

Feb. 18, 1969

H. STADLER ET AL

3,427,972

ELECTRICALLY IGNITED PRIMER ELEMENT

Filed June 6, 1966

FIG 1

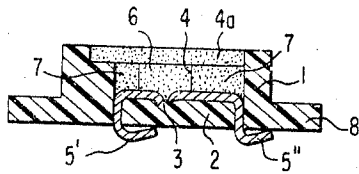


FIG 2

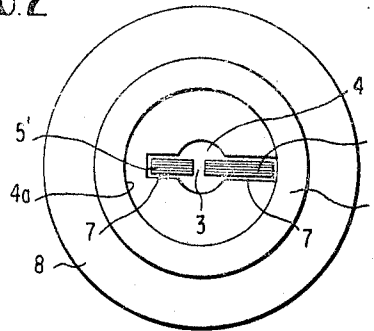


FIG 3

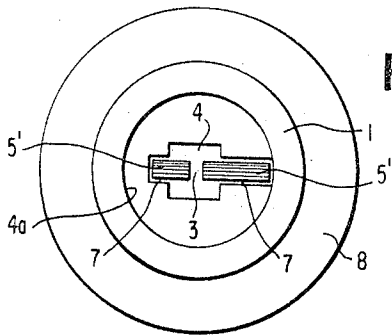


FIG 4

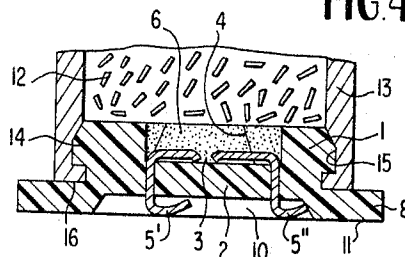


FIG 5

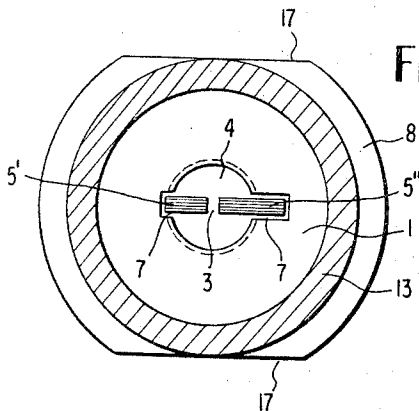


FIG 6

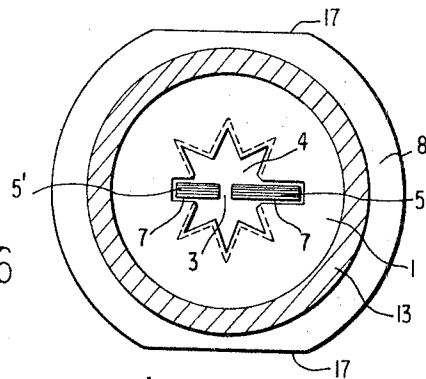


FIG 7

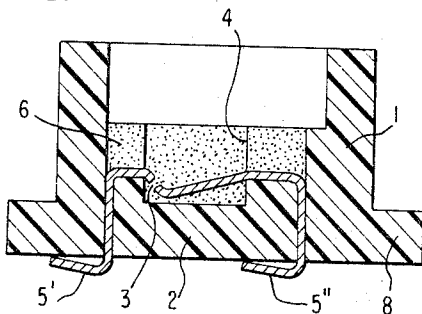
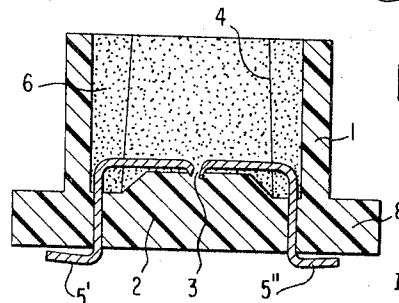


FIG 8



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3,427,972

ELECTRICALLY IGNITED PRIMER ELEMENT
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Filed June 6, 1966, Ser. No. 583,153

Claims priority, application Germany, June 4, 1965,
D 47,434

U.S. Cl. 102—46
Int. Cl. F42b 9/08

15 Claims

ABSTRACT OF THE DISCLOSURE

A gap-type electrically ignited primer element having two L-shaped conductors secured within a cup-shaped carrier or bottom piece to present a gap between them, which is filled and bridged by an electrically conductive primer composition accommodated within the cup-shaped carrier; the parallel legs of the conductors may be driven through the cup-shaped carrier and the aligned legs of the conductors may originally form a single bridging portion severed to form the gap.

Background of the invention

In the prior art primers of this type, the insulation of the metallic conductors and their attachment within the usually metallic carrier for the primer composition involve considerable difficulties.

Summary of the invention

It is an object of the present invention to eliminate these difficulties.

The present invention proposes to make the primer composition carrier from the thermoplastic material, for example, polyethylene, polycarbonate, polyamide, or polystyrene. Also, the conductors of the present invention are formed from a U-shaped staple-like member having leg portions driven from the inside outwardly through the bottom of the primer composition cup-shaped carrier and bent to the same or opposite side. Thereafter, the bridging portion of the U-shaped member is severed to form two L-shaped members having aligned legs forming a gap and encased in the primer composition.

The use of a thermoplastic or other insulating primer composition carrier eliminates the usual insulation problems and allows the simple inexpensive attachment of the conductors in a manner analogous to the impact driving of a staple by a gun or other machine. As in conventional stapling, the leg portions emerging from the bottom of the cup-shaped carrier are bent to one side by appropriately shaped recesses in an anvil type back-up plate supporting the bottom of the cup-shaped carrier.

The separation of the bridging portion may be accomplished by a mill or other appropriate cutting tool, or a knife-like element, which may, press the separated ends into the bottom of the cup-shaped primer composition carrier to firmly anchor the conductors. It is contemplated that the gap may be in the center or outside area of the cup-shaped carrier; however, the gap must be arranged so that the igniting current will flow through the electrically conductive primer composition, which is forced into the gap after the separation, from one conductor to the other. It is contemplated that only the gap or gap area may be filled with electrically conducted primer compositions so that the majority of the primer composition may be non-conductive. To seal the primer element, the primer composition may be coated with a lacquer or other similar material. The interior of the cup-shaped member may be formed with a downwardly and outwardly extending wall portion to securely hold the primer composition within

the cup-shaped member. To more securely hold the primer composition, the interior of the cup-shaped carrier may be formed with a quadrangular, star-shaped, or other non-circular primer composition containing recess.

Other features, advantages and objects of the present invention will become apparent from the illustrative description of the accompanying drawing, wherein:

FIGURE 1 is an axial cross-sectional view through a primer element according to the present invention, wherein the outside ends of the conductors are bent toward one side and there is a centrally arranged gap between the conductors;

FIGURE 2 is a top plan view of the primer element according to FIGURE 1, with the primer composition removed for purposes of illustration to show the circular shape of the primer composition recess;

FIGURE 3 is a top plan view similar to FIGURE 2, of another embodiment of the present invention having a quadrangular primer composition recess;

FIGURE 4 is an axial cross-sectional view through another embodiment of the present invention secured in the lower portion of a cartridge case, with portions of the cartridge case omitted for purposes of illustration;

FIGURE 5 is a top plan view of the primer element according to FIGURE 4, showing the circular primer composition recess;

FIGURE 6 is a top plan view similar to FIGURE 5, of another embodiment of the present invention having a star-shaped primer composition recess;

FIGURE 7 is an axial cross-sectional view of an additional embodiment of the present invention; and

FIGURE 8 is an axial cross-sectional view of a further embodiment of the primer element according to the present invention.

In the embodiment according to FIGURE 1, the cup-shaped primer composition carrier or bottom piece 1 has a bottom portion 2 receiving the legs 5' and 5'' of the U-shaped staple-like member, which has been severed at its bridging portion to form a gap 3 between the two conductors or leg portions 5' and 5''. The end portions of the thus formed aligned legs of the L-shaped members adjacent the gap 3 are bent over into the bottom 2 of the cup-shaped carrier 1. The gap 3 is centrally located within the primer composition recess 4, which communicates with radially extending oppositely disposed slots 7 and a widened upper portion 4a; the gap 3, recess 4, slots 7, and widened upper portion 4a are filled with the electrically conductive primer composition 6. Alternatively, it is contemplated that the widened upper portion 4a may be filled with a non-conductive primer composition. The cup-shaped carrier 1 is formed with an annular flange 8, which will abut with the rear end of the cartridge case or, additionally, the cartridge chamber wall. As shown in FIGURE 2, the primer composition recess 4 is substantially cylindrical.

The embodiment of the present invention according to FIGURE 3 is identical to the embodiment of FIGURE 1, except that the recess 4 is quadrangular to increase the adherence between the primer composition and the cup-shaped member 1. Also, it is contemplated that the widened upper portion 4a in either FIGURE 1 or FIGURE 3 may have a non-circular shape.

In FIGURE 4, the cup-shaped carrier has an outer recessed area 10 for receiving the bent over ends of the conductors 5' and 5'', which have been inserted in the same manner as FIGURE 1; the outer end of the conductors are flush with the rear end face 11 of the cup-shaped carrier 1. As shown in FIGURES 4 and 5, the primer composition recess 4 is frusto-conical in shape to securely hold the primer composition 6 within the cup-shaped carrier 1. The forward end of the cup-shaped member 1 has an annular reinforcement 14 for snap-

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engagement with a correspondingly shaped annular groove 15 within a cartridge case 13, which is filled with a propellant charge 12 to form a propellant cartridge for use in a bolt-setting device, for example. Also, the cup-shaped carrier 1 is provided with a flange 8 to support the cup-shaped carrier 1 against the rear end face 16 of the cartridge case 13 and to support the cartridge within a cartridge chamber. It is contemplated that the flange could be formed on the outer end portion of the cartridge case 13. The cup-shaped member 1 is provided with a bottom portion 2 and slots 7, similar to the correspondingly numbered parts in FIGURE 1. For purposes of alignment, particularly when the outermost conductor 5" is used as the ground-conductor and the innermost conductor 5' is used as the electrode contacting conductor, the flange 8 may be flattened at 17 to provide locating surfaces for aligning the conductors in a cartridge chamber.

The embodiment of FIGURE 6 is identical to the embodiment of FIGURES 4 and 5, except that the recess 4 is star-shaped. As shown by the dotted lines, the recess 4 is tapered toward the forward end, in a manner similar to the recess 4 of FIGURE 4.

The primer element of FIGURE 7 is constructed similar to the primer element of FIGURE 1, with correspondingly numbered elements. The recess 4 is constructed eccentrically with respect to the cup-shaped carrier 1 and the gap 3 formed by the conductors 5' and 5" is eccentrically located within the recess 4. The innermost ends of the conductors 5' and 5" are bent toward bottom portion 2 to form a secure attachment, but do not engage the bottom portion 2.

The embodiment of FIGURE 8 is similar to the preceding embodiments with correspondingly numbered elements. The conductors 5' and 5" are forced into the bottom portion 2, as in the previously described embodiment of FIGURE 1. However, the transition portions between the bridging portion and the leg portions freely project into the primer composition 6. The outermost ends of the conductors 5' and 5" are bent over to project radially outwardly toward opposite sides; with this construction it may not be necessary to have a specific orientation within the cartridge chamber. In this embodiment, the recess 4 is forwardly tapered and extends to the forwardmost portion of the cup-shaped carrier 1.

It will be understood that the foregoing embodiments shown and described must be considered as examples only, and that further modifications, variations, and embodiments are intended to be covered within the spirit and scope of the invention as defined by the following claims.

We claim:

1. A gap-type electrically ignited primer element, comprising: a bottom piece constructed of an insulating material, two electrically conductive substantially L-shaped members with two legs; each of said members having one leg substantially aligned with and the other leg substantially parallel with corresponding legs of the other member; said aligned legs having inner free ends displaced transversely from alignment with respect to each other forming a gap adjacent to the inner portion of said bottom piece; said one leg having a total length substantially equal to the spacing between said other legs at their ends adjacent said one leg.

2. The device of claim 1, wherein the inner free ends of said members that form the gap are bent toward and embedded in said bottom piece.

3. The device of claim 2, wherein said bottom piece has opposed substantially radially extending slots communicating with said recess and containing the radially outer portions of said aligned legs, said slots are eccentric with respect to the axis of said bottom piece, and said recess is substantially cylindrical and centrally located with respect to said axis.

4. The device of claim 3, wherein said recess includes a

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rearward gap-containing portion, a widened forward portion, and a shoulder portion connecting said rearward and forward portions; and said bottom portion having an outwardly radially extending flange at its rearward end; said parallel legs having free outer ends bent back toward said bottom piece and said free outer ends being bent in the same direction.

5. The device of claim 1, wherein said bottom piece is a synthetic plastic substantially cup-shaped member having a primer composition recess, and the gap is located within said recess.

6. The device of claim 5, including an electrically conductive primer composition within said recess and filling said gap.

7. The device of claim 5 wherein said recess is formed by forwardly tapered walls to securely hold the primer composition within said recess.

8. The device of claim 5, wherein said recess is quadrangularly shaped in the plan view.

9. The device of claim 5 wherein said recess is substantially star-shaped in the plan view.

10. The device of claim 5, wherein said bottom piece has a centrally located projection forwardly extending into said recess; the inner free ends of said members that formed the gap being bent toward and embedded in said projection; the parallel legs of said members being radially spaced a substantial distance from said projection to form a substantial space between the bottom piece and the junction of the legs for each member.

11. The device of claim 5, wherein said bottom piece has opposed substantially radially extending slots communicating with said recess and containing the radially outer portions of said aligned legs.

12. The device of claim 11, wherein said slots, said gap, and said recess are eccentrically located with respect to the axis of said bottom piece.

13. The device of claim 11, wherein said recess extends rearwardly to a greater extent than said slot; the radially outer portions of said aligned legs firmly engaging the bottoms of said slots; and the inner free ends of said members that form the gap being bent rearwardly into said recess.

14. The device of claim 1, wherein said parallel legs have free outer ends bent back toward said bottom piece said bottom piece is formed with an outer recess containing the bent outer free ends of said parallel legs; and said outer ends are flush with the outer surfaces of said bottom piece.

15. The device of claim 14, wherein said bottom piece has an annular reinforcing rib portion at its forward end, and including a substantially tubular cartridge case having a correspondingly shaped inner annular groove forming a snap connection with said reinforcing rib portion, and said bottom portion having an outwardly radially extending flange at its rearward end.

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U.S. Cl. X.R.