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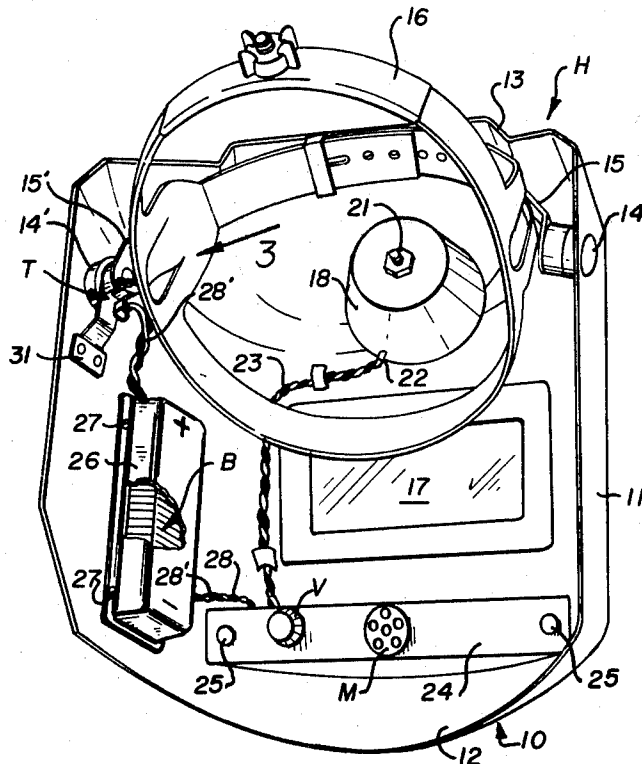
**[54] SPEAKER SYSTEM FOR WELDERS' HELMETS
AND THE LIKE
10 Claims, 5 Drawing Figs.**

[52] U.S. Cl..... 179/156,
179/1,325/118

[51] Int. Cl.⁷..... H04m 1/05

[50] **Field of Search**..... 179/1Meg,
156, 168; 325/118, 111

ABSTRACT: The following application discloses a welder's helmet having a speaker adapted to function whenever the helmet is lowered over the face of the welder and to turn off whenever the helmet is lifted to its retracted position. The speaker, microphone and amplifying circuit are selected, small components capable of being powered by a small battery which is also mounted within the helmet. A turn-off feature, operative whenever the helmet is lifted over the wearer's head, is provided by a switch associated with one of the pivots supporting the welder's helmet on his headband.



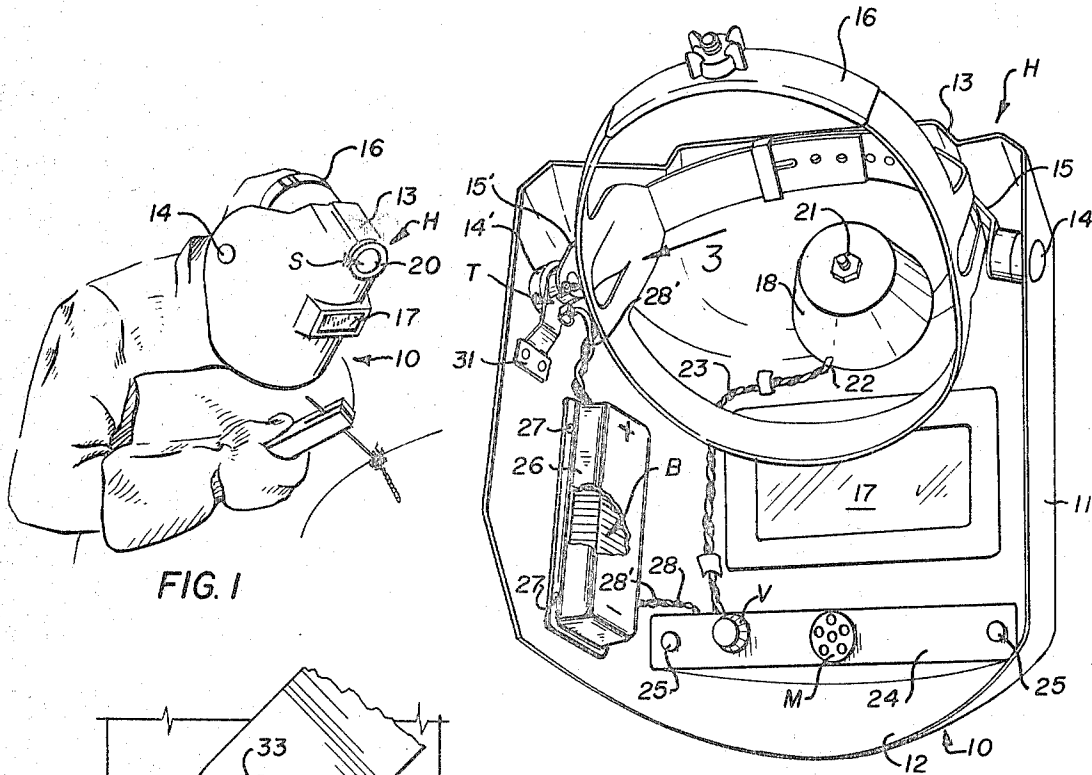


FIG. 1

FIG. 2

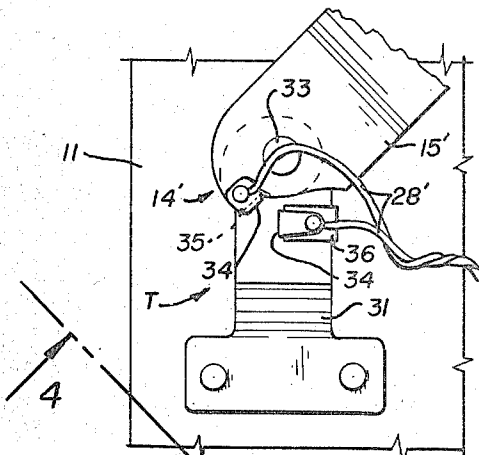


FIG. 3

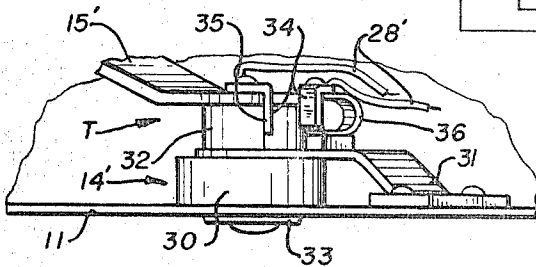


FIG. 4

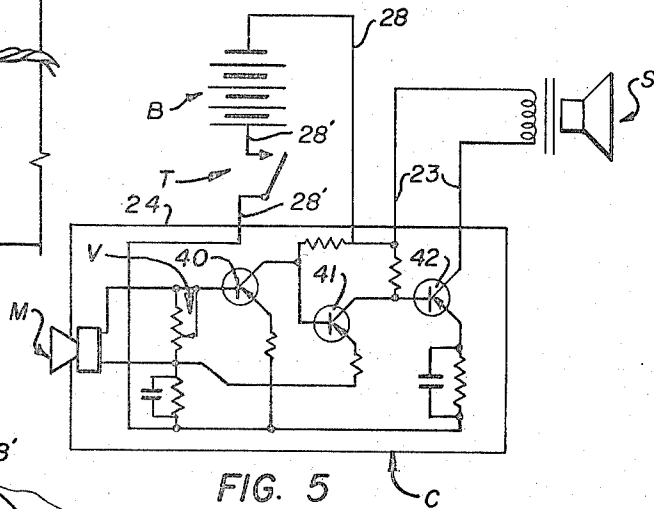


FIG. 5

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SPEAKER SYSTEM FOR WELDERS' HELMETS AND THE LIKE

SPEAKER FOR WELDERS' HELMETS AND THE LIKE

This invention relates to speakers for headgear and more particularly to speakers for helmets of the type which shield the face of the wearer. The invention has special application to arc welders helmets and accordingly, will be referred to as a "Speaker for a Welder's Helmet."

An electric arc not only emits an intense light requiring an arc welder to protect his eyes, but it also emits ultra violet light of such intensity as to require the welder to protect his face and hands to avoid injurious burns. This has resulted in the development of several types of arc welders helmets or face shields. Such helmets are contoured to fit about an individual's face with sufficient clearance to provide for comfort and freedom in breathing, and also place a window at his eye level to permit him to view his work while welding, the window being enclosed with a special protective glass. Perhaps the most common and popular type of a welder's helmet provides for a headband with the helmet face cover being pivotally secured to the sides of the headband by frictional bearings. This permits the welder to raise the helmet above his face when he is not actually welding, and when he is ready to commence arc welding, he merely nods his head to permit the helmet to drop over his face.

While a welder using such a helmet can freely converse and communicate with others in a normal manner when his helmet is raised over his head, his ability to do so is severely hampered whenever the helmet is lowered. In the field, shop or production line this limitation is not especially significant for the noise produced by an arc is not conducive to conversation. However, there exist a number of situations where it is desirable and even necessary for the welder to talk to others when his helmet is lowered and while he is welding. A welding instructor is especially hampered when he is unable to talk to his students as when he is demonstrating a technique of welding. A specialty salesman or technical demonstrator is also at a disadvantage when he is endeavoring to point out advantages and techniques of his methods and materials to a prospective customer. Often, instructions and demonstrations are found to be insufficient merely because of the inconvenience created by the helmet restricting the instructors or demonstrator's ability to talk sufficiently loudly and effectively while the welding operation is under way.

The present invention, a speaker for a welder's helmet, was conceived with the foregoing and other considerations in view. It comprises, in essence, a welder's helmet combined and equipped with a self-contained speaker assembly including a microphone, a battery power supply, a loudspeaker and an amplifying circuit between the microphone and speaker. An alternate combination would comprise the helmet equipped with a small, self-contained radio transmitter to transmit to remote receivers having speakers which could be located as desired. In either case, the assembly also includes a switch associated with one of the headband pivots of the helmet which is adapted to automatically turn the speaker on whenever the helmet is dropped over the face of the welder and to thereafter turn it off whenever the helmet is lifted above the welder's face.

It follows that a primary object of the invention is to provide a novel and improved speaker for a welder's helmet which permits the welder to converse with others whenever the helmet is lowered over his face.

Another object of the invention is to provide a novel and improved speaker for a welder's helmet which permits the welder's voice to be amplified whenever the helmet is lowered over his face to a loudness sufficient to permit him to be easily heard over the noise of an arc.

Other objects of the invention are to provide a novel and improved speaker for a welder's helmet which is fully self-contained and does not require any connective cords for a power supply; which may be adapted to transmit sound directly from

a speaker on the helmet or may be adapted to transmit the welder's speech at radio frequencies to be picked up on receivers which are spaced from the speaker; and which is especially useful for instructors and demonstrators of arc welding techniques who desire to explain while they are welding.

Another object of the invention is to provide a novel and improved speaker for a welder's helmet which is operative only when the helmet is lowered over the welder's face and which turns off when the helmet is lifted and thereby conserves the power supply for the speaker.

Other objects of the invention are to provide a novel and improved speaker for a welder's helmet which is a complete unit compactly arranged within a welder's helmet, and which is a reliable, low cost, economically operated, rugged and durable unit.

With the foregoing and other objects in view, all of which more fully hereinafter appear, my invention comprises certain constructions, combinations and arrangements of parts and elements as hereinafter described, defined in the appended claims and illustrated in preferred embodiment in the accompanying drawing in which:

FIG. 1 is a perspective view of an arc welder wearing an improved speaker helmet, and with the helmet being lowered and the welder about to strike an arc on some work material.

FIG. 2 is a perspective view of the inside of a welder's helmet which is modified to incorporate therein the improved speaker system illustrative of one facet of the invention.

FIG. 3 is a fragmentary detail of one switching arrangement which may be located at the headband pivot connecting to the helmet, as viewed from the indicated arrow 3 at FIG. 2, but on an enlarged scale.

FIG. 4 is an edge view of the structure shown at FIG. 3, as taken from the indicated line 4-4 at FIG. 3.

FIG. 5 is a representative circuit diagram of an amplifying circuit which may be used in connection with the invention.

Referring more particularly to the drawing, a typical welder's helmet assembly H is modified only in minor respects to be adapted for the present invention. The helmet shield 10 is formed as a molded, thin-wall structure of a selected fibre or plastic material which is characterized by lightweight, opaqueness and toughness. The helmet shield 10, adapted to shield the front portion of a welder's head and face extends about the welder's head with approximately 1-inch clearance. It includes a semicylindrical face portion 11 extending in height from a wearer's chin to the top of his head and about each side of his face to enclose the entire front half of his head. The lower edge of this face portion is partially closed by a chin protector 12, and the upper edge is partially closed by a head cover 13. Friction pivots 14 and 14' are located adjacent to the rearward side edges of the face portion 11 to connect with arms 15 and 15' outstanding from the side of an adjustable headband 16. This headband 16 is worn by the welder to hold the helmet in a retracted or in an in-use position, and the entire unit is so proportioned that the helmet may swing about the pivots 14 and 14' as from the retracted position over the top of a welder's head to an in-use position in front of his face. To complete the conventional array of components of the helmet H, a window 17 is provided across the front of the face portion 11 which is enclosed with a special darkened glass.

This helmet may be modified to include a speaker transmission system, or a radio transmission system in accordance with the invention, and the following description of the speaker system is illustrative of one embodiment of the invention. To adapt the helmet to a speaker system which is self-contained and completely free of electrical cords which have to be connected to power outlets, it is possible to mount small microphone and battery components within the helmet itself without significantly interfering with the clearance space about a wearer's head as will be described. However, it is desirable to mount the emitter face of a speaker at the outside of the helmet and accordingly, a frustoconical socket 18 is molded into the face 11 of the helmet at a centered position

directly above the window, this socket being proportioned to receive and retain a speaker S in the desired manner. Many different types of speakers are available, and a preferred type known as a 3-inch P.M. speaker is adequate to amplify a man's voice several times without undue distortion. This speaker S is adapted to fit into the frustoconical socket 18 with its emitter face 20 at the exterior of the helmet, as illustrated at FIG. 1, and with its driver parts being within the socket 18. The speaker may be secured within the socket in any suitable manner as by turning a nut onto a screw shank 21 extending through the bottom end of the socket 17 as illustrated, or by cementing it into position with a suitable mastic. A passageway 22 is provided at the head of the socket to permit electrical leads 23 to be extended from the speaker to the interior of the helmet for connection with an amplifying circuit as will be described.

The amplifying circuit C of FIG. 5 is a suitable, miniaturized solid state circuit which is encased within a module circuit box 24 mounted within the helmet as in FIG. 2, near the mouth level, as by rivets 25. This circuit box also includes a microphone M and a potentiometer volume control V as well as the several transistors, resistors and capacitors which form the circuit C. This circuit is powered by a battery B which may be a selected type of one of several small, powerful batteries commonly available. A suitable battery is known as NEDA type 1403. This battery, a flat, elongated member, is conveniently housed within a case 26 which is mounted on a side of the helmet, and the cover of the case may be opened, as by screws 27 extending through the flanges of the case and into the wall of the helmet.

The two battery leads 28 and 28' extend from the respective poles of the battery and to the amplifying circuit within the circuit box 24; however, one of the leads 28' is first extended to a control switch T which is associated with a pivot 14' and operates with the tipping of the helmet. The basic structure of the pivot 14' includes a comparatively heavy boss 30, shown in FIG. 4, which is affixed to the side of the face portion 11 of the helmet. This boss is reinforced by a brace 31 which is riveted to the wall 11 of the helmet shield 10 adjacent to the boss 30 and has a tongue portion connecting with the top of the boss. The headband arm 15' connects with the pivot 14' by a smaller boss 32, serving also as a spacer, which sets upon the brace 31 over the boss 30. A shaft member 33 extends through these bosses and brace to hold the members together with a tight, frictional fit.

In the improved construction, the switch T may be of any suitable type which is responsive to the rotation of the helmet about the headband. The switch T, as illustrated in FIGS. 3 and 4, includes a pair of contacts 34 connecting with ends of the lead 28'. One contact 34 is mounted upon a radial offset 35 on the arm boss 32, while the other contact is mounted upon a resilient abutment 36 secured to the brace 31 adjacent to the pivot. The offset 35 and the abutment 36 are in a rotative alignment and positioned for contact when the helmet is lowered to the in-use position. The resilient abutment 36 permits the helmet 10 to swing to different stopping positions when it is lowered and still effect contacting of the contacts 34 to close the switch T. The advantages of the switch T lie not only in automatically shutting the speaker off whenever the wearer lifts the helmet to conserve the batteries, but also in preventing any speaker interference whenever the helmet is lifted and the wearer is able to talk to his audience in a normal manner.

It is to be noted that other types of switches, not shown, may be used for the purpose at hand. For example, a common microswitch may be mounted upon the side of the helmet or on the brace 31 in a position where its actuating finger will engage the radial offset 35 of the headband boss 32. The lead ends 28' may then be connected to this microswitch. Another type of switch which may be used in is a mercury tilt switch of any common type. It may be mounted upon the headband arm 15' and adjusted thereon in a manner which permits it to close contact when the helmet is lowered over the welder's face, but to open contact when lifted.

The circuit diagram, illustrated at FIG. 5, is exemplary of several circuits possible to use to amplify the signals from the microphone M to the speaker S. This circuit includes a first pair of transistors 40 and 41 in a cascading arrangement. The base of the transistor 40 is connected with one lead of the microphone M and the volume control V may conveniently be a variable resistor regulating the input to the base of the transistor 40. The output, amplified by the transistors 40 and 41, is further amplified by a transistor 42 having its collector connected directly to one speaker lead 23 extending to the speaker S while the other speaker lead 23 connects with a battery lead 28.

In using this speaker system, all that is required is for the wearer to don the helmet, drop it over his face and adjust the volume control to amplify his speech to a desired loudness. The helmet is then ready for use, but when it is again lifted, the speaker system is automatically shut off. Therefore, no drain upon the battery will occur except when the helmet is actually being used. The wearer may then talk in a natural manner and the speaker will project and amplify his voice to the extent desired. Thereafter, when he is through welding and lifts his helmet, the speaker shuts off. In storage of the helmet, the headband will be invariably tipped to the retracted position with respect to the helmet whether the helmet is laid on a bench, placed in a box or hung upon a peg. This will naturally open the switch to shut the speaker circuit off and prevent any battery drain until it is again ready for use.

When it is desirable to use a radio transmission system in the helmet, the same general organization is possible and the radio system can comprise the components of any of a number of small radio transmitters available on the market and of a type which can use a low power output without a F.C.C. license. The basic organization is the same as that heretofore described. A small microphone and battery components may be mounted within the helmet itself without significantly interfering with the clearance space about the welder's head. A portion of the circuitry for the radio, a suitable miniaturized solid state circuit, may be encased within a module circuit box with the microphone, as heretofore described, and for purposes of convenience, the remainder of the transmission system may be housed within the socket 18 within the helmet should such be necessary.

In such a radio circuit, a switch comparable to the switch T heretofore described will be mounted at a headband pivot to function to turn the radio transmission system on whenever the helmet is lowered over the welder's face, but to turn the system off whenever the helmet is lifted above the welder's head. In the use of a radio transmission system, it is necessary to have receivers which may be stationed at suitable locations about a welder; for example, where a welding instructor is using the helmet, receivers may be located at the sides and back of the classroom or individual receivers with earphones may be used by the students.

I have now described my invention in considerable detail. However, it is obvious that others skilled in the art can build and device alternate and equivalent constructions which are nevertheless within the spirit and scope of my invention. Hence, I desire that my protection be limited not by the constructions illustrated and described, but only by the proper scope of the appended claims.

I claim:

1. In combination with a welder's helmet assembly of the type having a helmet pivotally carried upon a headband adapted to be worn by a welder and to support the helmet thereon for lowering over his face when in use, and for raising above his head when in a retracted position, a transmission system comprising:

a microphone within the helmet at the lower portion thereof adapted to pick up the speech of a welder when the helmet is at the lowered position; and

a powered transmitting means adapted to transmit the speech signal of the welder from the helmet so that the same may be received at a location at a distance from the welder.

2. The combination defined in claim 1, wherein:

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the powered transmitting means includes a speaker installed on the helmet having its emitting face at the exterior of the helmet; and
an amplifying means interconnecting the microphone and the speaker adapted to drive the speaker to reproduce and amplify the voice of a welder wearing the helmet. 5

3. The combination defined in claim 1, wherein the powered transmitting means comprises: a radio transmitter adapted to emit a signal.

4. The combination defined in claim 2, wherein: the amplifying means includes a volume control adapted to regulate the degree of amplification of the welder's speech received by the microphone. 10

5. The combination defined in claim 1, wherein: the transmitting means includes a switch and means adapted to open the switch whenever the helmet is lifted to the retracted position. 15

6. The combination defined in claim 2, wherein: the welder's helmet includes a cuplike socket adapted to retain the speaker exteriorly of the helmet. 20

7. The combination defined in claim 1, wherein the transmitting means includes:
a circuit lead extending to the pivot juncture between the helmet and the headband;
switch means in the lead at said juncture; 25

means adapted to secure the switch means to the helmet portion; and
an offset on the headband pivot adapted to engage the switch means when the helmet is lowered over the face of a welder, to close the same and to disengage the switch means, and when the helmet is raised over the welder's head, to open the same.

8. The combination defined in claim 1, wherein the transmitting means includes:
a circuit lead extending to the pivot juncture between the helmet and the headband; and
a switch in the lead at the juncture having one contact on the helmet and having another contact on the headband, with said contacts being arcuately aligned and adapted to close when the helmet is rotated about the headband to the lowered in-use position.

9. The combination defined in claim 1, wherein:
one of said contacts is mounted upon a resilient; and abutment adapted to yield when the helmet is rotated past a selected, normally contacting position.

10. The combination defined in claim 1, wherein the transmitting means includes: a circuit lead having a mercury switch mounted on the helmet adapted to be closed when the helmet is lowered and to be opened when the helmet is raised.

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