

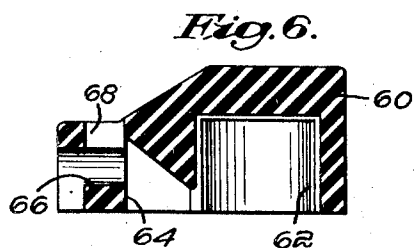
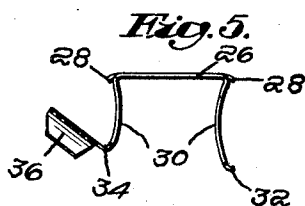
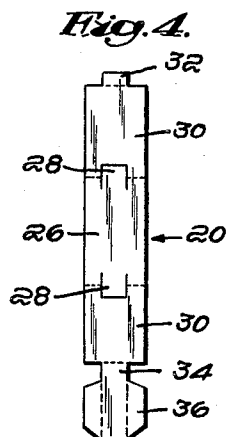
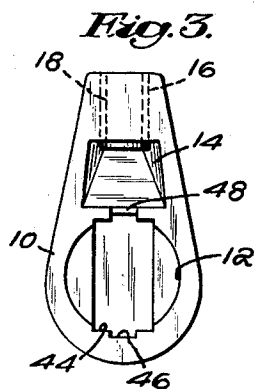
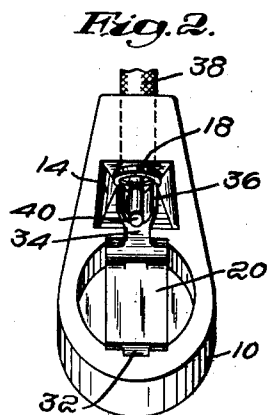
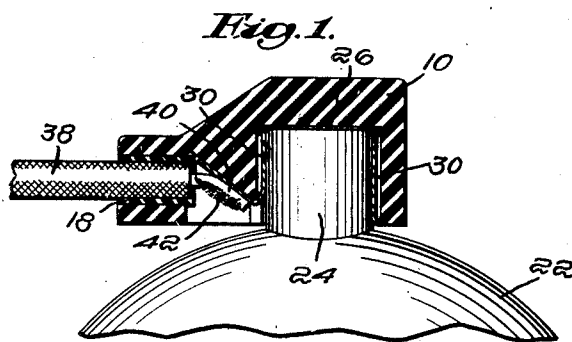
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W. J. LARKIN, JR

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ELECTRICAL APPARATUS

Filed April 26, 1940



Inventor:

William J. Larkin, Jr.

By Kenney & Witter
Attorneys

UNITED STATES PATENT OFFICE

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ELECTRICAL APPARATUS

William J. Larkin, Jr., Lynnfield, Mass., assignor
to National Company, Inc., Malden, Mass., a
corporation of Massachusetts

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4 Claims. (Cl. 173-269)

My invention relates to electrical apparatus and consists in an improved safety cap for high voltage terminals.

The most important object of my invention is to provide an insulated connector cap for the end of a wire leading to the grid or plate terminal of a high voltage vacuum tube, which will permit the operator to make or break the connection while current is flowing without any danger of touching conducting material and with entire safety to himself. High voltages are often used in radio transmitting equipment and in various industrial apparatus, and severe injuries or even death by electrocution have resulted when the operator of the apparatus has accidentally come in contact with a terminal while the current was flowing. The connector cap of my invention is well calculated to eliminate such accidents.

An important feature of my invention resides in an insulating cap containing a one-piece metal contact member one portion of which is arranged to fit over the terminal to which the connection is made and another integral portion of which is formed as a soldering lug.

A striking advantage resulting from the construction of my invention comes from the ease with which one or more wires may be slipped in place and soldered to the contact member referred to above.

These and other objects and features of my invention will be more readily understood and appreciated from the following detailed description of a preferred embodiment thereof, selected for purposes of illustration and shown in the accompanying drawing in which—

Fig. 1 is a view in cross section showing the safety cap of my invention applied to the grid terminal of a vacuum tube,

Fig. 2 is a view in perspective of the safety cap as seen from below,

Fig. 3 is a bottom plan view of the insulating cap with the metal contact member removed,

Fig. 4 is a plan view of the metal contact member after it has been cut from strip metal and before it is bent to shape,

Fig. 5 is a view in side elevation showing the metal contact member after it has been shaped, and

Fig. 6 is a view in cross section of an alternative form of cap.

As shown in the drawing, the safety cap of my invention consists essentially of two elements, an elongated outer insulating body 10 and a metal contact member 20. The body of

the cap 10 may be constructed in any convenient manner, but I prefer to mold it from a thermo-setting insulating material, such as mica-filled Bakelite, electrical porcelain, polystyrene, or any other thermo-plastic material of very high resistance. One end of the cap body 10 is larger than the other and substantially cylindrical in shape, and the cap tapers in both width and height toward its other end. In the large end of the cap is a cylindrical well or socket 12 which may be termed the terminal-receiving well. The well 12 extends inwardly through the bottom wall of the cap, and a second and somewhat smaller well 14 is disposed adjacent thereto and also extends inwardly through the bottom wall of the cap 10. The smaller well 14 may be termed the soldering well and is provided with an inner wall sloping outwardly so that the deeper part of the soldering well 14 lies in the side opposite to the terminal-receiving well 12. The end wall of the cap 10 is pierced as shown at 16 and a bushing 18 of insulating material is tightly fitted into the hole 16 extending parallel to the bottom face of the cap and at an obtuse angle to the inner sloping wall of the soldering well.

As shown in Fig. 4, the contact member 20 is cut from a strip of flat resilient sheet metal. The dotted lines indicate the places where the flat cut-out blank is to be bent. At one end the blank is reduced to form a narrow lug 32, and ears 28 are cut out of the body portion of the blank, the blank is also reduced adjacent its other end to form a narrow neck 34 and a broader throat portion 36. After the blank has been cut out, it is bent into the shape shown in Fig. 5. It will be seen that the finished contact member 20 has a flat top 25 and inwardly bowed sides 30. The ears 28 are directed downwardly and outwardly and are resilient. The lug 32 is bent outwardly, the neck 34 is bent to form an acute angle with the adjacent side 30, and the throat portion 36 is concaved to form a dished or channel-shaped soldering lug.

The sides of the terminal-receiving well 12 are provided with oppositely disposed, vertical channels 44 dimensioned to receive the sides 30 of the contact 20. Smaller channels 46 are cut into the channels 44 and receive the resilient ears 28. The larger channels 44 prevent the member 20 from rotating in the well 12 while the ears 28 engage the sides of the smaller channels 46. Since the ears 28 are slanted downwardly, they act as resilient barbs and resist separation

of the member 20 from the cap 10. The lug 32 acts in the same way as the ears 28.

The neck 34 of the contact 20 fits into a recess 48 cut into the wall of the cap which separates the wells 12 and 14, and the throat 36 lies on, or parallel to, the inclined inner wall of the well 14.

Fig. 1 illustrates the application of a cap to the grid terminal 24 of a vacuum tube 22. It will be evident that the insulating cap 10 completely covers the terminal 24 so that no conducting material is exposed. Those skilled in the art will recognize that the only exposed conducting material in a vacuum tube of the type illustrated is the grid or plate terminal and the contacts in the base which are nearly always under a protecting panel or chassis.

The wire 40 is covered by insulation 38, and in connecting the end of the wire to the cap a small section of the insulation 38 is stripped away to expose a length of the bare wire. When the wire is inserted through the hole 16 in the cap 10, the end of the wire 40 strikes the inclined throat 36 and is bent outwardly at an angle so that the exposed end portion of the wire lies snugly in the concave throat 36. The bare portion of the wire 40 is entirely within the cap. The sides of the throat 36 may be closed around the wire 40, and a drop of solder 42 applied to make a firm connection. The wire may be disconnected, should occasion arise, by heating the solder and pulling out the wire. The ease and rapidity with which the cap may be connected to a wire is a striking feature of my invention.

The ears 28 hold the contact member 20 in the cap 10 so that the cap may be removed from the terminal 24 without loosening the contact or separating it from the cap. The bowing of the sides 30 of the contact renders them resilient in order that they may firmly grip the terminal 24 and establish a good electrical contact. The fact that the soldering lug or throat 36 is integral with the contact proper is advantageous, inasmuch as it eliminates a further joint in the circuit.

An alternative form of cap is shown in Fig. 6, where a molded insulating cap 60 is provided with a terminal-receiving well 62 precisely similar to the well 12. Another well 64 is disposed adjacent the well 62 and is provided with a sloping inner wall. An outlet 66 leads laterally from the well 64, and the bushing may be omitted if desired. In the top of the cap 60 is another outlet 68 leading into the well 64. The contact member is not illustrated, since it may be similar to the contact 20. The cap 60 permits two wires to be connected to the contact member, one wire entering the outlet 66 and the other coming in the outlet 68. Otherwise the cap functions like the cap 10. Both outlets 66 and 68 are so placed that the bare end of an entering wire is automatically directed into soldering position on the throat of the contact member.

I have now described with particularity an improved safety cap for high voltage terminals. It is important to note, in using the cap of my invention, that the terminal-receiving well and the contact member are so constructed and arranged that the entire terminal is covered by the insulating material of the cap and no conducting or "live" material is exposed. Furthermore the contact 20 is entirely within the confines of the cap and is not exposed. The result is

that when the apparatus is in use, the operator can make adjustments or inspect the apparatus without danger of accidentally coming in contact with current carrying material. In addition, the configuration of the throat of the contact member automatically brings the bare end of the wire in position to be clamped and soldered firmly in place, no screws or separate clamps are necessary, so that the cap and the contact member may each be formed in simple shaping operations, no screw threading or other treatment being required.

Having thus described my invention what I claim as new and desire to secure by Letters Patent of the United States is:

1. A device of the class described, comprising an insulating cap having a terminal-receiving well and a soldering well in side by side relation in one wall, the soldering well having a bottom wall inclined with respect to its sides, a wire-receiving outlet in another wall of the cap leading from said soldering well and disposed at an angle to the bottom wall of the said well, a metal contact member disposed in the terminal-receiving well and extending into and along the bottom wall of the soldering well, whereby a wire inserted through said outlet strikes the contact member and is automatically deflected and bent to lie on the contact member in soldering position.

2. A device of the class described, comprising a molded cap of insulating material provided in one wall with a terminal-receiving well and a soldering well separated by a recessed wall, said soldering well having a bottom wall inclined with respect to its sides, a wire-receiving outlet formed in another wall of the cap and entering the soldering well at an obtuse angle with respect to said inclined wall, and a metal contact member disposed in said terminal-receiving well and having a neck fitting the recess in said separating wall and a concaved throat portion disposed on said sloping wall, whereby a wire pushed through said outlet will strike said throat portion.

3. A cap of insulating material provided with a terminal-receiving well and a soldering well in side by side relation in one wall thereof separated by a recessed wall, the bottom wall of the soldering well being slanted down and away from the recessed wall separating the wells, an outlet in another wall of the cap adjacent the deepest portion of said soldering well and disposed at an obtuse angle with respect to said slanted wall, and a contact member comprising a strip of sheet metal bent to follow the contours of the terminal well, and having a neck fitting in the recess of the separating wall and having a concaved throat portion lying along the slanted inner wall of the soldering well.

4. A safety cap for terminals, comprising an insulating body having a cylindrical terminal well in one of its walls, opposed channels in the sides of the walls of the well, narrower channels in each of the opposed channels, a second well adjacent the cylindrical well, a contact member comprising a strip of sheet metal following the contours of the cylindrical well and disposed in said opposed channels, wings cut from said strip and engaging the sides of the narrower channels, and a throat portion integral with the strip and disposed in the second well.

WILLIAM J. LARKIN, JR.