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R. W. PETERS ET AL
ARC-WELDING HELMET

3,227,866

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2 Sheets-Sheet 1

Fig. 1

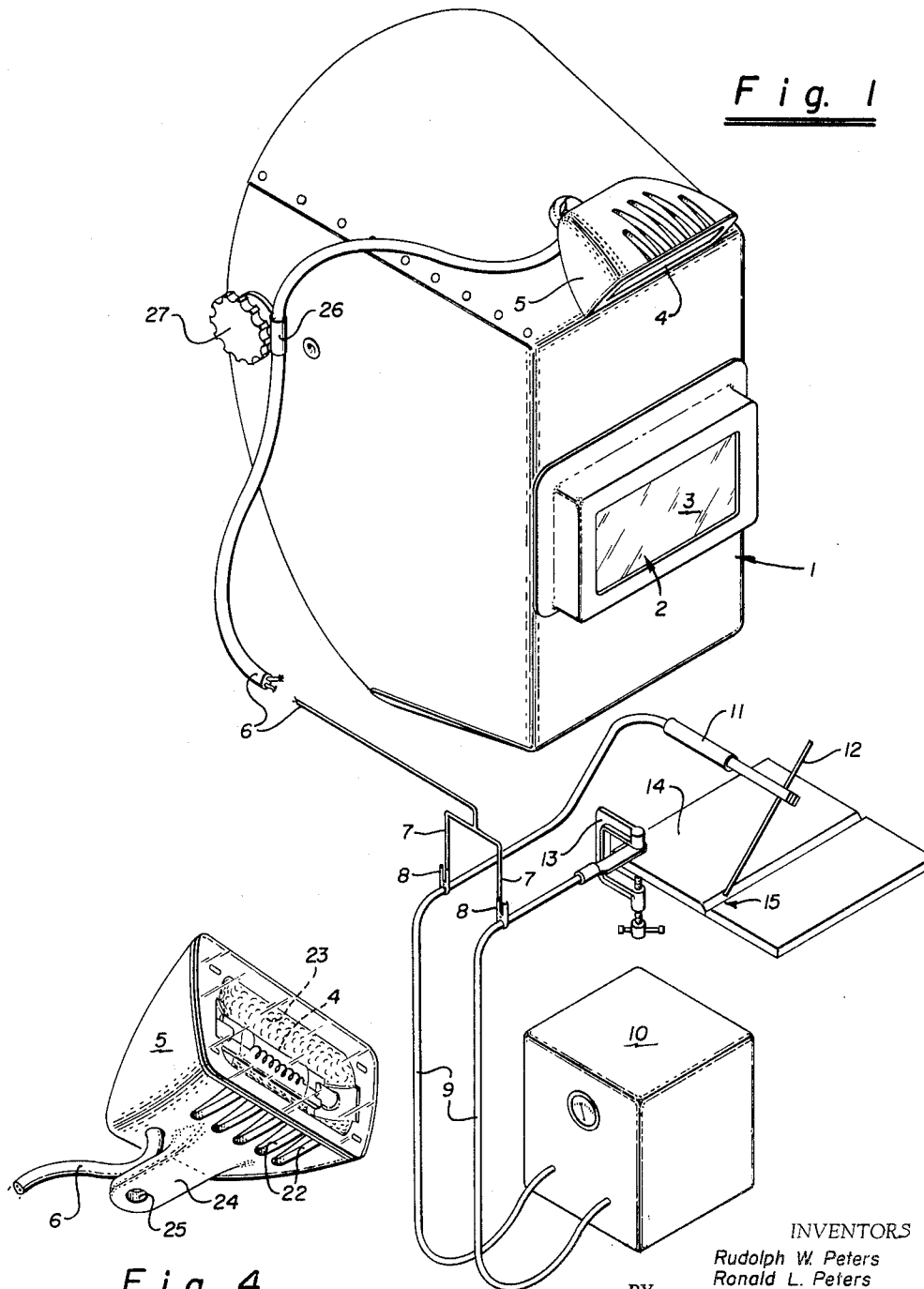


Fig. 4

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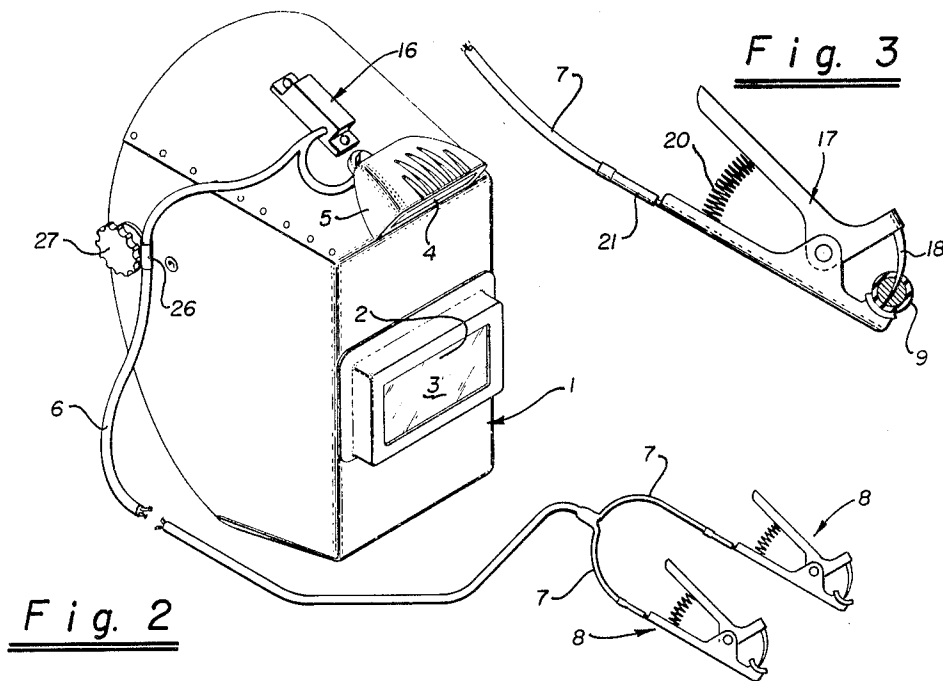
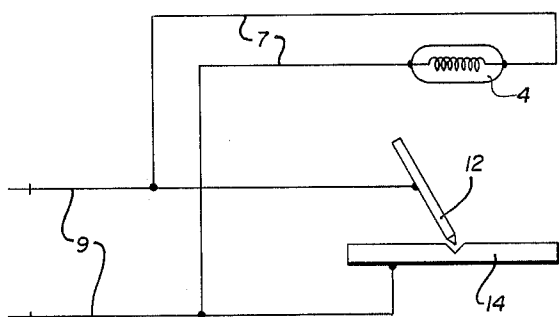
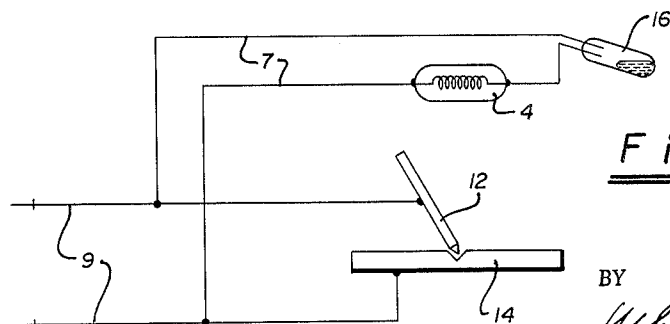
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2 Sheets-Sheet 2



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3,227,866

ARC-WELDING HELMET

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1 Claim. (Cl. 240—2)

This invention relates to helmets, shields, or masks used to protect the face and eyes of an operator engaged in electric arc-welding. More particularly it relates to an improved method of illuminating the work being welded and the area surrounding it.

As is well known to those engaged in the art of electric arc-welding, this process is accompanied by the pronounced splattering of hot metal particles while the welding is taking place, making it necessary to protect or shield the welding operator's body and particularly his face and eyes therefrom. The action of the electric arc is further characterized by the emission of rays of light of high intensity and including light of various and diverse wave lengths, including ultraviolet, some of which are highly injurious to the eyes and have been known to cause blindness. Helmets, masks or face shields used by operators in this process are equipped with small windows, or viewing openings, to permit the operator to see what he is doing. In order to cut off these injurious rays however, these windows must be equipped with special colored, stained or shielded glass which is impervious to these rays. This type of glass cuts off most of the other light also, thereby making it practically impossible to see through this window when the electric arc is not being maintained. This is extremely disadvantageous to the operator since the instant that the electric arc is extinguished, he is left in practically total darkness and can neither see his work nor the area surrounding him without removing his mask. This is, moreover, especially hazardous when the operator is working in dimly lighted locations such as the interior of tanks or vessels where a real hazard exists.

When it becomes necessary for the operator to frequently remove his mask before restarting his arc, he runs the further risk of striking the arc with his mask off and thus causing injury to his eyesight as well as his face.

To provide a working area with high intensity flood lighting is not only very expensive but wasteful since this light is not needed while the electric arc of the welder is being maintained. This method is also very cumbersome since the lights must be shifted whenever the position of the work or that of the welder is changed materially. Actually, there has been no satisfactory solution to this problem until the making of our invention which is disclosed herein.

It is therefore a general object of my invention to provide a means whereby an electric welding operator can see his work and the area surrounding it when the arc is not in operation without the removal of his mask.

It is a further object of our invention to provide a means of illuminating an electric arc-welding area which would be cheap, compact, and economical to operate.

It is yet another object of our invention to provide a light for an electric arc-welding area which would provide sufficient illumination to enable the operator to see through the window in his mask when the arc is not in operation by utilizing the power supply of the welding machine itself.

It is a more specific object of our invention to provide a light such as that described above and an electric circuit therefor in which illumination would be provided when the arc is not in operation, but would be extinguished when the arc is operating.

Other objects and advantages of our invention will be

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apparent to those skilled in the art from the description which follows, including the figures in which:

FIG. 1 is a preferred arrangement of one embodiment of our invention.

FIG. 2 is an alternate embodiment of the helmet of our invention.

FIG. 3 is an embodiment of one of the electrical clamps or contactors of our invention.

FIG. 4 is a preferred embodiment of the electric light of our invention.

FIG. 5 is the wiring diagram for the electrical circuit of the embodiment of FIG. 1.

FIG. 6 is the wiring diagram of the electrical circuit of the embodiment of FIG. 2.

Referring now more particularly to FIG. 1, there is seen the main body of my mask or helmet 1 which may be of a conventional type. A glass pane 2 of ordinary window glass is backed up by pane 3, which is composed of special shielding glass which cuts off injurious rays emanating from the arc, as well as most of the other normal light in the vicinity. These items are likewise of the conventional type found in welders' helmets or masks. A specially constructed light fixture 5 is fastened on top of the body of the helmet 1. This is equipped with a special light bulb 4. This combination is more fully described below and is arranged to emit a high intensity light for use in the manner provided in our invention. Light cable 6 connects to light fixture 5 and is fastened to the side of the body of the helmet 1 by means of clamp 26 and knob 27. The latter is concentric with and pivots upon the internal hinge pins (not shown), upon which the helmet is permitted to swivel from a horizontal to vertical position in the conventional manner. Light cable 6 is thereby prevented from interfering with the welder's normal movements. The two lead wires 7 from light wire 6 connect with cable clamps or terminals 8 which in turn make contact with welding cables 9 in the manner described below. Welding machine 10 may be of conventional A.C. or D.C. type. One of the leads 9 is connected to the work 14 by means of clamp 13, while the other lead runs to electrode holder 11 which holds electrode 12. The electric welding arc is maintained at point 15.

The operation of our invention is as follows. Referring now more particularly to FIG. 5, it will be seen that when the electric arc is not in operation the light bulb 4, being connected directly across welding cable 9 by means of lead 7, will be subjected to the full voltage of the welding machine 10 which may be of the order of magnitude of 25 to 50 volts and will consequently light up until an arc is established between electrode 12 and work 14. However, a large flow of current takes place from welding cable 9 and through the electrode 10 and work 14. This has the effect of dropping the voltage across the leads 9 and of robbing the current flow to lamp 4 which causes it to become extinguished. This latter condition represents normal welding operation. During this time the welder may see his work adequately through the shielded glass windows because of the intense light emitted by the arc. Just as soon as the arc is broken light 4 goes on automatically, as explained above, and the welder continues to see his work and the surrounding area through the shielded glass window, because of the intensity of the light bulb 4 in combination with the special fixture 5. At no time does the welder have to raise his helmet 1 and may continue with his work and related movements in perfect safety. By extinguishing itself automatically when the arc is in operation, wear and tear on the light bulb 4 is reduced and its life very greatly prolonged. This is very important since light bulbs of this special construction are expensive.

Referring now more particularly to FIG. 4, there is seen an expanded isometric view of light fixture 5 con-

taining light bulb 4. The latter is of special construction and while only approximately 3 inches in length and ½ inch in diameter, is able to emit the light equivalent of a 625 watt conventional bulb at approximately 100 volts. Lights or light bulbs of this character are manufactured by Sylvania Electric Products Company under the name "Movie Lamp Type DWY."

We house such a light bulb in our special fixture 5 which is of generally pyramidal configuration and is equipped with a bright aluminum reflector 23 of generally parabolic configuration. With this combination the equivalent candle power or luminous intensity of the light bulb 4 is magnified many fold. We have discovered that this combination produces light of sufficient intensity to make it possible for the welder to see through his shielded glass window when the arc is not in operation. Considerable heat is generated from this combination of lamp 4 and reflector 23 when confined in a small housing 5 and consequently it is necessary to provide ventilating holes or vents 22 to prevent frequent failure of the bulb 4. Bracket 24 is equipped with hole 25 which permits fastening of the fixture 5 to the body of the helmet 1.

Referring now to FIG. 3 there is seen an enlarged view of our cable clamps or contactors 8 which are connected to leads 7 and in turn to our lights through cable 6. These may be of the pincer type comprising lever 17, spike 18 and spring 20. These are all constructed of materials having good electrical conductivity and are joined to lead wire 7 by lug 21. When applied against welding cable 9 they serve to provide an electrical connection for light bulb 4 across the terminals of welding machine 10 as described above.

Referring now to FIG. 2, there is seen an alternate embodiment of our invention which we have found to be advantageous under certain conditions as set forth below.

During certain intervals of his work it is often necessary for the welder to perform various manual operations aside from actually maintaining the electric arc, such as preparation of his work, movement of materials, scaffolding, etc. During these intervals the arc, of course, will be extinguished but the welding machine will be turned on. During these periods also, if he is working in a well lighted area, he will raise the body of his helmet 1 to a horizontal position and hence, if he can rely on the normal illumination of the area, he will not need the light from light bulb 4 and wear and tear on it would be saved if it could be turned off. It would not be economical for the welder to go to the trouble of turning this on and off during each one of these cycles, because of the time lost in doing so. To overcome these problems we provide the embodiment of FIG. 2. This includes in general all of the constructions described above for FIG. 1 but in addition it provides a switch 16 of the mercury contact type connected in series with light bulb 4, as shown more clearly in FIG. 6. In switches of this character the circuit is completed, or what amounts to the same thing, the switch is closed, by the action of liquid mercury coming in contact with and acting as a conductor for electricity between two exposed terminals, as is well known to those skilled in the art. Contact is broken, or the switch opened, when its position is moved so that the liquid mercury flows away from the terminals and out of contact with them. By mounting our switch 16 on top of helmet body 1, as shown in FIG. 2, we are able to utilize the action of such a switch in the following manner.

The vertical position of our helmet body 1 corresponds to the normally closed position of mercury switch 16 and the operation of our invention is exactly as described above in connection with FIGS. 1 and 5. When the welder raises his helmet in the horizontal position, under the conditions and for the reasons described above, the mercury flows away from the contact beside the switch, the circuit is broken and light 4 is extinguished. When the welder is ready to resume his welding he drops his

helmet, the mercury switch closes the circuit and light 4 goes on. It stays on until he strikes his arc, when light 4 again goes out as described above.

We have discovered that all of the component parts of our invention are all compact, light, and in no way hamper or interfere with the normal work or movements of a welder under any conditions. In fact, we have discovered that the time saved and the elimination of hazards have increased the productivity of welders using our invention to a substantial degree.

Other modifications and variations of the preferred embodiments which we have disclosed herein may be made without departing from the spirit of our invention and we do not limited ourselves to these embodiments herein disclosed, except as we do so in the claim which follows.

We claim:

A welder's helmet in combination with an electric arc-welding machine comprising:

a swivelling hood adapted to cover and uncover the welder's head;

a shielded glass window in said hood;

a high intensity electric light positioned on said hood; electrical leads connecting said light in parallel with the welding current supply from said welding machine to an electric arc,

whereby said light enables said welder to see through said window when said electric arc is not in operation but is extinguished as soon as said arc is formed;

a liquid mercury switch positioned on said swivelling hood;

said mercury switch being connected in series with said high intensity electric light and said welding current supply,

whereby said light is extinguished when said swivelling hood is raised to a horizontal position uncovering the welder's head;

rapid means for connecting said electrical leads to the welding current supply cables comprising a pincher-like electrode connected to each of said leads and comprising,

a pair of handles;

a pair of jaws;

a hinge pivot between said handles and said jaws;

a spring positioned between said handles so as to force said jaws into a normally closed position;

a sharp, electrically conducting spike positioned at the end of one of said jaws and arranged for penetration through the insulation of said supply cables;

means for connecting said electrodes to said electrical leads;

means for pivotally mounting said leads on said helmet to permit swivelling of said helmet in a vertical plane without interfering with the function of said electrodes.

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