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HERMETICALLY SEALED DETONATOR

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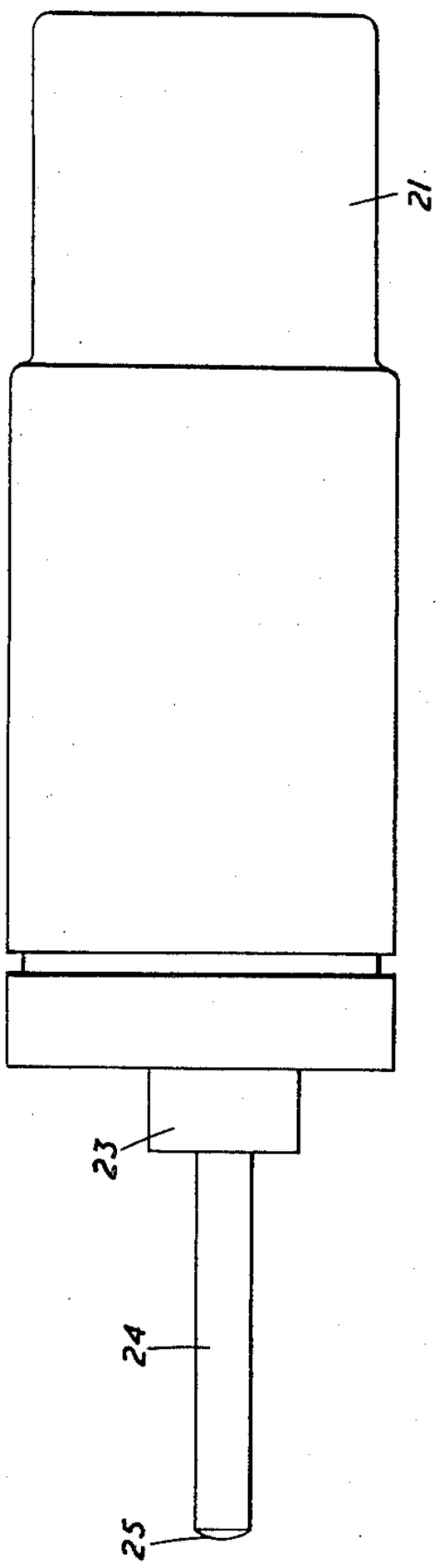

FIG. 1.

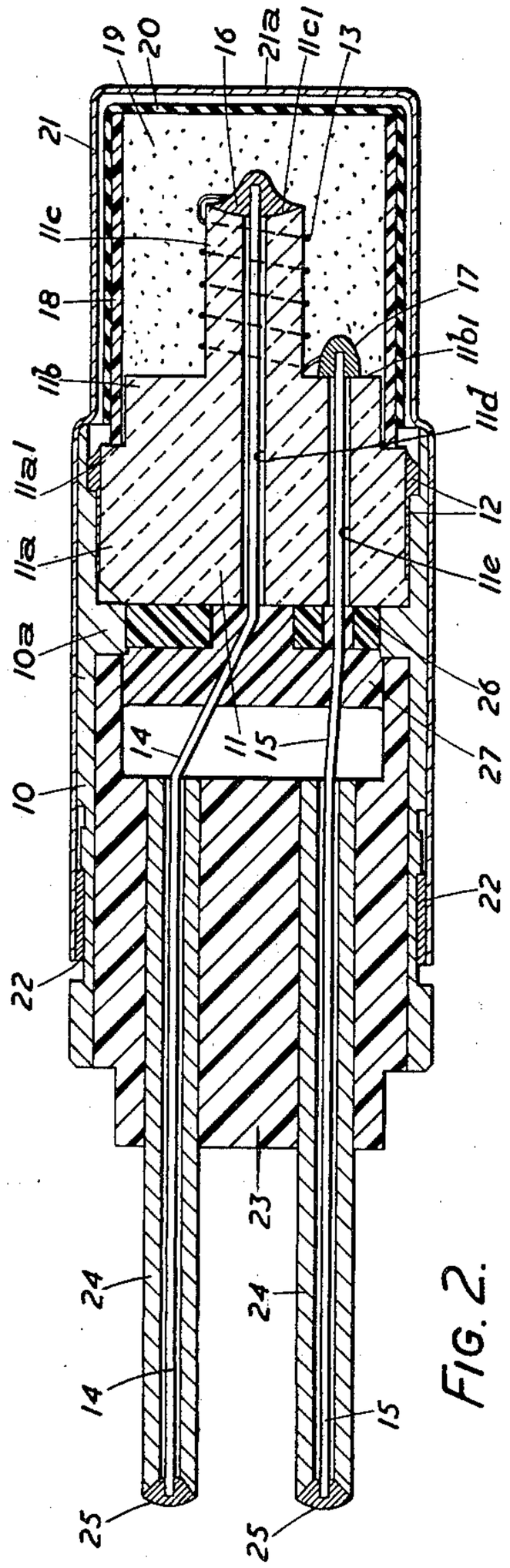

FIG. 2.

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HERMETICALLY SEALED DETONATOR

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This invention relates to electrically ignitable explosive charges or cartridges.

According to the present invention there is provided an electrically ignitable explosive cartridge comprising a hollow metal body closed at one end, a ceramic insulator mounted in said body and having its outer periphery hermetically sealed to the inner wall of said body, said insulator having a portion of reduced size located adjacent the closed end of the metal body, an igniting winding, wound on said portion of reduced size, the ends of said igniting winding being secured by solder to respective metallized portions of said insulator, and explosive powder in the space between said reduced portion and the closed end of said metal body.

One construction of electrically ignitable explosive cartridge in accordance with the invention will now be described, by way of example only, with reference to the accompanying drawing in which:

FIGURE 1 is a side elevation of the cartridge; and

FIGURE 2 is a sectional plan view.

In this construction, the cartridge comprises a metal plug body 10 of open-ended tubular form. An annular internal flange 10*a* is located approximately one-third of the distance from one end of the plug body 10 and located against this flange 10*a* and projecting from the latter end is a ceramic insulator 11. This insulator 11 has a first portion 11*a* which fits in the plug body 10 and the periphery of this portion is metallized so that the ceramic insulator 11 can be secured to the plug body 10 by solder 12 applied between the periphery of the insulator 11 and the inner periphery of the plug body 10. The insulator 11 has a further relatively short portion 11*b* of somewhat smaller diameter than the first portion 11*a* and a third portion 111. The third portion 11*c* is coaxial with the two portions 11*a*, 11*b* and its diameter is approximately one-third of that of the portion 11*a* of the insulator 11. Both the end surface 11*c*1 of the smallest diameter portion 11*c* and the annular surface 11*b*1 formed by the step between the portions 11*b* and 11*c* are metallized. A hole 11*d* is provided centrally through the insulator 11 and a second hole 11*e* is provided which extends through the two larger diameter portions 11*a*, 11*b* of the insulator 11 and has one end terminating in the metallized annular surface 11*b*1.

An electrical igniting winding 13 is wound on the narrowest diameter portion 11*c* of the insulator 11 and one end of this winding is connected to a lead wire 14 which extends through the central hole 11*d* in the insulator 11, the lead wire 14 and the end of the winding 13 being electrically connected by solder 16 which is applied to the metallizing on the end surface 11*c*1. The solder 16 serves also to form a hermetic seal across the end of the central hole 11*d*. The other end of the winding 13 is similarly connected by solder 17 to a second lead wire 15 which extends through the hole 11*e* in the insulator 11.

A tube 18 of insulating material rests on the step 11*a*1 betwen the larger diameter portion 11*a* of the insulator and the adjacent smaller diameter portion 11*b* of the insulator 11 and provides a space around and beyond the end of the igniting winding 13, in which space the explosive powder 19 is packed. A rubber sleeve 20 fits

over the tube 18 and closes the open end to complete an insulating enclosure around the powder. A metal outer sleeve 21 fits over this end of the cartridge, the outer sleeve having an integral end cap 21*a*, and extending rearwardly over the plug body 10 close to the far end thereof. The outer sleeve 21 is sealed to the outer surface of the plug body by solder 22.

An insulating moulding 23 fits in the rear portion of the plug body 10 and carries two rearwardly projecting contact pins 24 by which external electrical connection is made to the igniting winding 13. The contact pins 24 are hollow and each receives one of the lead wires 14, 15, the end of each lead wire 14, 15 being eelctrically connected by solder 25 to the projecting end of the respective contact pins 24. The solder 25 also forms a hermetic seal across the end of each contact pin 14, 15. A washer 26 of insulating material seats within the internal flange 10*a* in the plug body 10 and is provided with holes therein through which the lead wires 14, 15 pass; the holes and the adjacent space within the end of moulding 23 may be filled with hardenable synthetic-plastic insulating material 27.

It will be appreciated that the construction described provides a cartridge in which the explosive powder is completely hermetically sealed.

We claim:

1. An electrically ignitable explosive cartridge comprising a hollow metal body, said body having one end closed, a ceramic insulator mounted within said body, said insulator having an outer peripheral surface which is metallized, said metallized surface being united by solder to said body, said insulator having a portion of reduced cross-sectional area terminating in a metallized end surface which faces said body, said insulator also having a metallized annular surface at the step where the portion of reduced cross-sectional area abuts the remainder of the insulator, an electrical igniting winding, said winding being wound on said portion of reduced cross-sectional area, explosive powder, said powder surrounding said igniting winding, said insulator having first and second holes extending through said insulator, said first hole terminating at said metallized annular surface and said second hole terminating at said metallized end surface, first and second lead wires extending through said first and second holes respectively, said winding having two ends, solder adhering to said metallized annular surface and electrically connecting one winding end to said first lead wire, said solder extending across the first hole to form a seal, and further solder adhering to said metallized end surface and electrically connecting the other end of the winding to said second lead wire, said further solder extending across the second hole to form a seal.

2. An electrically ignitable explosive cartridge comprising a cylindrical metal body, a metal sleeve, said sleeve extending partly over said body, said sleeve having an integral end cap, a ceramic insulator, said ceramic insulator having a first cylindrical portion, said first cylindrical portion having a metallized periphery which is united by solder to said metal body, said ceramic insulator having a second cylindrical portion of smaller diameter than said first cylindrical portion, said insulator having a metallized annular surface at the step from the first cylindrical portion to the second cylindrical portion and the second cylindrical portion having a metallized end surface remote from said annular surface, an electrical igniting winding, said winding having two ends and being wound on said second cylindrical portion with one winding end adjacent said metallized annular surface and the other winding end adjacent said metallized end surface, explosive powder, said explosive powder lying within the interior of said metal sleeve and around said igniting winding, said insulator having first and second holes ex-

tending through said insulator, said first hole terminating at said metallized annular surface and said second hole terminating at said metallized end surface, first and second lead wires extending through said first and second holes respectively, solder adhering to said metallized annular surface and electrically connecting said one winding end to said first lead wire, further solder adhering to the said metallized end surface and electrically connecting said other winding end to said second lead wire, a further insulating member, said further insulating member being mounted in said metal body remote from the closed end of said sleeve, two tubular contact pins, said contact pins being mounted in said further insulating member, each of said lead wires passing through the interior of one of said contact pins, and solder sealing across the interior of each of said contact pins and electrically connecting the contact pins to the respective lead wires.

3. An electrically ignitable explosive cartridge comprising a cylindrical metal body, a metal sleeve, said sleeve extending partly over said body, said sleeve having an integral end cap, a ceramic insulator, said ceramic insulator having a first cylindrical portion, said first cylindrical portion having a metallized periphery which is united by solder to said metal body, said ceramic insulator having a second cylindrical portion of smaller diameter than said first cylindrical portion, said insulator having a metallized annular surface at the step from the first cylindrical

portion to the second cylindrical portion and the second cylindrical portion having a metallized end surface remote from said annular surface, an electrical igniting winding, said winding having two ends and being wound on said second cylindrical portion with one winding end adjacent said metallized annular surface and the other winding end adjacent said metallized end surface, explosive powder, said explosive powder lying within the interior of said metal sleeve and around said igniting winding, said insulator having first and second holes extending through said insulator, said first hole terminating at said metallized annular surface and said second hole terminating at said metallized end surface, first and second lead wires extending through said first and second holes respectively, solder adhering to said metallized annular surface and electrically connecting said one winding end to said first lead wire, and further solder adhering to the said metallized end surface and electrically connecting said other winding end to said second lead wire.

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