

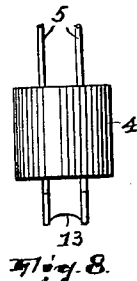
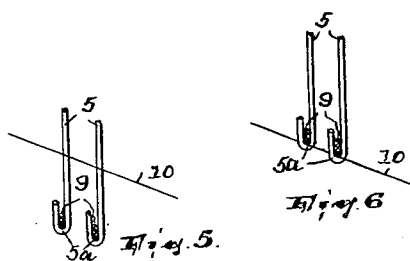
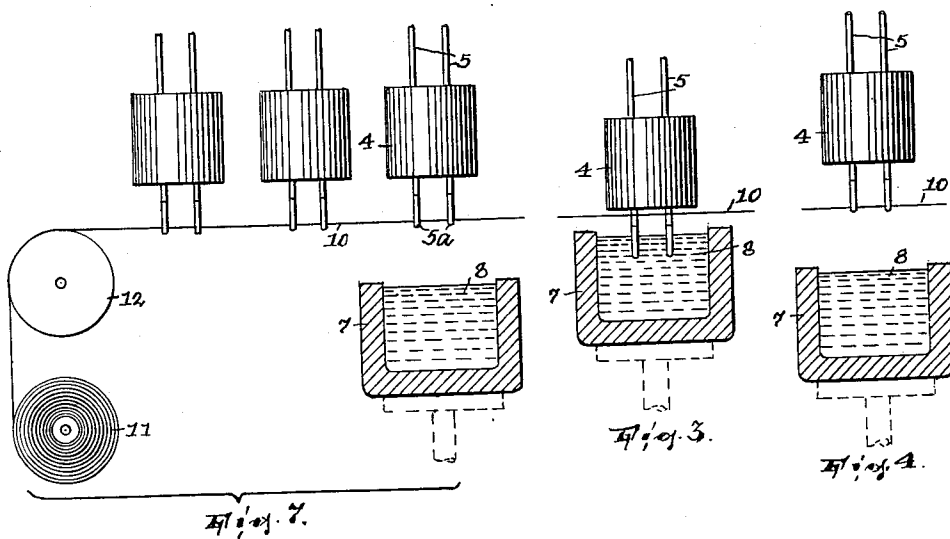
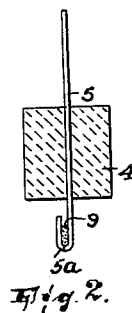
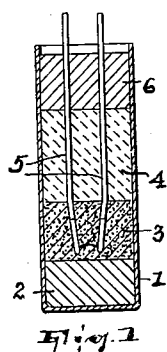
Aug. 4, 1942.

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2,292,117

METHOD OF SOLDERING

Filed Oct. 10, 1940



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UNITED STATES PATENT OFFICE

2,292,117

METHOD OF SOLDERING

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Application October 10, 1940, Serial No. 360,617

6 Claims. (Cl. 113—112)

This invention relates to devices of the class comprising an insulating body, as a plug, a pair of spaced conductors supported thereby and a fine metallic resistance filament connecting the conductors and to be rendered incandescent when current is passed through a circuit in part formed by the conductors and filament. A common application of such a device is as an igniter for a blasting cap, in which case the conductors usually penetrate the plug and have projecting end portions electrically connected by the filament; usually the connection between each conductor and the filament is effected by soldering, i. e., with the use of a soldering iron. But frequently the operator fails to connect the filament with at least one conductor, or if he connects it with both conductors he may do so so that the solder as well as the filament is left electrically connecting the conductors. In either such case a blasting cap completed by such a faulty igniter is potentially dangerous in that if, especially when as usual it is used in circuit with other caps, it may fail to be discharged when the circuit is closed, remaining as a "dud" to be inadvertently exploded later.

My object is to provide a method by which devices of the indicated class may be manufactured with facility and more expeditiously than heretofore and with assurance that in the case of each device produced there will be a good electric connection of the filament with each of the conductors and avoidance of an electrical connection between the conductors which will be formed by the solder used to connect the filament to each conductor.

In the drawing

Fig. 1 shows an igniter produced by my method here in place in a blasting cap, all parts excepting the conductors being in section;

Fig. 2 shows the igniter viewed from one side thereof with the plug in section in the plane of one conductor, which appears in elevation and as carrying a blob or globule of solder;

Figs. 3 and 4 illustrate, more or less diagrammatically, two steps in my method;

Figs. 5 and 6 are isometric views of certain parts in their relations respectively corresponding to Figs. 3 and 4;

Fig. 7 illustrates, in part, how my method is preferably performed; and

Fig. 8 is a front elevation of the completed igniter.

Let 1 in Fig. 1 be the shell of a blasting cap, 2 the pressed charge therein, 3 the loose charge above the pressed charge, 4 the plug and 5 the

conductors of the igniter, and 6 a plastic sealing mass which, after the igniter is introduced into the shell above the charge 3 with the ends of its conductors in the latter, is packed in above the igniter.

The conductors of each igniter to be formed penetrate the plug (of course being insulated from each other as by the plug being of insulating material) and project therefrom at what is to be its underside, the projecting portions or terminals of the conductors having solder-supporting seats at 5a, here and preferably formed by bending back said terminals as hooks.

Let 7 be a container, as a small pot, containing solder 8 in fused state. In accordance with my invention the pot and the element formed by the plug and its conductors are first made to assume the relation shown, with said element over the pot and its conductor terminals depending; then one or each is to be moved toward the other to cause said terminals to be entered into the solder to an extent at which the seats 5a will be depressed below the solder surface; and finally a reverse movement of one or each of the parts formed by said element and pot is effected so that separate blobs 9 of solder remain seated on said seats and above the surface of the solder in the pot, a portion of a metallic filament 10 being at this stage assembled with both blobs 9—that is to say, made to exist at least in contact with if not actually embedded in each of them while it remains in fused state, as while such reverse movement proceeds.

In the preferred practice of my invention the procedure is as follows (Fig. 7): The filament 10 is drawn (as will appear) from a wound supply 11 thereof and over a guide, as at 12, then extending approximately horizontally to the medium which exerts the draft thereon. Caused to travel (by any expedient not here material) in a path above and parallel with the horizontally extending filament portion and at the same speed is a succession of the aforesaid elements, they supporting the filament in their hooks 5a. The path of travel of the said filament portion is over the solder pot, whose normal position is preferably depressed so that its heat will not retard the setting of solder which it has delivered to any element. As each of said elements comes to a position over the pot the lateral progress of the filament and succession of elements is stopped while the following operations occur: the pot rises to the position of Fig. 3, and then the element coinciding therewith is depressed to the extent already indicated, leaving the fila-

ment supported by the other elements, and finally the said element is raised to the same elevation as its predecessors, whereby the filament becomes imbedded in the solder-blobs which are carried up by the hooks of said element; the solder pot then resumes its normal position. Thereupon the lateral progress of the succession of elements is renewed and continued until the next succeeding element is over the pot. In this example the medium which directly acts to draw the filament laterally is afforded by those elements to which the filament has become soldered.

Finally, with respect to each element the filament is cut away outward of its two conductors so as to leave only a filament portion 13 (Fig. 8) connecting said conductors, and these are slightly bent toward each other so that said portion stands bent somewhat, without which distortion of the conductors by temperature or otherwise in a way to strain said portion might result in disrupting it or tearing it from one conductor.

By providing the terminals of the conductors 5 with hooks the latter serve advantageously thus: To support the filament in the travel of the elements 4—5 successively to position over the solder-pot; and to sustain by each an ample quantity of solder, in quite isolated state with respect to the solder-blob in the other hook, for effecting a good electrical connection of the filament 30 with such hook.

Having thus fully described my invention, what I claim is:

1. The method of connecting the conductor terminals of an element comprising a body and such terminals projecting therefrom in substantially the same direction and insulated from each other and each having a seat facing said body which consists in immersing said element, with the seats of the terminals facing upwardly, in a fused metal mass and to a depth at which at least the seats stand immersed, separating said element and mass until the seats stand un-immersed, and, while the portion of the metal mass remaining on each seat continues in fused state, bringing such portion existing on each seat and a resistance conductor into contact with each other.

2. The method of connecting the conductor terminals of an element comprising a body and such terminals projecting therefrom in substantially the same direction and insulated from each other and each having a seat facing said body which consists in moving said element, with the seats of said terminals facing upwardly, into a fused metal mass and to a depth at which at least the seats stand immersed, separating said element and mass until the seats stand un-immersed, and, while the portion of the metal mass remaining on each seat continues in fused state, bringing such portion existing on each seat and

a resistance conductor into contact with each other.

3. The method of connecting the conductor terminals of an element comprising a body and such terminals projecting therefrom in substantially the same direction and insulated from each other and each having a seat facing said body which consists in moving said element, with the seats of said terminals facing upwardly, into a fused metal mass and to a depth at which at least the seats stand immersed, retracting said element from said mass until the seats stand un-immersed, and, while the portion of the metal mass remaining on each seat continues in fused state, bringing such portion existing on each seat and a resistance conductor into contact with each other.

4. The method of connecting the conductor terminals of an element comprising a body and such terminals projecting therefrom in substantially the same direction and insulated from each other and each having a seat facing said body which consists in moving said element, with the seats of said terminals facing upwardly, into a fused metal mass and to a depth at which at least the seats stand immersed, retracting said element from said mass until the seats stand un-immersed, and, during such retraction and while the portion of the metal mass remaining on each seat continues in fused state, maintaining a resistance conductor in the path of such portion existing on each seat.

5. The hereindescribed method which consists in advancing approximately horizontally a succession of elements each having a pair of depending conductor-portions providing upwardly facing seats, supporting on said seats of the several elements a resistance-conductor and advancing the latter in the direction of advance of said element, successively depressing said elements and while each is depressed applying fused solder-blobs to said seats, and then elevating the element so depressed to bring its said blobs into contact with said resistance-conductor.

6. The hereindescribed method which consists in advancing approximately horizontally a succession of elements each having a pair of depending hook-shaped conductor-portions insulated from each other, supporting in the said portions of the several elements a resistance-conductor and advancing the latter in the direction of advance of said elements, successively depressing said elements and while each is depressed applying fused solder-blobs in the bights of its said portions, and then elevating the element so depressed into position to receive in its said portions said resistance-conductor and bring said blobs into contact with the latter while the blobs remain fused.

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