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GUN PERFORATOR

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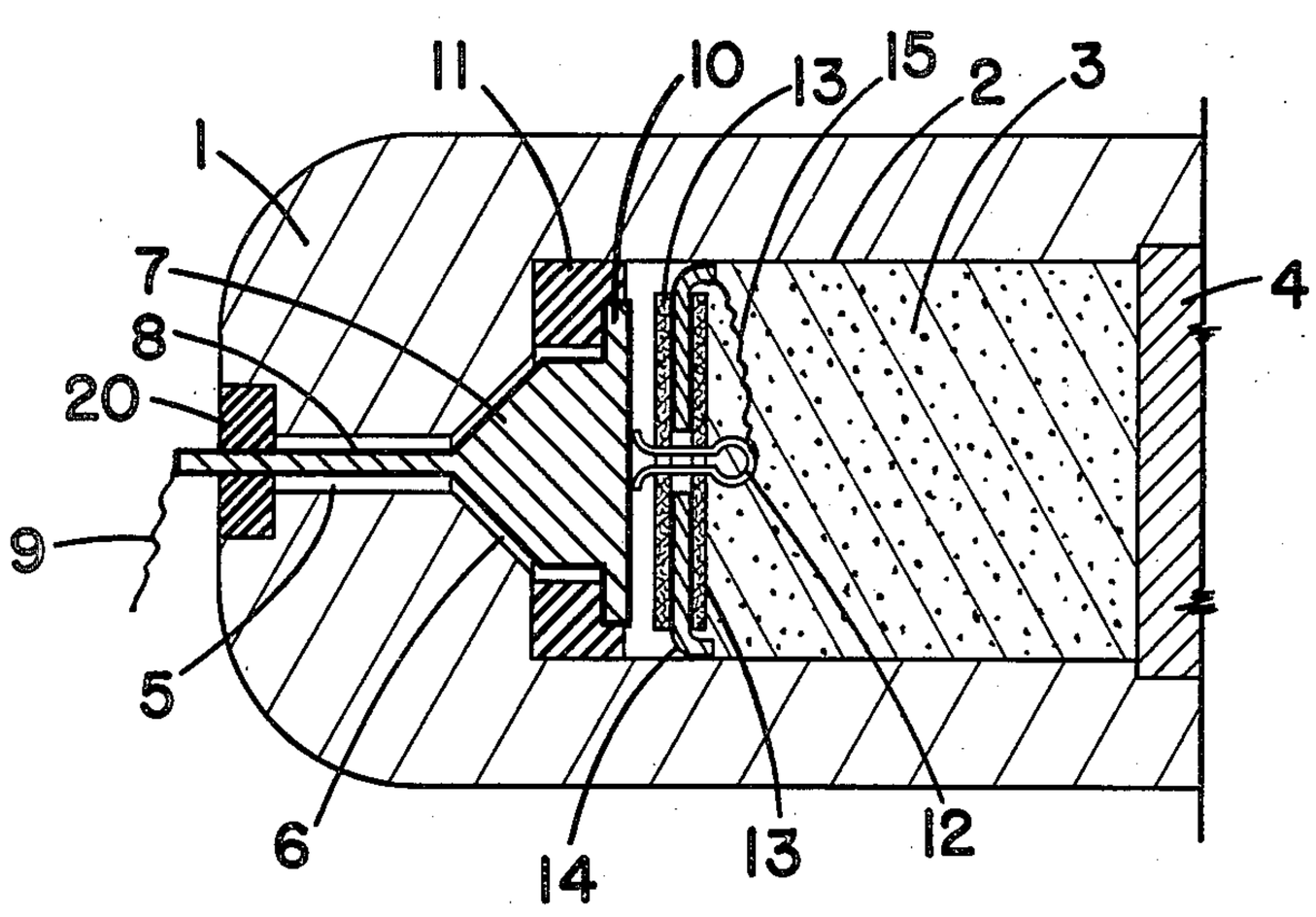

FIG. 1.

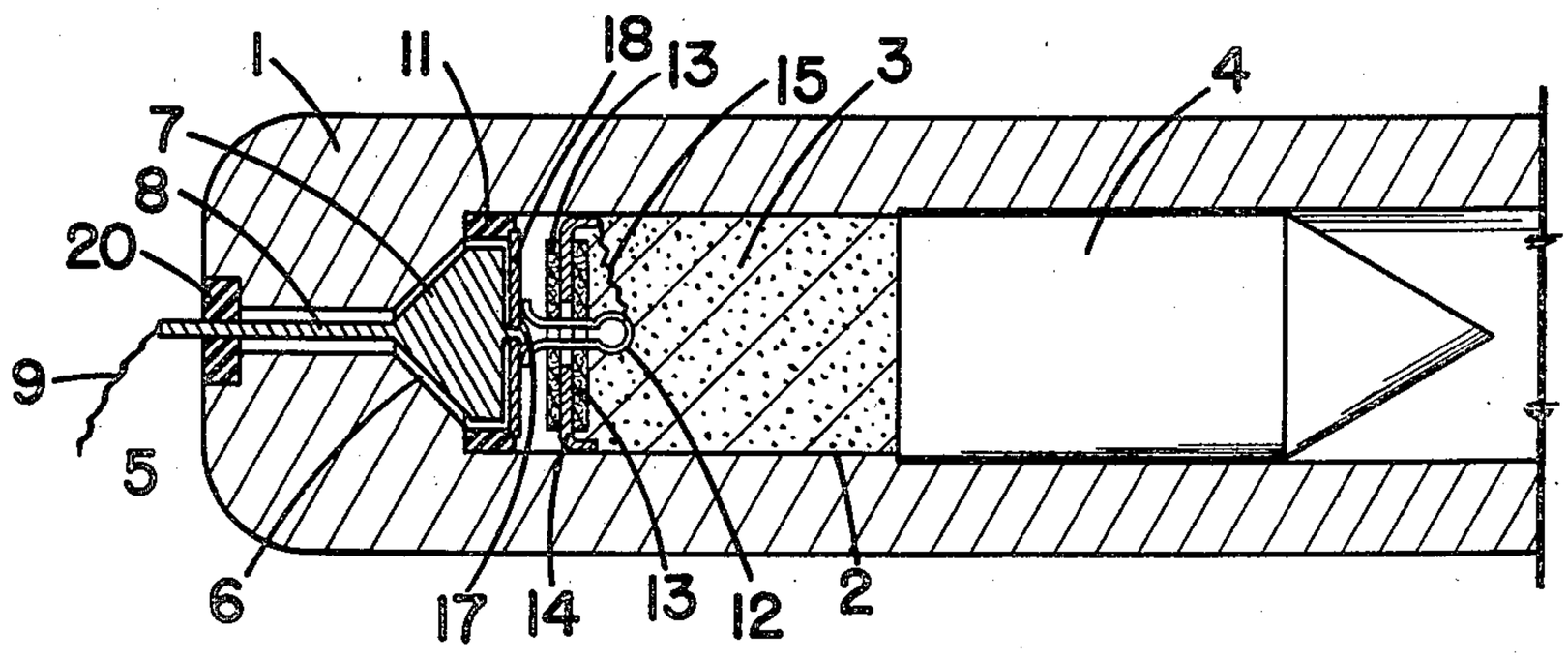

FIG. 2.

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GUN PERFORATOR

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4 Claims. (Cl. 164—0.5)

The present invention is directed to a gun perforator for use in bore holes and has particular reference to a firing chamber therefor.

As is known, the guns which are used for perforating casing in bore holes comprise an elongated gun body having spaced wells to accommodate firing chambers, these chambers being removable metal cylinders having a central passage to receive a bullet and a charge of powder, and having means embedded in the charge of powder for firing it. The firing circuit is ordinarily connected to the firing filament through the rear end of the firing chamber and this necessitates some sort of a conductor arranged in a passage connecting the rear end of the firing chamber to the exterior of the metal body. When the charge explodes, the pressure exerted must be supported by the rear end of the firing chamber, and this leads to considerable difficulties in the matter of insulation. As will be apparent, the conductor for the firing current must be insulated from the metal body in which it is arranged and this insulating material is usually destroyed by the explosion.

The principal object of the present invention is the provision of a firing chamber for a gun perforator so constructed that, up until the time the charge of powder is fired, the conductor carried in the firing current is insulated from the metal body containing the firing chamber but, upon the explosion, is brought into metal-to-metal contact with said metal body, thereby forming an effective pressure resistant seal against the pressure of the explosion. This permits the use of insulation for long periods of time and constitutes a considerable saving in the operation of the gun.

Further objects and advantages of the present invention will appear from the accompanying drawing in which:

Fig. 1 is a vertical section through a firing chamber constituting one embodiment of the present invention; and

Fig. 2 is a similar view of another embodiment of the present invention.

Referring to Fig. 1 in detail, numeral 1 designates a cylindrical metal insert adapted to be arranged in a well in a gun body and having a central cavity 2 for accommodating a powder charge 3 and a bullet 4. The inner end of the cavity 2 is connected to the exterior of body 1 by a passage 5, between which and the cavity proper is a conical portion 6 forming a seat for a conical valve 7 carrying a stem 8 extending through the passage 5 to the exterior of the body 1 where it is connected to a conductor 9. The valve 7 has at its inner end a flange 10 resting on an insulating ring 11 which is made of any suitable insulating material, such as Bakelite or other plastic.

It has been found that such insulating materials have sufficient resiliency to be compressed by the force of the explosion and to return to their normal shape after the explosion.

The insulated ring 11 is made of sufficient thickness to hold the conical valve 7 spaced from its seat 6, while the stem 8 is of such diameter as to be spaced from the wall of passage 5. The stem is held in spaced relation to the wall of passage 5 by suitable packing 20 which also serves to hold out drilling fluid.

Removably arranged in the recess 2 is a firing element comprising a cotter pin 12 having its prongs adapted to rest upon the top of the valve 7 and carrying three disks. The two outer disks 13 are made of insulating material, while the middle disk 14 is made of metal, has its center cut away so as not to contact the cotter pin, and has its outer edges upturned so as to press resiliently against the wall of the cavity 2. The outer edge of disk 14 is preferably serrated or notched so as to form spring fingers on its outer edge. The firing filament 15 is connected to the loop of the cotter pin and to the disk 14.

The parts are shown in Fig. 1 in the position they assume before the charge of powder is exploded. When the charge explodes the pressure exerted on the valve 7 compresses the insulating ring 11 and sets the valve on its seat 6 forming a metal-to-metal seal. When the pressure is released by projection of a bullet, the ring 11 expands to its normal shape and raises valve 7 off its seat.

The embodiment shown in Fig. 2 differs from that shown in Fig. 1 in that compression of the insulating material is not relied upon. In this figure parts corresponding to those shown in Fig. 1 bear the same numerals. Instead of valve 7 carrying a flange 10, the valve is connected by a rivet or pin 17 to a thin steel disk 18 which acts as a diaphragm and which rests on the insulating ring 11. In this case, when the charge explodes the diaphragm 18 yields sufficiently to permit the valve 7 to seat.

It will be apparent that the above described embodiments are not intended to define the scope of the present invention, but only to illustrate the nature thereof. Other modifications will occur to those skilled in the art without departing from the basic principle of the present invention,

which is the provision of a conducting element for leading current into the firing chamber which is normally held in spaced relation to the walls of the firing chamber and, therefore, insulated therefrom by a yieldable member which, upon the occurrence of an explosion, will permit the conductor to form a metal-to-metal seal with the wall of the firing chamber.

The nature and objects of the present invention having been thus described and illustrated, what is claimed as new and useful and is desired to be secured by Letters Patent is:

1. A gun barrel for a bore hole gun comprising a metal body having an elongated recess adapted to receive a powder charge, a firing filament and a projectile and a smaller passage connecting to the inner end of said recess adapted to carry a conductor, a conductive metal element extending through said passage in spaced relation thereto and adapted to seat on the inner end of said passage in metal-to-metal contact therewith, and yieldable means associated with said element and adapted normally to hold it off its seat, to yield under explosion pressure to permit the seating of said element and to force said element off its seat after the explosion pressure subsides.

2. A gun barrel for a bore hole gun comprising a metal body having an elongated recess adapted to receive a powder charge, a firing filament and a projectile and a smaller passage connecting to the inner end of said recess adapted to carry a conductor, a metal stem physically independent of said firing filament extending through said passage in spaced relation to the wall thereof, an enlarged head on the inner end of said stem adapted to seat on the inner end of said passage in metal-to-metal contact therewith, means connecting the outer end of said stem to a source of power, and yieldable means adapted normally to hold said head off its seat and in electrical contact with said firing filament.

3. A device according to claim 2 in which the yieldable means is resilient insulating material arranged behind said head to hold it off its seat.

4. A device according to claim 2 in which the yieldable means is a resilient disk supported in the recess on insulating material and physically connected on one side to the enlarged head and electrically connected on the other side to the firing filament.

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