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PRIMER HOLDER FOR IGNITABLE FIXTURE

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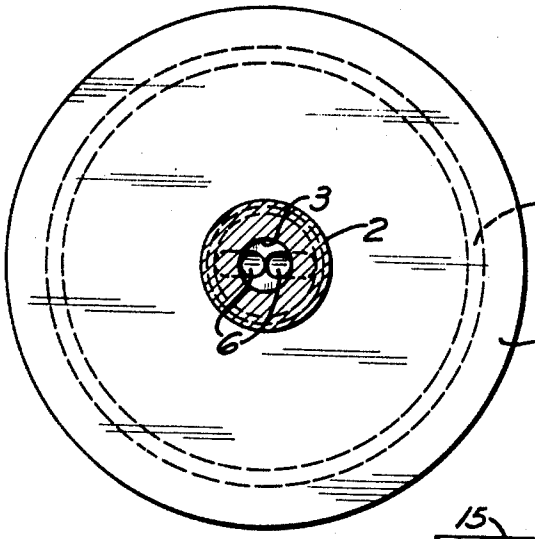


Fig. 1

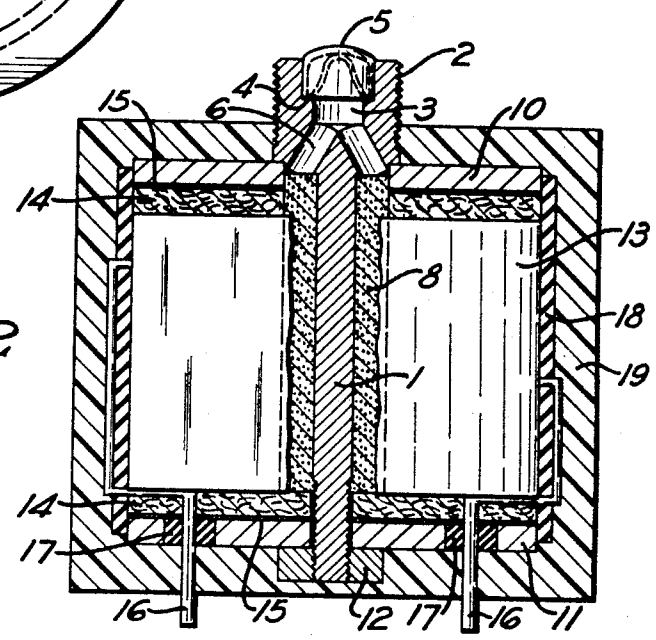


Fig. 2

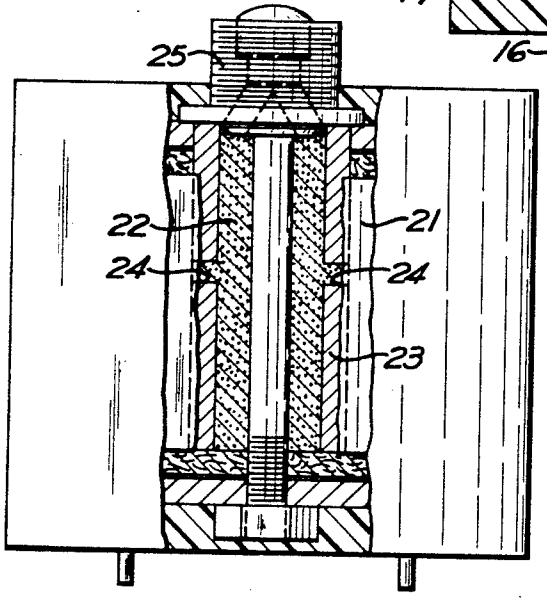


Fig. 3

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# PRIMER HOLDER FOR IGNITABLE FIXTURE

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## ABSTRACT OF THE DISCLOSURE

A mandrel has a head provided with a central socket for receiving a primer. The body of the mandrel is surrounded by a tubular fuse, and the fuse is surrounded by the fixture that is to be ignited. The fixture is clamped between end plates, through which the mandrel extends.

It is among the objects of this invention to provide a device in which a fixture that is to be ignited is mounted on a central mandrel, and in which a predetermined lapse of time takes place between the moment that a primer carried by the mandrel is fired and the moment that the fixture is ignited as a result of that firing.

In accordance with this invention, a mandrel rod has an enlarged head at one end that is provided in its outer end with a central socket adapted to receive a primer. Surrounding the rod is a tubular fuse that extends from the head to a point short of the opposite end of the rod. The head is provided with a plurality of passages extending from its socket toward the inner end of the head to place the socket in communication with the adjacent end of the fuse. An annular end plate encircles the fuse ends of the passages and is held by the head against movement outwardly over it. Surrounding the fuse at the inner side of this end plate is an ignitable fixture. A second end plate is provided with a central hole through which the opposite end of the rod projects, and means are attached to the projecting end of the rod for pressing the second plate toward the fixture.

The invention is illustrated in the accompanying drawings, in which:

FIG. 1 is a plan view with the mandrel head shown in section;

FIG. 2 is a central vertical section through the device; and

FIG. 3 is a side view, partly in section, of a modification.

Referring to FIGS. 1 and 2 of the drawings, a mandrel has a body in the form of a rod **1**, and a head **2** joined to the upper end of the rod. The two parts of the mandrel preferably are integral with each other. The upper or outer end portion of the head is provided with a central socket **3** in which there is an annular shoulder **4**. A primer **5** is pressed into the socket into engagement with the shoulder. The head **2** may be threaded so that it can be screwed into a firing mechanism (not shown). Extending from the bottom of the socket down to the bottom of the head beside the upper end of the rod are two or more passages **6**. Two passages will usually be sufficient and they will diverge downwardly from the bottom of the socket.

Mounted on the mandrel rod is a tubular fuse **8**. The fuse may be moulded, for example, from powdered silicon, copper oxide and lead oxide. The rate at which the fuse will burn can be controlled by the relative percentages of the above materials used in the fuse. The fuse can be made in one piece or from several shorter sections placed end to end.

Encircling the upper end of the fuse is a metal end plate **10**, the central opening of which is somewhat smaller than the head of the mandrel so that the plate cannot move outwardly over the head. A similar end plate **11**, but having a smaller central opening, is mounted on the lower end of the mandrel projecting from the fuse. A nut **12** screwed on the end of the mandrel holds this end plate in place.



Between the two end plates there is a fixture that surrounds and engages the fuse. This fixture may be anything that it is desired to ignite by the fuse. For example, the fixture may be a thermal battery **13** that includes, as is well known, a series of vertically spaced heat discs or pellets, all of which have to be ignited before the battery will start to produce electric current. The ends of the battery are formed from asbestos pads **14** and thin mica discs **15** engaging the end plates. The nut on the lower end of the mandrel clamps together all of the elements that surround the mandrel. Electric leads **16** connected with the battery extend through insulating plugs **17** in the lower end plate to conduct current away from the battery. The battery is enclosed in an insulating shell **18** and the entire assembly can be enclosed in a plastic case **19** that can be moulded around it.

When the primer is fired, the blast passing through passages **6** will ignite the upper end of the tubular fuse **8**, which will burn downwardly through the battery. The battery will not start to operate until the fuse has burned down far enough to ignite the lowest heat pellet in the battery. The lapse of time between firing of the primer and the production of electric current will depend upon the time required for the necessary length of fuse to burn. A desired time delay thus can be obtained.

In the modification shown in FIG. 3, the fixture **21** that is to be ignited is a device that will start to act the moment the burning fuse **22** reaches it. Therefore, in order to obtain a delay, the fixture must be shielded from the fuse until the desired length of fuse has burned. This can be accomplished by inserting an insulating tubular shield **23** between the fuse and the fixture. If it is desired that the fuse burn throughout its length before igniting the fixture, the shield should be solid. On the other hand, the fixture can be ignited sooner by providing the shield with radial ports **24** the desired distance from the mandrel head **25**. These ports may be filled with a relay powder to insure that the fuse will ignite the fixture as soon as the fuse has burned down to the ports.

According to the provisions of the patent statutes, I have explained the principle of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as sepcifically illustrated and described.

I claim:

**1.** A device of the type described comprising a mandrel in the form of a rod with an enlarged head at one end that is provided in its outer end with a central socket adapted to receive a primer, a tubular fuse surrounding the rod and extending from said head to a point short of the opposite end of the rod, the head being provided with a plurality of passages extending from its socket toward the inner end of the head to place the socket in communication with the adjacent end of the fuse, an annular end plate encircling the fuse ends of said passages and held by the head against movement outwardly over it, an ignitable fixture surrounding the fuse, a second end plate provided with a central hole through which said opposite end of the rod projects, and means attached to the projecting end of the rod clamping the fixture between said plates.

**2.** A device according to claim **1**, in which said passages diverge from said socket.

**3.** A device according to claim **1**, in which said fixture engages said fuse.

4. A device according to claim 1, in which the inner end of said head is provided with an annular seat receiving the adjoining end plate to position the plate on the head.

5. A device according to claim 1, in which said fixture generates electric current when heated by said fuse.

6. A device according to claim 1, including a tubular thermal shield surrounding said fuse between it and said fixture said shield being provided with openings spaced from said head.

7. A device according to claim 6, in which said head has an inner end portion projecting into the adjoining end of said shield, and said annular end plate surrounds said end of the shield.



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