

[54] **GANGED ARMING DEVICE**
 [75] Inventor: **Sidney A. Moses, Culver City, Calif.**
 [73] Assignee: **The United States of America as represented by the Secretary of the Army, Washington, D.C.**
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Primary Examiner—Benjamin A. Borchelt
Assistant Examiner—Thomas H. Webb
Attorney—William G. Gapcynski et al.

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 [58] Field of Search **102/70.2 R**

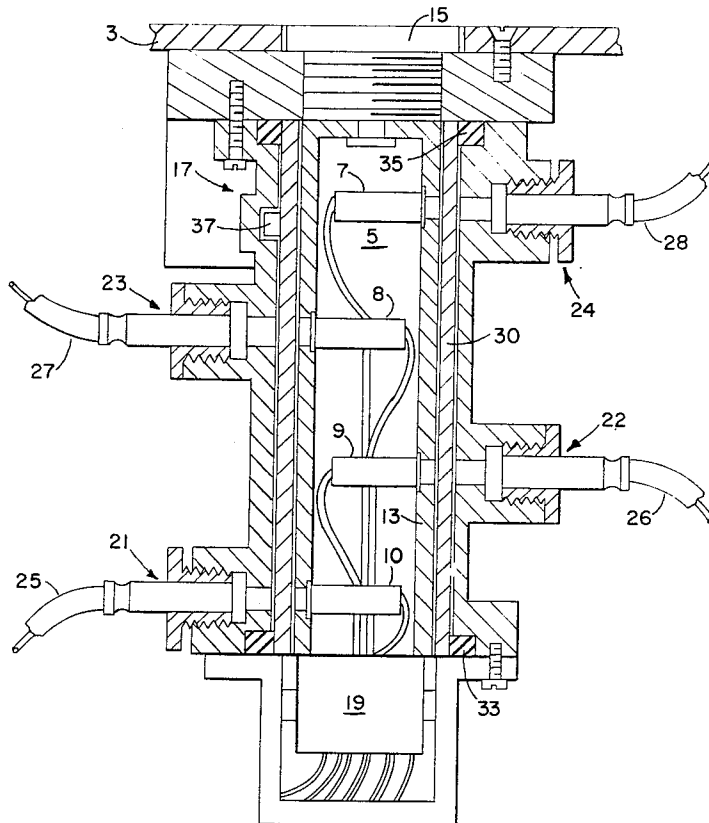
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[57] **ABSTRACT**

A plurality of detonators are separated from confined detonating fuses by a rotating, cylindrical shield. A gravity operating device causes this shield to rotate upon acceleration so as to align holes in the shield with the detonators and the fuses.

3 Claims, 2 Drawing Figures



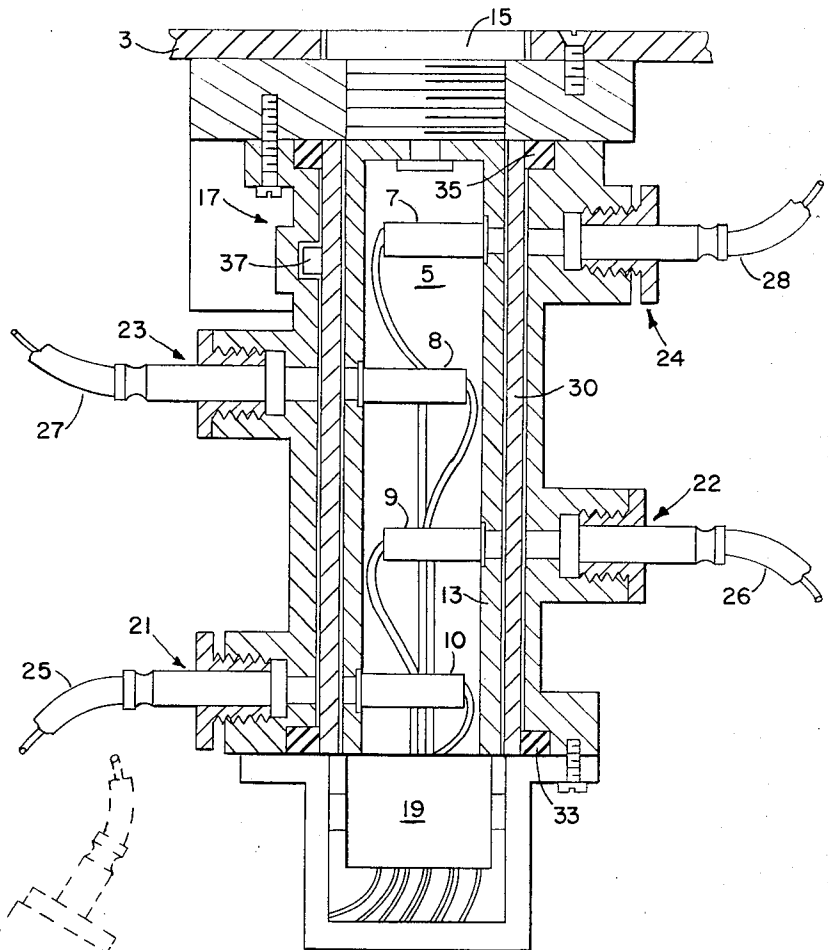


FIG. 1

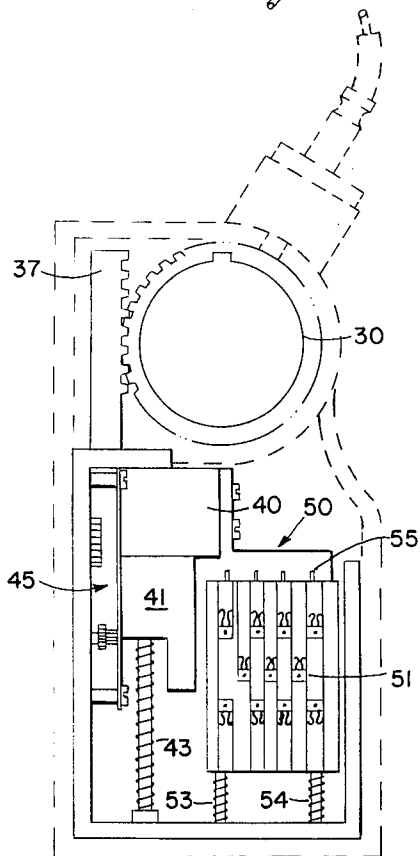


FIG. 2

GANGED ARMING DEVICE

SUMMARY OF THE INVENTION

The ganged safety and arming device has its housing attached to a missile's skin and contains a detonator unit. The detonator unit contains four RF protected detonators and their associated wiring. The detonating unit is threaded into the housing which is attached to the missile skin. It has wiring connected to the missile firing means by way of a nine-pin, male connector.

The detonators in the unit will align with four confined detonating fuse lines which lead to various explosive devices in the missile. The detonators are separated from explosive end fittings by a cylindrical, safety shield so that if the detonators are accidentally ignited, the detonation will not be transferred to the explosive end fittings.

This safety shield is mounted on bearings and held in place until it is rotated by a gravity timing device. When the gravity timing device operates due to missile acceleration, the safety shield is rotated so that holes in the shield are aligned between the detonators and the explosive end fittings. When the shield is in this position, the ganged safety and arming device is armed.

The gravity timing device contains two weights which are free to move upon acceleration of the missile. One weight, which is held in place by two springs, moves immediately and sets up the wiring system so that the detonators go from a short-circuited, safe position, to a circuited, armed position. The other weight which rotates the cylindrical, safety shield is restrained by an escapement mechanism, which allows the missile to move a certain determinable distance before arming takes place.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top, cut-away view of the preferred embodiment of the invention, and

FIG. 2 is a side view showing the relationship of the timing mechanism with the safety shield.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Safety and arming devices are widely used in the aerospace industry in conjunction with explosive systems such as destruct systems, separation systems, and initiation systems. When the safety and arming device is in the safe position, the explosive elements are misaligned or separated so that initiation of the detonator cannot cause subsequent initiation of the main explosive charge. In addition, the device has its electrical firing leads are shorted together. In the armed position the explosive elements are aligned and the electrical short is removed. The present invention involves the ganging together of a number of detonators into a single housing attached to the vehicle's skin.

FIG. 1 shows a top, cut-away view of the ganged safe and arming device which is attached to the skin 3 of the missile. The device contains a detonator unit 5 which in turn contains 4 RF protected detonators 7-10 and their associated wiring. The RF protection is provided by ferrite or similar filters not shown in detail. A metal body 13 is attached to a threaded head 15 which is screwed into the housing 17. The body 13 is kept from rotating by a key riding in a slot in the housing (not shown). A 9-pin male connector 19 is attached to the other end of the body. When the body is completely in-

serted, the connector mates with the female socket (not shown) which is connected to the missile's wiring system.

When fully assembled, each detonator 7-10 is in line with explosive end fittings 21-24, which are each attached to one of the explosive line of Confined Detonating Fuse 25-28. These fuses in turn lead to various explosive devices (not shown) to be functioned during missile flight. Detonators 7-10 are separated from the explosive end fittings 21-24 by a cylindrical safety shield 30, so that even if the detonators are accidentally fired, the detonation will not be transferred to the explosive end fittings. Safety shield 30 is mounted on bearings 33 and 35 and held in place by an arm 37 of a gravity timer drive mechanism until missile acceleration causes actuation of the drive mechanism.

FIG. 2 shows the gravity timer drive mechanism in greater detail. This mechanism contains two acceleration weights. Upon acceleration of the missile, these acceleration weights 40 and 41 will move downwardly. The lower weight 41, which is held by spring 43, moves almost immediately, whereas the upper weight 40 is restrained by the escapement mechanism 45. This allows the missile to move a certain determinable distance before arming takes place. These two weights are used to prevent the device from arming if subjected to sudden shock, yet allows the device to arm within limits. Weight 40 is attached to arm 37, and as the escapement device 45 allows this weight to move down, safety shield 30 will be rotated so that holes in this shield are aligned between the detonators 7-10 and the explosive end fittings 21-24. With the shield in this position, firing the detonator will initiate the firing of the explosive end fittings.

A switch plate device 50 is attached to weight 41. Switch plate 50 is made up of 4 individual plates corresponding with the number of detonators. As the plate moves, contacts 55 make connection with stationary contactor clips 51 which are connected to the detonators and power circuitry (not shown) to switch the lines from a short circuited condition to an armed condition. Plate 50 is aligned and held by springs 53 and 54 until acceleration. In the unarmed position, the leads from each detonator are in a shorted condition and grounded. And as the weight moves down, these leads are unshorted and switched from the safe condition to the armed position.

I claim:

1. A safe and arming device having a housing, a plurality of detonator means inclosed therein, a corresponding number of detonation responsive initiator means each aligned respectively with one of said detonator means, shielding means having holes therein, said shielding means being moveably mounted between said detonator means and said initiator means so that its holes can be selectively aligned between the respective individual detonator means and the initiator means, means for moving said shield means, and said shielding means being cylindrical and inclosing said detonator means.

2. A device as set forth in claim 1 wherein said means for moving said shield means comprises an arm having a rack portion in engaged relation to a pinion portion of said shielding means, a spring loaded weight attached to said arm so as to move said arm upon acceleration of the device, and an escapement means con-

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nected to said weight and said arm in a manner to cause a predetermined delay of movement of said arm.

3. A device as set forth in claim 2 wherein said housing further contains wiring means connected to said detonator means, a switching means contained in said means for moving said shield, said wiring means being further connected to said switching means whereby in

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the unaccelerated positions of said device said wires will be in a short circuited condition with respect to the detonator means, and a second spring biased weight connected to said switching means so as to move said switches off their short circuit condition on acceleration of the device.

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