

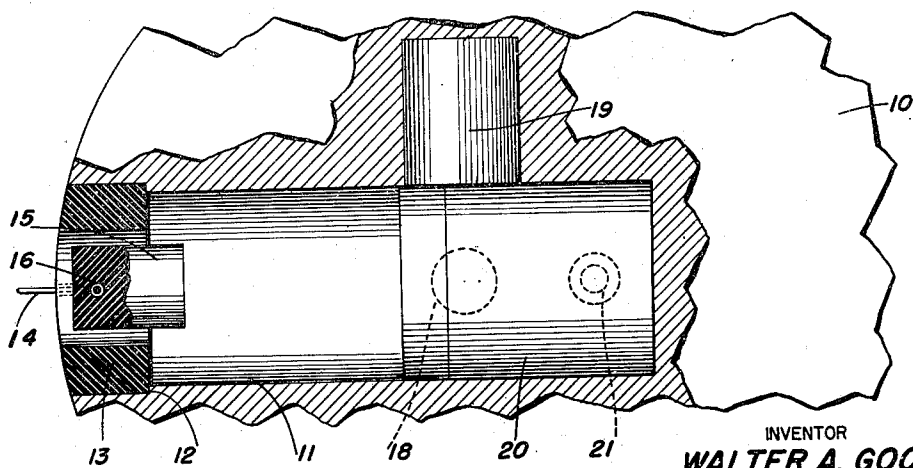
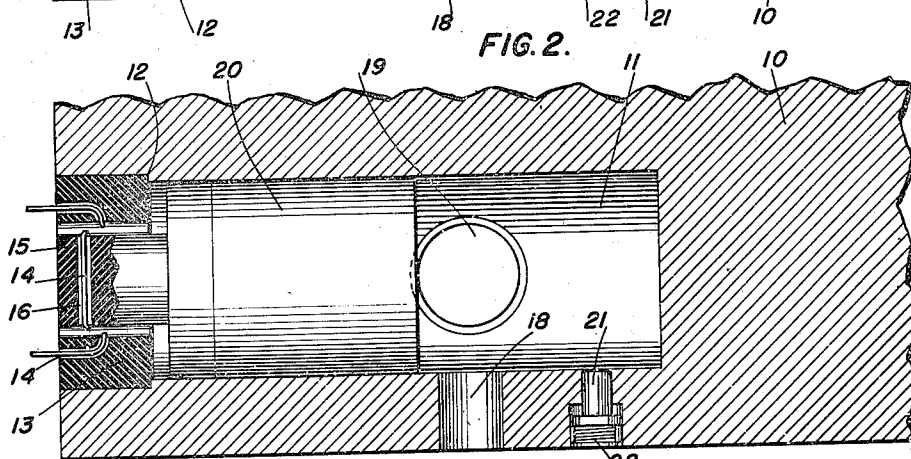
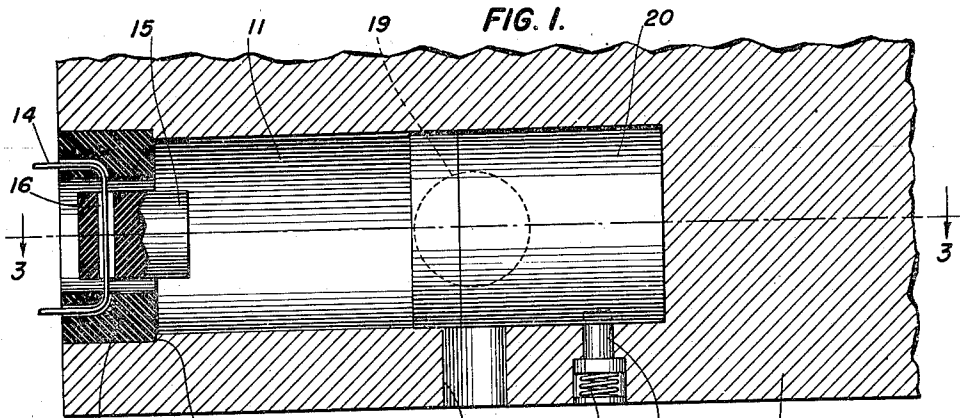
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UNSHORTING SWITCH

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## UNITED STATES PATENT OFFICE

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## UNSHORTING SWITCH

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3 Claims. (Cl. 200—80)

This invention relates to switches of the type which includes a short-circuiting wire adapted to be broken under the action of centrifugal force, or the like. More particularly, the invention is concerned with a novel unshorting switch of simple and compact construction adapted for manufacture at low cost and which is positive and reliable in operation.

Unshorting switches have been used heretofore for controlling electrical apparatus in projectiles, the switches being operable by centrifugal force to break a short circuit in the apparatus. These switches, as commonly made, include a short-circuiting wire which is broken by a fiber plunger on the end of a gate actuated by the centrifugal force. Some difficulty has been experienced with unshorting switches of this type, due to the fact that the fiber plunger is not always in perfect alignment with the shorting wire so as to insure breakage thereof when the plunger is actuated. More particularly, the shorting wire is normally mounted in an opening into which the plunger moves to break the wire, and it sometimes happens that the wire is disposed in slightly offset relation to the axis of the plunger and the gate, with the result that the plunger is prevented from striking the wire and breaking it.

One object of the present invention, therefore, resides in the provision of an unshorting switch which is so constructed that the gate or other wire breaking element need not be mounted on the same axis with the support for the shorting wire.

Another object of the invention is to provide a switch of the character described in which the fiber plunger is in continuous engagement with the shorting wire to insure breakage thereof under the action of centrifugal force.

These and other objects of the invention may be better understood by reference to the accompanying drawing, illustrating one form of the switch adapted for use in a rotary projectile. In the drawing:

Fig. 1 is a longitudinal sectional view of the switch in its unarmed position;

Fig. 2 is a view similar to Fig. 1 but showing the switch in its armed position, and

Fig. 3 is a sectional view on the line 3—3 in Fig. 1.

In the drawing, the numeral 10 designates part of a rotary projectile having a bore or cylinder 11 extending transversely of the axis of the projectile. The outer end portion of the cylinder 11 is enlarged, as shown at 12, and secured in the enlarged portion of the cylinder is an insulating

ring 13 which supports a short-circuiting wire 14. The wire 14 extends diametrically across the opening in the ring 13 and is disposed in suitable passages in the ring, the ends of the wire projecting from the outer end of the ring so that they may be connected in circuit with an electrical device in the projectile, such as a squib to be described presently. A breaking stud 15 is loosely mounted in the opening in ring 13 and projects inwardly into the enlarged portion of cylinder 11. The stud 15 is made of any suitable insulating material, such as fiber, and has a transverse opening 16 near its outer end through which the wire 14 extends.

A squib discharge passage 18 is provided in the projectile body 10 and extends rearwardly from the cylinder 11 near its inner end. An electrical squib 19 is disposed in a suitable recess in the body 10 and communicates with the inner end portion of cylinder 11, the squib extending transversely of the projectile axis and at right angles to the axis of the cylinder. The squib discharge passage 18 is normally blocked from the squib 19 by a gate 20 in the inner end portion of the cylinder, whereby accidental explosion of the squib cannot be communicated to the discharge passage 18. The gate 20 fits closely in the cylinder and is held in its safe or locking position by a setback detent 21 slidably mounted in the projectile body to the rear of cylinder 11. A compression spring 22 urges the detent forwardly into a recess in the gate 20.

The operation of the switch is as follows: When the projectile 10 is fired from a gun, the resulting force of setback moves the detent 21 rearwardly against spring 22 so as to release the safety gate 20. The centrifugal force incident to rotation of the projectile then moves the gate 20 outwardly in cylinder 11 against the adjacent protruding end of the breaking stud 15. As a result, the stud 15 is driven outwardly in ring 13 and breaks the short-circuiting wire 14, as shown in Fig. 2. The outward movement of gate 20 under the action of centrifugal force also uncovers the discharge passage 18 and the squib 19, so that when the squib is fired the resulting explosion is communicated through the cylinder 11 and the passage 18 to the usual booster (not shown) in the projectile.

It will be apparent that in the new switch, the gate 20 does not have to be disposed on the same axis as the breaking stud 15. Accordingly, the switch does not require precision operations in its manufacture.

The unshorting switch of my invention may be

used for various purposes. For example, it may be used as a safety device by connecting the wire 14 across the electrical squib 19, whereby the squib is normally short-circuited and cannot be energized accidentally by the electrical device 5 controlling it. When the wire 14 is broken by outward movement of gate 20 in response to firing of the projectile, the squib short-circuit is removed so that the squib is armed and ready for firing.

I claim:

1. An unshorting switch comprising a body having a cylinder, a ring mounted in the cylinder, a shorting wire in the ring extending across the opening therein, a stud mounted in the ring and engaging the shorting wire, and a gate in the cylinder movable by centrifugal force to engage the stud and drive it outwardly for shearing the wire.

2. An unshorting switch comprising a body having a cylinder, an insulating ring mounted in the cylinder, a shorting wire in the ring extending across the opening therein, an insulating stud mounted in the ring and engaging the shorting wire, and a gate in the cylinder movable by centrifugal force to engage the stud and drive it outwardly in the ring for shearing the wire.

3. An unshorting switch comprising a body 10 having a cylinder which is enlarged at one end, a ring mounted in said enlarged portion of the cylinder, a shorting wire in the ring extending across the opening therein, a stud mounted in the ring and through which the wire extends, and a 15 safety gate in the cylinder movable by centrifugal force to engage the stud and drive it outwardly in the ring to shear the wire.

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