, smoke and gases. It is to be understood that the air filters **33** are so constructed as to remove poisons from the air drawn therethru, whereby the air inhaled by the operator thru the air filters **33**, will be purified sufficiently to prevent injury to the operator.

The construction of the helmet as a whole is also such that it may be manufactured at a very nominal cost, and when once adjusted for a given operator's head, it will always properly fit such operator's head without requiring any adjustments each time the helmet is placed on his head. It will also be understood that the nose and mouth pieces of the respirator carried by the upper hinged section of the helmet need not be adjusted to the operator's face each time the helmet is placed in position on the head. This is highly desirable and tends to reduce irritation to the face, caused by the nose and mouth pieces relatively moving with respect to the face as is more or less common when using conventional respirators.

It will be apparent to those skilled in the art that I have accomplished at least the principal objects of my invention, and it will also be apparent to those skilled in the art that the embodiments herein described may be variously changed and modified without departing from the spirit of the invention, and that the invention is capable of uses and has advantages not herein specifically described; hence it will be appreciated that the herein disclosed embodiments are illustrative only, and that my invention is not limited thereto.

I claim:

1. A welding helmet comprising upper and lower sections normally joined together in an inclined plane extending upwardly and rearwardly from a point below the operator's mouth, means hinging the upper section to the lower section at the

rear of the helmet, and a respirator carried entirely by the upper section.

2. A welding helmet comprising upper and lower sections normally joined together in substantially leak-tight relation in an inclined plane extending upwardly and rearwardly from a point below the operator's mouth, means hinging the upper section to the lower section at the back of the helmet, a respirator and air filter carried by the upper section, the air filter being mounted in the upper wall portion of the upper section rearwardly of the vertical axis of the helmet, and flexible means for sealing the annular space between the lower marginal edge of the helmet and the operator's body.

3. A welding helmet comprising upper and lower sections normally joined together in a plane disposed at an incline to the vertical, means for supporting the lower section in relatively fixed position upon the operator's head, means for pivotally connecting together said sections at the rear of the helmet whereby the upper section may be swung upwardly out of the line of vision of the operator, and a respirator carried by the upper section.

4. A welding helmet comprising upper and lower sections normally joined together in a plane disposed at an incline to the vertical, means for supporting the lower section in relatively fixed position upon the wearer's head, means for pivotally connecting the upper section to the upper rear portion of the lower section whereby the upper section may be swung upwardly out of the line of vision of the wearer, a respirator mounted in the front wall of the upper section in position to engage the operator's face, when the upper section is closed, and air filters carrier by the upper section and in communicatien with the respirator.

5. A welding helmet comprising upper and lower sections normally joined together in a plane extending upwardly from a point below the operator's mouth to a point at the rear of the helmet above the operator's mouth, means for adjustably supporting the lower section upon the operator's head, means pivotally connecting the upper section to the lower section at the rear of the helmet, a window carried by the upper section through which the operator may view the work when the helmet is closed, means for securing the upper section in closed position, and means constantly urging the upper section into open position and capable of holding the upper section in such position, when the latter is released from the lower section.

6. A welding helmet comprising a lower section and an upper section cooperating to provide a hood, said lower section having means for supporting it in position on an operator's head, the upper edge of said lower section being disposed at an incline to the vertical and extending upwardly from a point below the operator's mouth, means for hinging the upper section to the lower section at the rear of the helmet, spring means constantly urging the upper section into open position and capable of retaining it in such position, means for securing the upper section to the lower section in closed position, a respirator mounted in the front wall of the upper section and adapted to be brought into position against the operator's face, when the upper section is closed, air filters mounted in the upper rear wall portion of the upper section, and conduits connecting the air filters to the respirator, said respirator and air filters being carried entirely by the upper section and movable therewith.

7. A welding helmet comprising a lower section and an upper section cooperating to provide a hood, said lower section having means for supporting it in position on an operator's head, the upper edge of said lower section being disposed at an incline to the vertical and extending upwardly from a point below the operator's mouth, means for hinging the upper section to the lower section at the rear of the helmet, a spring constantly urging the upper section into open position and capable of retaining it in such position, means for securing the upper section to the lower section in closed position, a respirator mounted in the front wall of the upper section and adapted to be brought into position against the operator's face, when the upper section is closed, air filters mounted in upper rear wall portion of the upper section and having operative connections with the respirator, and a flexible skirt detachably secured to the lower edge of the lower section and adapted to be fitted over the operator's shoulders and under a jacket or other clothing, thereby to prevent noxious gases, fumes and insects from entering the helmet.

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