United States Patent

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[73] Assignee **The United States of America as represented by the Secretary of the Army**

[54] **DETONATOR SAFETY DEVICE**
2 Claims, 3 Drawing Figs.

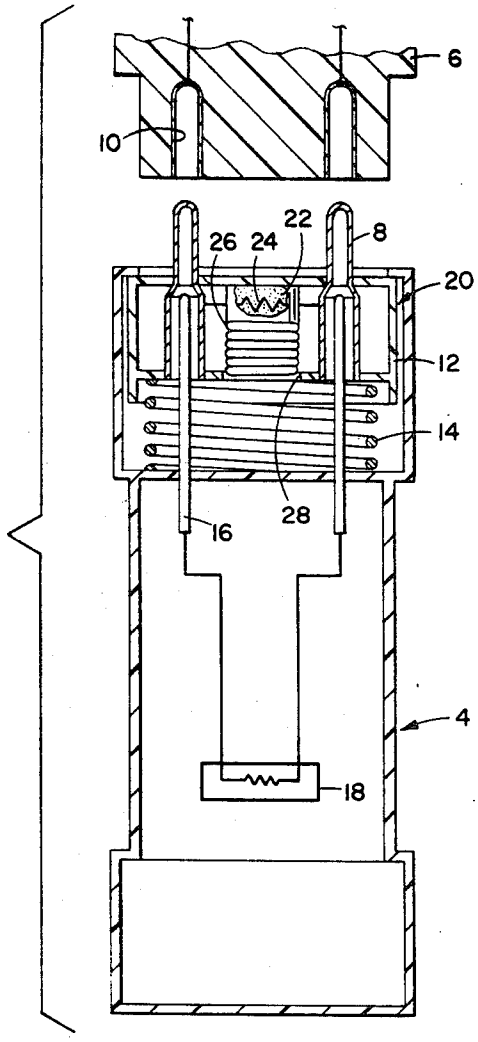
[52] **U.S. Cl.** **102/28**
[51] **Int. Cl.** **F42b 3/12, F24b 3/18**
[50] **Field of Search** 102/28

[56] **References Cited**
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ABSTRACT: An electroexplosive detonator safety device that when operated will expand a means to block the connection between the electrical contacts of the detonator and a circuit connector. The safety device includes a piston to house an explosion operated bellows and a voltage current sensor having a bridgewire made more sensitive than a bridgewire of the detonator. When the detonator is to be connected to the circuit connector and a dangerous stray voltage or inadvertent firing current is present in the circuit, the voltage current sensor causes an explosion to expand the bellows and thus the bellows blocks any further insertion of the detonator into the circuit connector.



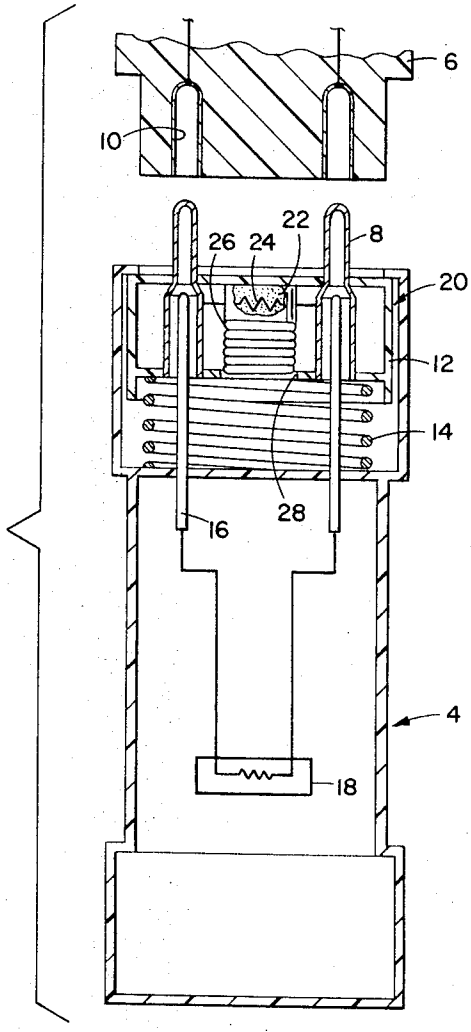


FIG. 1

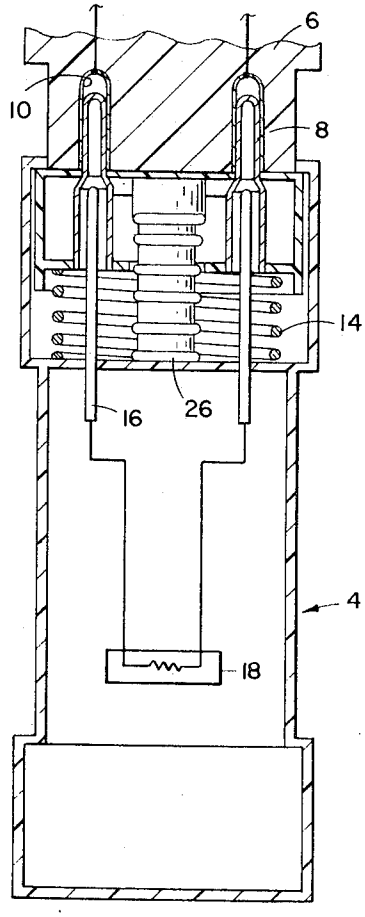


FIG. 2

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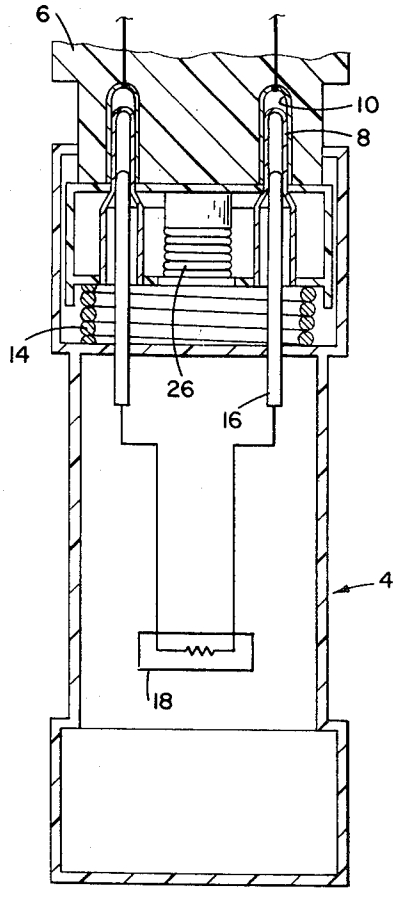


FIG. 3

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DETONATOR SAFETY DEVICE

The invention herein described was made in the course of or under a contract or subcontract thereunder (or grant) with the Department of the Army.

BACKGROUND OF THE INVENTION

This invention is related to the field of electroexplosive detonators. Associated with the many missile systems being developed are numerous components that use electronics. Thus there exists the possibility of dangerous stray voltages and inadvertent firing currents that can create a hazard in connecting electroexplosive detonators.

SUMMARY OF THE INVENTION

A main feature of this invention involves a novel arrangement of a voltage current sensor that will be activated should a dangerous voltage or inadvertent firing current exist when connecting an electroexplosive detonator to a circuit connector. The activated sensor will cause an explosion and the confined gases therein will expand the bellows to a blocking position to prevent accidental firing of the detonator.

This invention may be better understood from the following detailed description taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a sectional view of the detonator and safety device prior to insertion into the circuit connector.

FIG. 2 is a sectional view of the safety device in its blocking position.

FIG. 3 is a sectional view of the detonator and safety device under normal conditions after insertion into the circuit connector.

DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in FIG. 1 when electroexplosive detonator 4 is to be connected into circuit connector 6, connectors 8 are aligned with circuit conductors 10. Under normal conditions, that is when there is an absence of a dangerous stray voltage or inadvertent firing current, connectors 8 are fitted into conductors 10. Further movement of the electroexplosive detonator toward circuit connector 6 will cause circuit connector 6 to move piston 12 against the bias of spring 14 until contacts 16

of the electroexplosive detonator are fitted into connectors 8, thus completing the electrical connection from circuit connector 6 to electroexplosive bridgewire 18 as shown in FIG. 3. It is noted that connectors 8, conductors 10 and contacts 16 are of the telescopic bayonet type.

The safety device generally shown as 20 comprises connectors 8, piston 12, voltage current sensor 22 including a small explosive charge therein, sensor bridgewire 24 and explosion operated bellows 26. Piston 12 has an opening 28 to allow passage of the bellows when expanded. Sensor bridgewire 24 is made more sensitive than the electroexplosive bridgewire so that it will more readily respond to stray voltages or inadvertent firing currents before the electroexplosive bridgewire can operate.

In the event that a dangerous stray voltage or inadvertent firing current exists in the circuit the voltage current sensor will cause a small explosion thereby giving an audible sound of functioning. Internal gas pressure causes an expansion of the bellows through opening 28 and the entrapped pressure provides a positive force to keep the bellows expanded thus blocking the connection of the electroexplosive detonator into the circuit connector as seen in FIG. 2.

I claim:

1. An electroexplosive detonator safety device disposed between a circuit connector having a pair of conductors of a circuit secured therein and an electroexplosive detonator including a bridgewire connected to a pair of contacts, comprising a piston disposed in said electroexplosive detonator and provided with a pair of connectors for respective engagement with said conductors and a spring disposed to bias said connectors from said contacts; said electroexplosive device being disposed for operation of said piston for respective engagement of said contacts with said connectors responsive to normal voltage and current conditions in said circuit; a bellows and a voltage current sensor disposed in opposing relation with said spring, said sensor having a bridgewire connected between said connectors for explosive operation of said bellows to prevent engagement of said contacts with said conductors responsive to stray voltages or inadvertent firing currents.

2. An electroexplosive detonator safety device as set forth in claim 1 wherein said conductors, contacts and connectors comprise a telescopic bayonet connection.