Jan. 7, 1958 B. A. HOWE 2,818,734

SHOCK ACTUATED MECHANISM

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Fig. 3

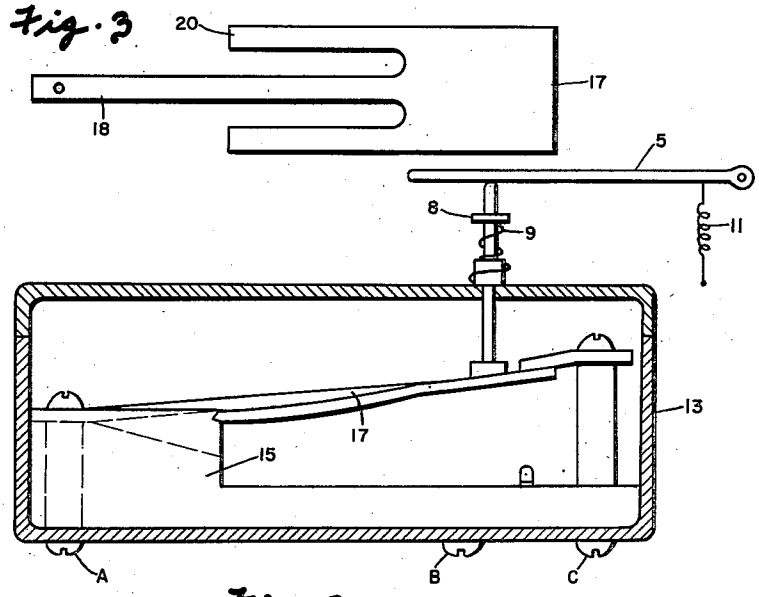


Fig. 2

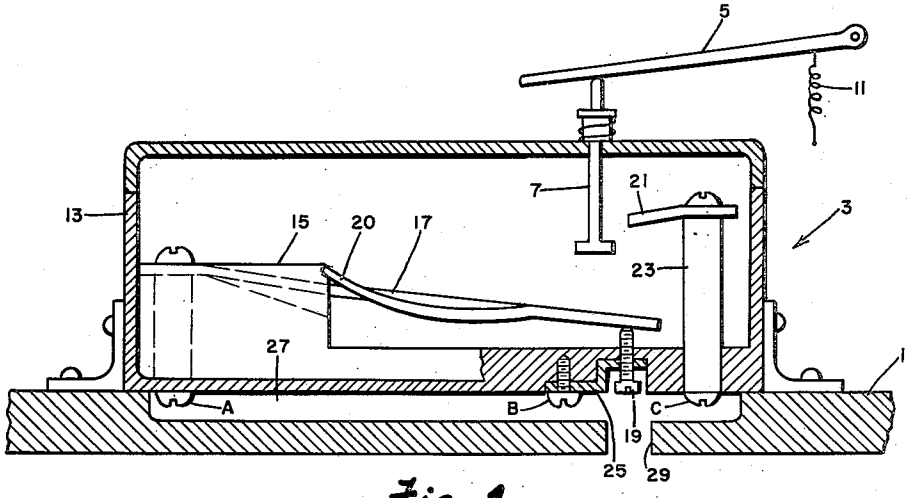


Fig. 1

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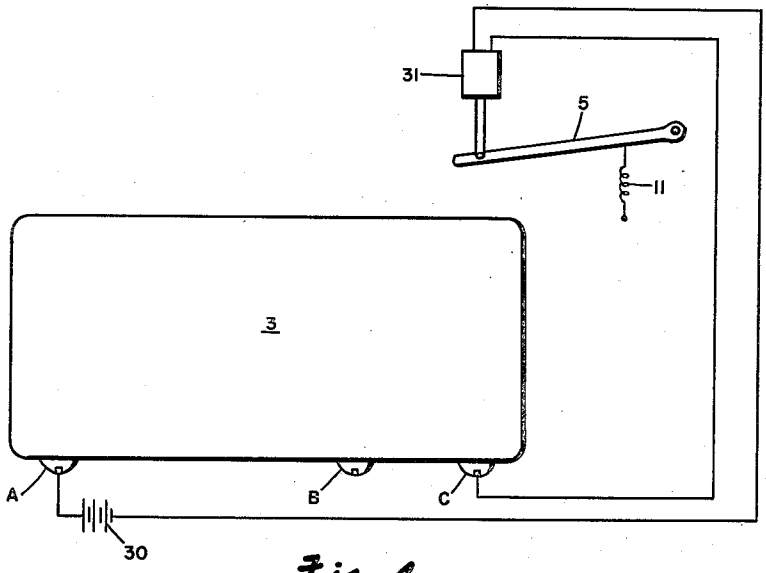


Fig. 4

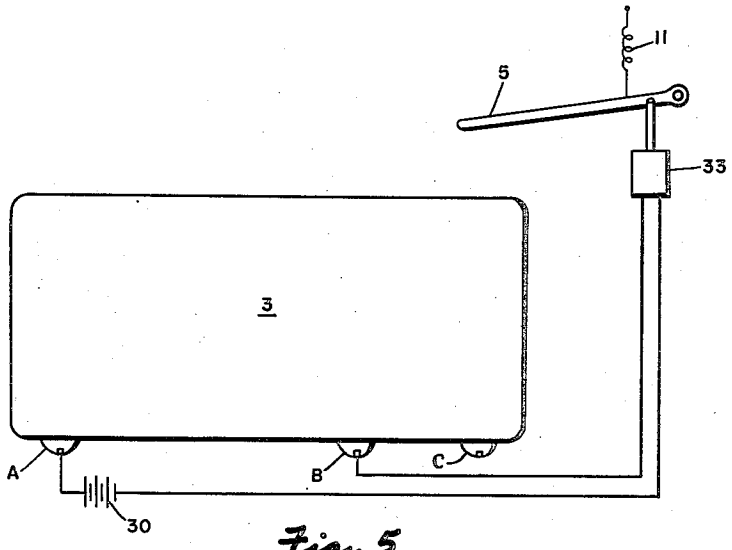


Fig. 5

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SHOCK ACTUATED MECHANISM

Boyd A. Howe, Farmingdale, N. Y., assignor to the United States of America as represented by the Secretary of the Navy

Application May 20, 1954, Serial No. 431,303

8 Claims. (Cl. 74—2)

(Granted under Title 35, U. S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

The present invention relates to a shock actuated mechanism particularly useful in connection with disappearing targets, although it could be used to release any type of trigger mechanism upon being actuated by a jar or shock impact.

The device is a relatively small mechanism designed principally for causing a hinged target to fall below a sight level when the target is hit by a bullet. In targets of this type it is the general practice to mount the target upon a horizontal hinge so that it may be lowered to a substantially horizontal position out of the view of the person shooting or pivoted about the hinge to a raised and substantially upright position. Latch means is customarily employed to retain the target in elevated position. The latch is usually spring actuated, and a spring is sometimes employed to urge the target against the latch and also toward a lowered position when the latch is released. Difficulty has been experienced in the past with the latch releasing mechanism which is supposed to release the target latch when a bullet hits or penetrates the target so that the target will swing to its lowered position. It has been difficult to design a latch releasing mechanism which is certain to respond to the shock produced when the target is struck, and even more difficulty has been experienced in providing a mechanism which could be adjusted to respond to various degrees of impact or shock. This is desirable when the target is intended for use with bullets of varying caliber.

The present invention overcomes many of these difficulties, is simple to operate and adjust, and may be made very small to occupy a small space. It has been found that a mechanism less than three inches long will give excellent results.

One of the objects of the present invention is to provide an activating mechanism to release a target latch.

Another object is to provide a shock activated mechanism which will release a target latching device and allow the target to fall when the target is hit.

A still further object of the invention is to provide a shock actuated mechanism which is adjustable to respond to various degrees of shock or impact.

A further object is to provide a shock actuated mechanism which is entirely mechanical in its construction.

A still further object is to provide a shock actuated mechanism that will act as a switch and make an electrical contact when the mechanism is jarred by shock or impact.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

Fig. 1 is a vertical cross sectional view of the invention,

and shows the relative parts in the position they occupy prior to the time the target is hit,

Fig. 2 is a similar view, but shows the device in released position after having been actuated by the shock or impact caused by a bullet striking or penetrating the target,

Fig. 3 is a detailed plan view of the toggle spring element,

Fig. 4 shows the mechanism of Figs. 1 to 3 as applied to an electrical releasing means for the latch, and

Fig. 5 shows another form of electrical releasing means.

Devices generally termed snap switches are well known in the art. These devices employ a thin spring supported in cantilever fashion so as to provide a snap action when pressure is applied to the free end of the spring. When the pressure is relieved the free end springs back to its normal position. This spring never passes through a dead center position and is designed to maintain contact until the intended pressure is applied regardless of shock conditions. These switches vary from the present invention in that they are intended to resist shock while the present invention is actually shock actuated.

The specific details forming the essential parts of the invention shown in Figs. 1 to 3 will now be described. The internal structure of the mechanisms shown in Figs. 4 and 5 are essentially the same as those of Figs. 1 to 3 except for the omission of the actuating pin 7 which is omitted in the electrically connected devices. The numeral 1 refers to a fairly upright target panel member made preferably of wood through which bullets may pass. This target is normally maintained in an upright position and visible to a person firing at the target. It is shown in a horizontal position in Fig. 1 simply to more clearly disclose the shock actuated mechanism which is fastened to it. The shock actuated mechanism 3 is secured directly to the target panel 1 by means of conventional brackets so that any shock received by the target will be directly transmitted to the mechanism 3.

The releasing mechanism for the target panel may be any well known form of latch which is adapted to have a latching position and a releasing position. No specific form of latch is shown because such latch forms no part of the present invention. The latch or releasable mechanism may carry any lever or extension such as 5, pivoted to assume a latching position as in Fig. 1 and a released position shown in Fig. 2. This lever may be normally retained in its latching position by any conventional resilient means such as a spring 11.

A pin 7 is mounted in the upper end of the shock actuated mechanism for releasing the latch 5 by forcing it from its Fig. 1 position to its Fig. 2 position against the tension of spring 11. This pin 7 carries a collar 8 which is engaged by compression spring 9 to urge pin 7 outwardly against lever 5. The friction of the latch when in latching or cocked position and the tension of spring 11 are sufficient to overcome the force of spring 9 so that pin 7 is always maintained in contact with lever 5. The small force of spring 9 is intended merely to maintain this contact, which thus prevents chatter and eliminates jamming of the parts.

The mechanism is carried within a main housing such as 13 which may be made in one or two pieces according to the necessity for assembling parts. If formed in two parts as indicated in the drawings, these parts could be held together in any well known manner. This housing is preferably made of either hard or soft rubber or any well known insulating material, especially when the device is intended to operate electrically. Otherwise, it may be of any desired material.

Internally of the housing, platform 15 provides a securing or anchor point as well as a pivot point for the snap spring 17. The detailed construction of this spring

is shown in Fig. 3. One end **18** of the spring is anchored to the platform by means of a bolt or stud A. The protruding tongues **20** extend into recesses or grooves in platform **15** as shown in Figs. 1 and 2 to provide a pivot point for the tongue ends and give spring **17** a toggle or snap action as it passes through a dead center position. By means of this action, the spring will normally be retained in either the upward position of Fig. 2 or the lower position of Fig. 1. Extension **21** at the top of post **23** provides a stop means to limit the upward movement of the spring **17**. Adjusting screw **19** acts as a stop means to limit its downward movement.

Screw **19** also performs the function of adjusting the amount of tension on the toggle spring. The purpose of this adjustment is to enable the operator to change the lower stop position either toward or away from the dead center position of the toggle spring. The closer the stop is to this dead center position, the more sensitive the device will be to jar or shock. In other words, it will require a greater amount of shock on the target to jar the spring from its lower position to its upper position when the screw **19** is lowered in Fig. 1 than it would if the screw end or tip is in a higher position in Fig. 1. By moving this screw inwardly, the spring **17** may be moved very close to its dead center position and the device made very sensitive so that a very slight shock will jolt spring past its dead center position and cause it to snap up against stop **21**.

When the target is struck by a bullet the resulting shock or jolt will cause spring **17** to snap through dead center and into engagement with stop **21**. During this action the spring engages the lower free end of pin **7** and forces it outwardly against the lever **5**. The spring action and impact against the pin **7** is sufficient to move the lever **5** from its Fig. 1 position to its Fig. 2 position, thus releasing the target latch and allowing the target to swing to its lowered position to denote a hit. When the target is reset, usually by manually moving it up on its hinge or pivot, the latch lever **5** is reset to its latching or cocked position of Fig. 1. This movement causes pin **7** to move to its Fig. 1 position and to snap the spring **17** to its lower Fig. 1 position. This procedure automatically resets the mechanism to register another hit.

The target panel **1** is recessed at **27** to provide clearance for the heads A, B and C of the mounting screws and bolts. The panel is apertured at **29** to provide access to the screw **19** for adjusting this screw. The screw may be adjustably threaded in any element such as a metal bracket or plate **25** retained in the housing by a screw B.

Although the entirely mechanical type of shock actuated release mechanism of Figs. 1 to 3 may be used on most targets, it is sometimes necessary to provide a greater releasing force for the lever **5** than is offered by the simple snap action of spring **17**. One method of doing this is by omitting the pin **7** and employing either a solenoid **31** as shown in Fig. 4 for pulling up the lever or a holding type solenoid as at **33** in Fig. 5 for holding the latch **5** against the action of the latch spring **11**. The internal structure of the mechanism **3** is not shown in detail in these figures because it is the same as in Figs. 1 to 3.

In Fig. 4 the spring **11** normally retains latch lever **5** in its downward position. A solenoid **31** is secured to this lever and is actuated when the spring **17** snaps to its uppermost position, at which time the connection from solenoid **31** to the battery or other power source **30** is made through studs A and C, the spring **17**, stop **21** and post **23**. The solenoid **31** is obviously designed to have whatever pulling power is necessary to overcome the tension of spring **11** and to release the lever to its uppermost position.

In Fig. 5 the action is reversed. The solenoid **33** acts as a holding device for retaining lever **5** in its latching position. When spring **17** is in its lower position, the solenoid **33** is energized by power source **30** through elements A, **17**, **19**, **25** and B. When a shock releases the spring **17**, the solenoid is released, permitting spring **11** to pull lever **5** to its uppermost latch releasing position.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claim the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. A shock actuated device adapted to release a trigger mechanism comprising a housing, a pin secured slidably in said housing and adapted to engage such trigger mechanism, a support mounted on said housing remote from said pin, a snap spring including an elongated tongue secured in said support and a pair of tines on said spring compressed on said support, said snap spring being normally out of contact with said pin whereby said spring is snapped into pin-engaging position to release such trigger mechanism.

2. A shock actuated device adapted to release a trigger mechanism, comprising a housing, a pin slidably secured in said housing and adapted to engage such trigger mechanism, a support mounted on said housing remote from said pin, and a snap spring secured on said support, said snap spring including a plurality of tines and a groove in said support receiving the ends of said tines, said snap spring being normally out of contact with said pin and the tines being compressed whereby said spring is snapped through dead center into pin engaging position to release such trigger mechanism.

3. A shock actuated device adapted to release a trigger mechanism, comprising a housing, a pin slidably secured in said housing and adapted to engage such trigger mechanism, a support mounted on said housing remote from said pin, a snap spring secured on said support, said snap spring including a plurality of tines and a groove in said support receiving the ends of said tines, said snap spring being normally out of contact with said pin the tines being compressed whereby said spring is snapped through dead center into pin engaging position to release such trigger mechanism, and a plurality of stop means secured on said housing to limit spring movement in each direction.

4. A shock actuated device adapted to release a trigger mechanism comprising a housing, a pin secured slidably in said housing and adapted to maintain engagement with such trigger mechanism, a support mounted on said housing remote from said pin, recesses in said support, a snap spring having an elongated tongue secured to said support, and tines extending from said snap spring and seated in said recesses, the distance between the recesses and the end of the tines being less than the length of the tines, said snap spring being normally out of contact with said spring whereby said tines are bowed to provide a snap-back action when the spring is snapped through dead center into pin-engaging position to release such trigger mechanism.

5. A shock actuated device adapted to release a trigger mechanism comprising a housing, a pin secured slidably in said housing and adapted to maintain engagement with such trigger mechanism, a support mounted on said housing remote from said pin, recesses in said support, a snap spring having an elongated tongue secured to said support, tines extending from said snap spring and seated in said recesses, the distance between the recesses and the end of the tines being less than the length of the tines, said snap spring being normally out of contact with said pin whereby said tines are bowed to provide a snap-back action when the spring is snapped through dead center into pin-engaging position to release such trigger mechanism, and stop means secured on said housing to limit the spring movement in each direction.

6. The combination of claim 5, wherein said spring includes a flat bar section extending from said tine and tongue portions, said bar being adapted to strike said pin

whereby the trigger mechanism is actuated into release position.

7. The combination of a latch member adapted to be connected to a target and a shock actuated device, comprising a housing, a support member secured in said housing, a snap spring secured at one end on said support and extending freely in said housing and a pin member engaging said latch member and extending into said housing, said pin member overlying the free end of said snap spring in spaced apart relation whereby a hit on the target provides a resulting shock to cause the spring to snap through dead center, thereby engaging the pin and thrusting it upwardly to release the latch.

8. The combination of a latch member adapted to be connected to a target, and a shock actuated device, comprising a housing, a support mounted in said housing, a snap spring including an elongated tongue secured on said support and extending freely in said housing, a pin

member engaging said latch member, extending into said housing and overlying the free end of the snap spring in spaced apart relation, said spring being urged against the pin member when shock is produced by a bullet striking the target, thereby causing the pin to release the latch to register a hit, and stop means in said housing to limit the movement of the snap spring.

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