April 17, 1934. L. WILLIAMS 1,954,907

SAFETY SWITCH FOR SHOT FIRING CABLES

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Fig. 1.

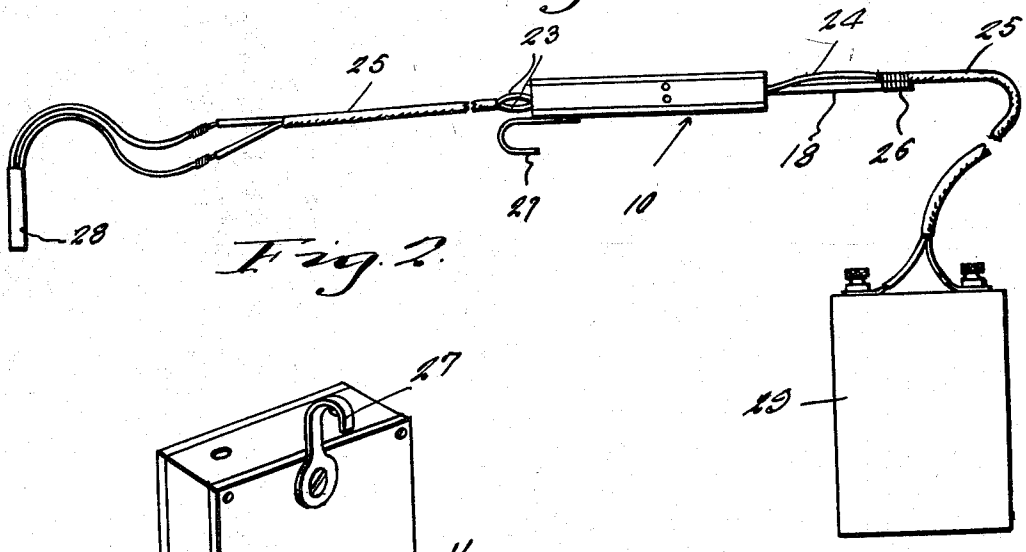


Fig. 2.

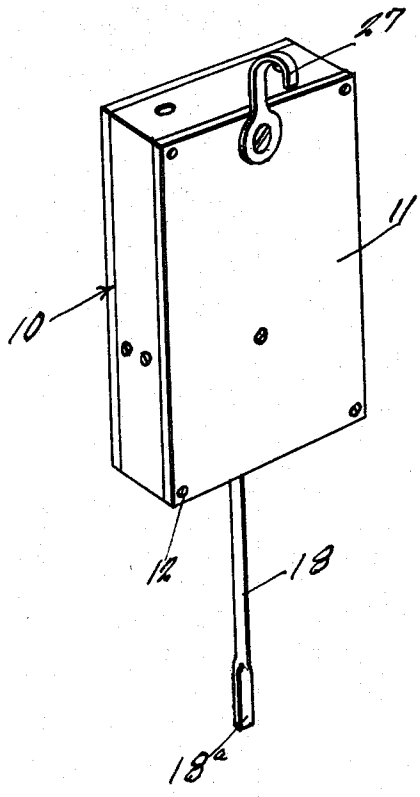


Fig. 3.

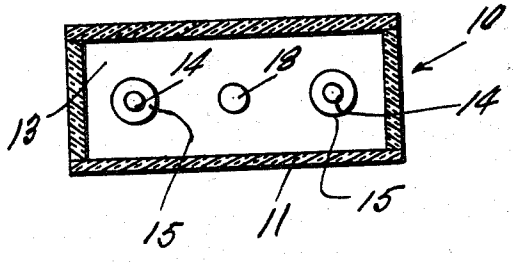
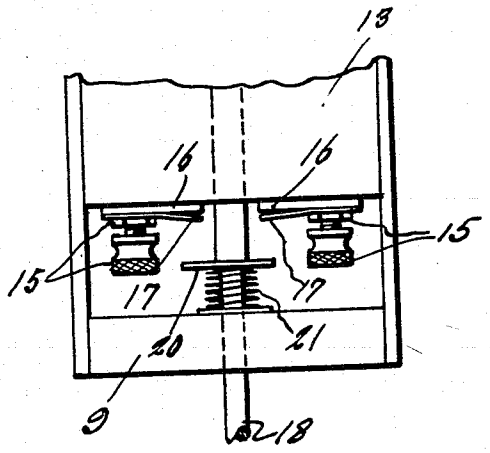


Fig. 4.



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Fig. 3.

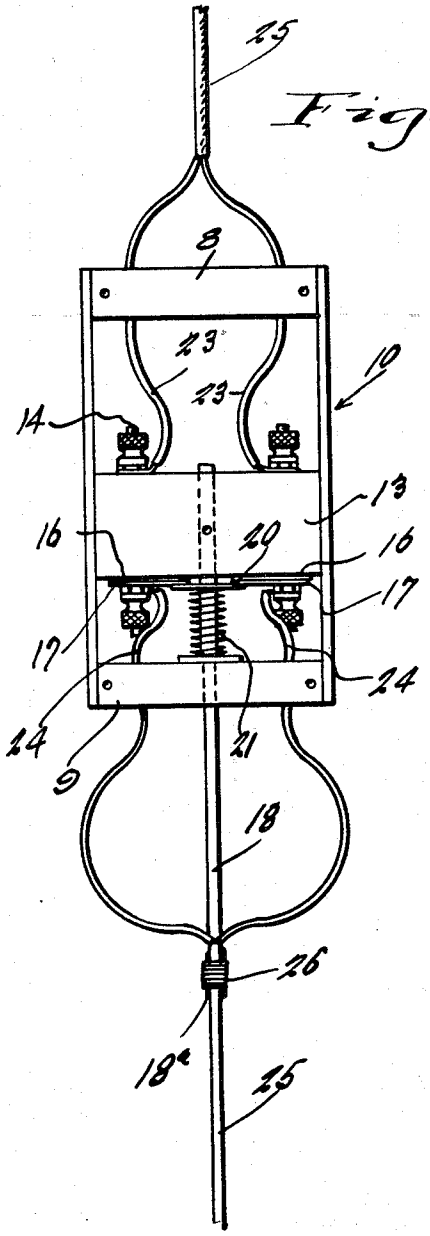


Fig. 5.

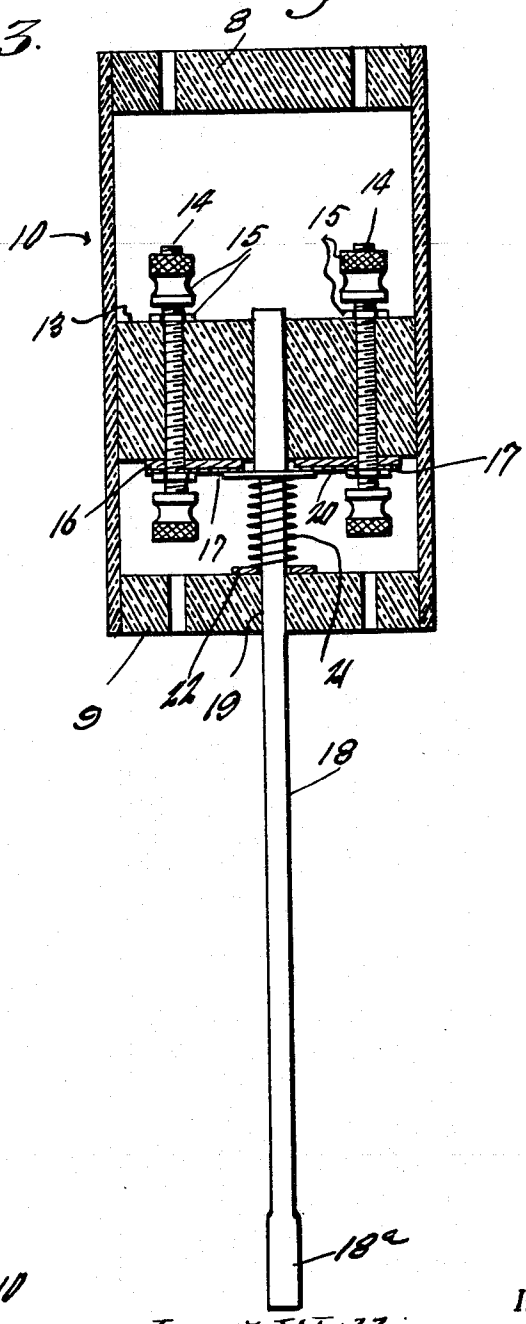
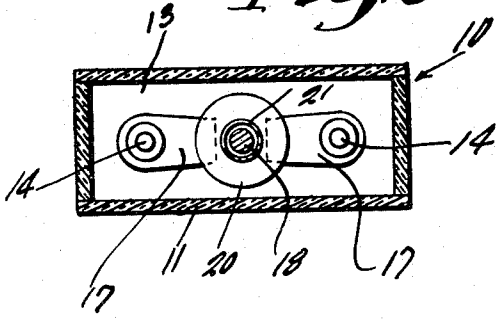


Fig. 6.



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UNITED STATES PATENT OFFICE

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SAFETY SWITCH FOR SHOT FIRING CABLES

Loyd Williams, Peach Creek, W. Va., assignor of one-third to Albert A. Crawford and one-third to Carl Crawford

Application January 31, 1933, Serial No. 654,529

1 Claim. (Cl. 200—163)

This invention relates broadly to a portable shot firer of the type designed for use in conjunction with any suitable type of storage battery at present used in mining operations.

At the present time much difficulty is incurred in the use of these shot firers due to the fact that the cable is often laid in proximity to the rails provided for mine cars, with the result that it sometimes happens a portion of the wire becomes exposed and accidentally engaged with the rail thus completing the circuit to the cap attached to the shot to be fired thereby prematurely detonating the said shot; such being often accompanied with disaster.

In accordance with the present invention an improved switch is provided that will positively prevent the firer being actuated unintentionally since through the medium of the improved switch the circuit is normally short-circuited and a positive operation of the switch is required before a shot can be detonated.

The invention together with its numerous objects and advantages will be best understood from a study of the following description, taken in connection with the accompanying drawings wherein:

Figure 1 is a side elevational view of the invention showing an application thereof.

Figure 2 is a perspective view of the switch.

Figure 3 is an elevational view of the switch, the cover plate of the switch box being removed.

Figure 4 is a fragmentary elevational view, the cover plate of the switch box being removed and the switch being shown in open position so that the electric circuit is completed for detonating the shot.

Figure 5 is a longitudinal sectional elevational view through the switch and

Figures 6 and 7 are horizontal sectional views taken on different planes through the switch box.

Referring to the drawings by reference numerals it will be seen that the safety switch comprises a casing 10 of any desired shape and design and constructed from any suitable insulating material. One side of the casing is open, and for this side there is provided a removable cover plate 11 that is readily secured in position through the medium of screws or other fastening elements 12.

Arranged within the casing 10 adjacent one end thereof is a transverse block 13 of insulating material that has extending therethrough relatively spaced openings accommodating elongated terminal bolts 14. The terminal bolts 14 are suitably equipped at the ends thereof with pairs of nuts 15 for securing the bolts in position and for electrically securing in engagement with the bolts the wires of the shot cable.

Fixedly secured on one end of the bolts 14 are contact members each of which include a relatively thick metallic plate 16 and a relatively thin spring like metallic plate 17 that has one end normally flexed downwardly or away from its associated plate 16 as will be clear from a study of Figure 4.

The block 13 is also provided with an intermediate opening through which is slidable the inner end of a plunger or rod 18 that is also slidable through an opening 19 provided in one wall 9 of the casing 10. A bridge contact 20 is suitably mounted on an inner end portion of the rod 18 and is normally engaged with the spring fingers 17 of the stationary contacts to provide a "short" in the circuit. The rod 18 is normally urged inwardly to engage the contact 20 with the fixed contact fingers 17 through the medium of a spring 21 disposed about the rod and arranged between the contact 20 and a washer 22 located against the inner side of the casing wall 9 as shown in Figure 5.

Wires 23 extend through openings provided in the end wall 8 of the casing and are electrically connected with one end of the bolts 14. Wires 24 lead through apertures provided therefor in the wall 9 of the casing and are connected to the ends of the bolts 14 in proximity to the contacts 17. The wires 23, 24 are preferably combined in a single cable as shown at 25 and the cable 25 is secured to the free end 18a of the rod 18 through the medium of a wrapping 26 of sheathed wire or suitable material. Suitably secured to the cover plate 11 at one end thereof is a hook 27 adapted to be engaged with some fixed support for holding the casing stationary or fixed relative to the rod 18. In operation the cartridge 28 or other charge to be exploded is applied in the usual manner and as suggested in Figure 1 while the other end of the cable 25 is suitably and electrically connected with the storage battery 29 as also shown in Figure 1. Preferably, the section of cable between the shot 28 and the casing 10 is considerably shorter than the section of cable between said casing 10 and the battery 29, it being understood of course, that the first named section of cable will be of suitable length so that the operator firing the blast will be at a safe distance therefrom. Further, and as is thought obvious, the second named section of cable, may be of any length desired since as is apparent, the contact 20 being normally engaged

with the contacts 17, the circuit is normally shorted so that if the wire of either section should become exposed and in contact with the rails usually laid for the mine cars, the circuit to the cartridge or cap would not be completed.

When the blast is to be fired, the operator pulls outwardly on the rod 18 against the action of spring 21 to move the contact 20 out of engagement with the contacts 17 thus eliminating the "short" in the circuit and thereby permit the circuit to pass through the wires 23 to the shot or cartridge 28 to detonate the said shot or cartridge. Upon release of the rod 18 the latter will return to its normal position to bridge the contacts 17, and obviously when in this position the fixing of the connections of the electrical circuit can be accomplished without danger of a premature actuation of the firer.

Even though I have herein shown and described the preferred embodiment of the invention, it is to be understood that the same is susceptible of further changes, modifications and improvements coming within the scope of the appended claim.

Having thus described my invention, what I claim as new is:

A safety switch for connecting the ends of a shot firing cable formed by splitting said cable, including a casing of insulating material having end walls provided with apertures through which said ends of the shot firing cable are received within the casing, a block of insulating material fixed within said casing and spaced from the end walls of the latter, a pair of binding posts extending through said block and connected at the ends thereof with the ends of the shot firing cable to complete a circuit through said posts and shot firing cable, fixed contacts on the end of said posts at one side of said block, a rod having an end portion slidable through said block and one end wall of said casing, said block and said one end wall having openings to receive said rod, a bridge contact on said rod, a spring disposed about said rod between said bridge contact and said one end wall urging the rod inwardly of the casing and the bridge contact into engagement with said fixed contacts so as to form a short circuit, said shot firing cable having a section thereof secured to the outer ends of the rod, and an anchoring hook on the casing to secure the casing when the cable is pulled to slide the rod outwardly for breaking the short circuit engagement of the bridge contact with said fixed contacts.

LOYD WILLIAMS.