Feb. 8, 1944. R. I. MARKEY ET AL 2,341,456

BOMB RELEASING SHACKLE

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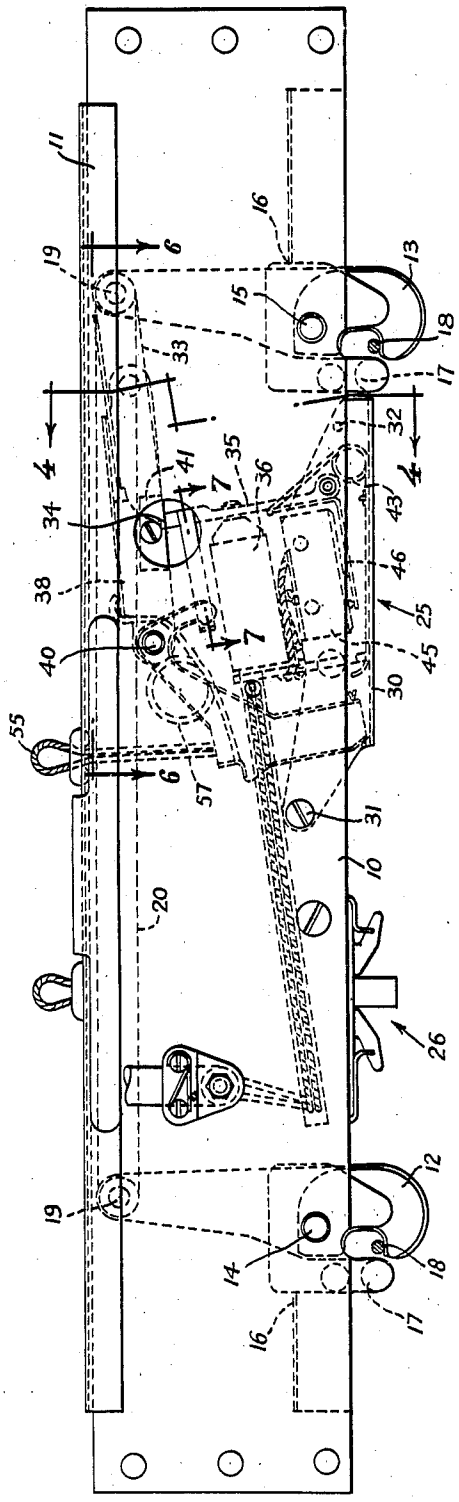


FIG. 1.

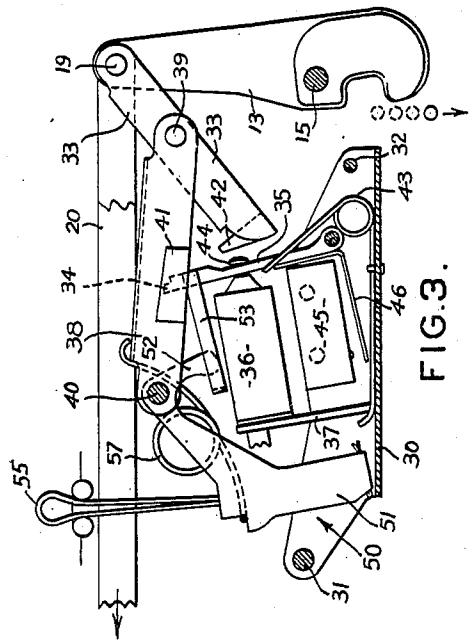


FIG. 3.

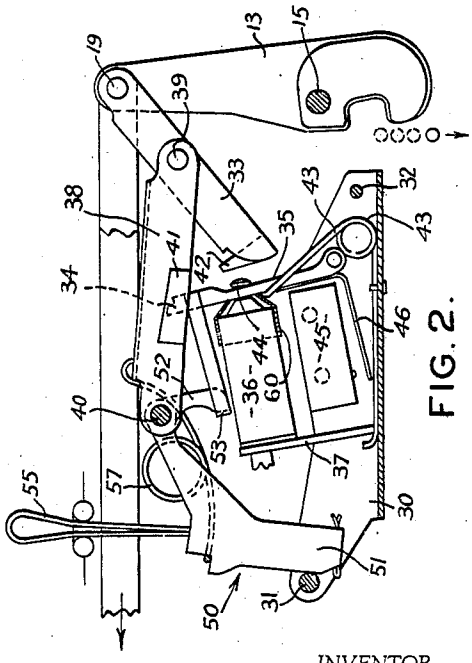


FIG. 2.

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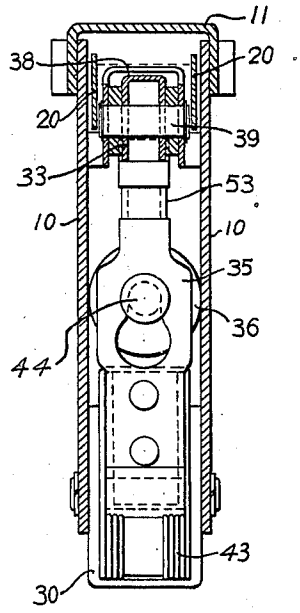


FIG. 4.

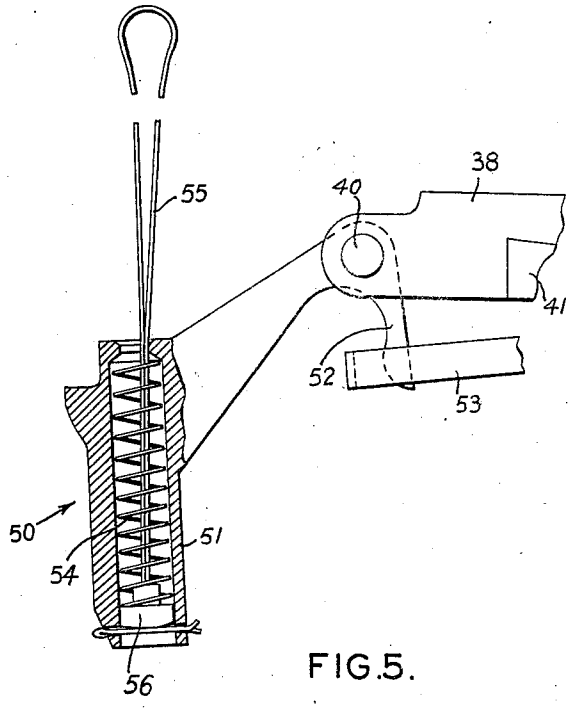


FIG.5.

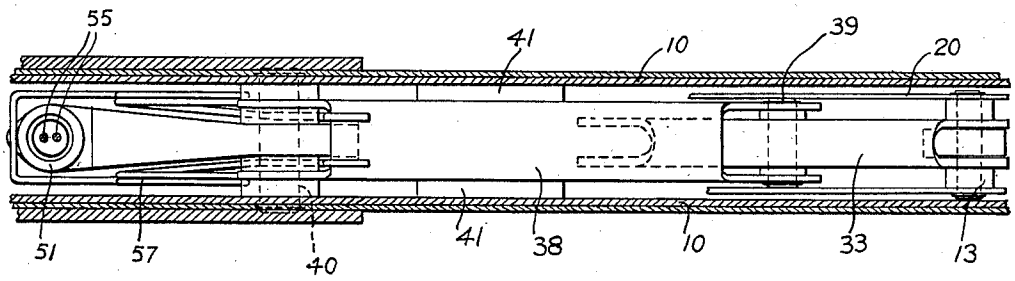


FIG.6.

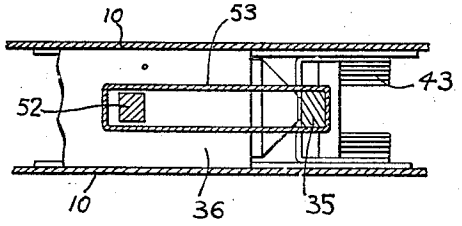


FIG.7.

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BOMB RELEASING SHACKLE

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Application January 20, 1942, Serial No. 427,431

6 Claims. (Cl. 89—1.5)

The invention relates to bomb releasing shackles, particularly adapted for use with aerial bombs.

In accordance with the invention a bomb shackle having a two point support for the bomb is provided with suitable means to release both of these supports at precisely the same time.

The principal object of the present invention is to provide a simple device which is rugged in construction and fool proof in operation for releasing the bomb.

Another object is to provide a releasing mechanism for a bomb shackle which may be operated electrically or manually.

Another object is to provide a means for mounting the electrical parts of the releasing mechanism in the bomb shackle as a unit, easily and quickly removed, so that should any parts become injured, the entire unit may be removed and a new one substituted with little effort and time and without interfering with any other mechanism on the bomb shackle.

With the foregoing objects in view and others that will become apparent hereinafter the invention is fully described in the following specification and illustrated in accompanying drawings forming a part thereof and in which a preferred form of the invention is illustrated. Referring to said drawings:

Fig. 1 is a side elevation with the parts in what might be termed the locked position;

Fig. 2 is an elevational view with parts in section, the front plate being removed and the releasing mechanism being in the position it would assume when it has been manually operated to release the bomb;

Fig. 3 is a view similar to Fig. 2, the releasing mechanism being in the position it would assume when it has been electrically operated to release the bomb;

Fig. 4 is a detail cross-sectional view taken on the line 4—4 of Fig. 1;

Fig. 5 is a detail fragmentary view partly in section of the manual control means;

Fig. 6 is a sectional plan view taken on the line 6—6 of Fig. 1; and

Fig. 7 is a fragmentary detail sectional plan view taken on the line 7—7 of Fig. 1.

Referring again to the drawings the framework or supporting structure of the shackle comprises two spaced plates 10—10 resistance welded or otherwise secured to a channel member 11.

Hooks 12 and 13 are pivoted at 14 and 15 in the plates 10 and the plates are suitably reinforced as indicated at 16 in the pivotal regions of the hooks. In the closed or locked position of the hooks their open ends abut studs 17 secured to and forming part of the plate reinforcing means and confine the rings or other suitable members 18 which carry the bomb (not shown), thus providing a two point support for the bomb.

The upper portions of the hooks 12 and 13 are pivoted at 19 to a longitudinally extending tie member 30. It will be apparent the hooks 12 and 13 and the tie member 20 are movable simultaneously, and furthermore the weight of the bomb as it hangs on the hooks tends to move the tie member toward the left and cause the hooks to move away from the studs 17 to release the bomb.

Releasable locking means for the tie member and its hooks are provided and this means is generally indicated by the reference numeral 25. Means indicated at 26 are provided for dropping the bomb armed or unarmed but as this means forms the subject matter of another application no further description of it is necessary.

The releasable locking means may be operated electrically or manually. Naturally the automatic electrically operated means is preferred but there is always the possibility of something going wrong electrically and it is therefore considered very important to provide a manually operated means which performs the same function as the electrically operated means and for the sake of simplicity utilizes the mechanical parts of the electrically operated means. The operation of the electrically controlled releasable locking means is particularly illustrated in Fig. 3 and this will now be described.

Fig. 1 shows the releasable locking means in its locked position, it being understood there is a bomb suspended in the shackle, and Fig. 3 illustrates the locking means in its released position, after having been electrically operated, to permit of the bomb being dropped. As heretofore stated the electrical parts of the releasable locking means are mounted as a unit to permit of their ready removal from or assembly with the shackle. For this purpose a channel member 30 is secured to the plates 10 by screws or pins 31 and 32. The electrical parts are mounted on the channel member as will be hereinafter apparent. The screws or pins 31, 32 are preferably made with a push fit so as to expedite removal when it is desired to substitute units.

A pawl 33 is pivoted on the pivot 19 of the hook 13 and tie member 20. The free end of

the pawl 33 engages a notch 34 in a pivoted lever, 35. The solenoid 36 is carried on a bracket 37 secured to or formed as part of the channel member 30. A link 38 is pivoted at 39 to the pawl 33 and has its opposite end pivoted on a pin 40 carried by the side plates 10. The tie member 20 is formed of a pair of spaced strips and in the locked position the pawl 33 and link 38 rest partly between the strips. The link 38 is U-shaped in cross section and blocks 41 secured to the sides of the link function as stops to limit the upward movement of the link by contacting with the strips forming the tie member. The end of the pawl 33 has a stop piece 42 secured to it and in the locked position of Fig. 1 this stop piece engages the top portion of the link 38 to maintain the parts in proper relation to each other.

The pivoted lever 35 is normally urged away from the solenoid by a spring 43 and when the solenoid is energized its core 44 is withdrawn and the notch 34 in the pivoted lever is moved out of engagement with the end of the pawl 33. The parts then instantaneously assume the position of Fig. 3 and the bomb is dropped.

A switch 45 is carried by the channel member 30 and the operation of this switch is controlled by a contact finger 46 carried by the pivoted lever 35. In operation when the shackle or rack is loaded the switch pin is not in contact with the finger 46. When the solenoid is energized the contact finger moves away from the switch pin but after the releasing mechanism has been tripped and the current cut to the solenoid the spring 43 moves the lever 35 and finger 46 to operate the switch and direct the electrical charge to the following station. The switch or a similar switch might be used to control a light or signal in the bombardier's station or any other part of the aeroplane.

As has been heretofore stated if for any reason the electrically controlled means for operating the releasing mechanism should fail, manually operated means are provided. The operation of the manually operated means is particularly illustrated in Fig. 2.

A trigger member 50 is pivoted on the pin 40 and this trigger member comprises a barrel portion 51 and a toe 52. The toe 52 rests in a stirrup 53 carried by the lever 35. The barrel portion 51 is hollow and has a buffer spring 54 confined therein; see Fig. 5. A pull cable 55 is secured to a necked plug 56 between which and the top of the barrel portion the buffer spring 54 is confined. The pull cable extends beyond the top of the shackle in the form of a loop and when it is pulled upward till the parts reach the position of Fig. 2 the toe 52 engages the end of the stirrup 53, the pivoted lever 35 is moved the same as if it were electrically operated and the bomb is dropped.

One end of a spring 57 engages a notch in the trigger 50 and forces the parts back to normal position when the pull cable 55 is released. The other end of the spring 57 engages the link 38 forming part of the toggle latching mechanism heretofore described. When the pawl 33 is disengaged from the pivoted lever 35 the spring 57 acts to break the toggle and move the hooks to their open position. The barrel portion of the trigger engages the pin 31 when the parts are in the release position of Fig. 2 and acts as a stop to prevent undue strain on the parts should excessive pressure be exerted on the pull cable.

The solenoid 36 is preferably weatherproofed as illustrated in Fig. 2. This is accomplished by slipping an elastic cap 60 over the end of the solenoid, the head of the solenoid plunger projecting through the cap. In this way any possibility of the solenoid failing due to corrosion of the end of the plunger is eliminated.

Throughout the specification and claims the device is spoken of as a shackle. It is thought to be obvious the release mechanism is just as applicable to a bomb rack or for that matter to any device for dropping bombs.

Changes in details of construction and arrangements of parts such as would occur to one skilled in the art are to be considered as coming within the spirit of the invention as set forth in the appended claims.

I claim:

1. A bomb releasing shackle having in combination, a supporting frame, bomb carrying hooks pivoted in said frame, a tie member connecting said hooks so they will operate simultaneously, a pawl pivotally mounted on the pivot of the tie member and one of its hooks, a link pivoted at one end to an intermediate portion of said pawl and at the other end to the frame, the pivot of the link and pawl being slightly offset in relation to a line drawn from the pivot of said hook and pawl to the pivot of said link on the frame when said hooks are closed, a solenoid mechanism including an actuating plunger mounted in said frame, and a pivoted lever mounted in said frame in angular relation to said pawl and link and operatively connected to said plunger, the free end of said pivoted lever engaging the free end of said pawl when the mechanism is in bomb supporting position so that said tie member and its hooks will be held in bomb supporting position and the bomb cannot be released until the solenoid is energized, said pivoted lever being on the same side of said pawl and link as the offset pivot thereof.

2. A bomb releasing shackle having in combination, a supporting frame, bomb carrying hooks pivoted in said frame, a tie member connecting said hooks so they will operate simultaneously, a pawl pivotally mounted on the pivot of the tie member and one of its hooks, a link pivoted at one end to an intermediate portion of said pawl and at the other end to the frame, the pivot of the link and pawl being slightly offset in relation to a line drawn from the pivot of said hook and pawl to the pivot of said link on the frame when said hooks are closed, a solenoid mechanism including an actuating plunger mounted in said frame, a pivoted lever mounted in said frame in angular relation to said pawl and link and operatively connected to said plunger, the free end of said pivoted lever engaging the free end of said pawl when the mechanism is in bomb supporting position so that said tie member and its hooks will be held in bomb supporting position and the bomb cannot be released until the solenoid is energized, said pivoted lever being on the same side of said pawl and link as the offset pivot thereof, and manually operated means for moving said pivoted lever the same as if the solenoid were energized.

3. A bomb releasing shackle having in combination, a supporting frame, bomb carrying hooks pivoted in said frame, a tie member connecting said hooks so they will operate simultaneously, a pawl pivotally mounted on the pivot of the tie

member and one of its hooks, a link pivoted at one end to an intermediate portion of said pawl and at the other end to the frame, the pivot of the link and pawl being slightly offset in relation to a line drawn from the pivot of said hook and pawl to the pivot of said link on the frame when said hooks are closed, a solenoid mechanism including an actuating plunger mounted in said frame, a pivoted lever mounted in said frame in angular relation to said pawl and link and operatively connected to said plunger, the free end of said pivoted lever engaging the free end of said pawl when the mechanism is in bomb supporting position so that said tie member and its hooks will be held in bomb supporting position and the bomb cannot be released until the solenoid is energized, said pivoted lever being on the same side of said pawl and link as the offset pivot thereof, a trigger pivoted in said supporting frame, and connections between said trigger and said pivoted lever so that manual operation of said trigger will move said pivoted lever the same as if the solenoid were energized.

4. A bomb releasing shackle having in combination, a supporting frame, bomb carrying hooks pivoted in said frame, a tie member connecting said hooks so they will operate simultaneously, a pawl pivotally mounted on the pivot of the tie member and one of its hooks, a link pivoted at one end to an intermediate portion of said pawl and at the other end to the frame the pivot of the link and pawl being slightly offset in relation to a line drawn from the pivot of said hook and pawl to the pivot of said link on the frame when said hooks are closed, a solenoid mechanism including an actuating plunger mounted in said frame, a pivoted lever mounted in said frame in angular relation to said pawl and link and operatively connected to said plunger, the free end of said pivoted lever engaging the free end of said pawl when the mechanism is in bomb supporting position so that said tie member and its hooks will be held in bomb supporting position and the bomb cannot be released until the solenoid is energized, said pivoted lever being on the same side of said pawl and link as the offset pivot thereof, a stirrup carried by said pivoted lever, and a trigger pivoted in said supporting frame, the trigger engaging said stirrup so that manual operation thereof will move said pivoted lever the same as if the solenoid were energized.

5. A bomb releasing shackle having in combination, a supporting frame, bomb carrying hooks pivoted in said frame, a tie member connecting said hooks so they will operate simultaneously, a pawl pivotally mounted on the pivot of the tie member and one of its hooks, a link pivoted at one end to an intermediate portion of said pawl and at the other end to the frame, the pivot of the link and pawl being slightly offset in relation to a line drawn from the pivot of said hook and pawl to the pivot of said link on the frame when said hooks are closed, a solenoid mechanism including an actuating plunger mounted in said frame, a pivoted lever mounted in said frame in angular relation to said pawl and link and operatively connected to said plunger, the free end of said pivoted lever engaging the free end of said pawl when the mechanism is in bomb supporting position so that said tie member and its hooks will be held in bomb supporting position and the bomb cannot be released until the solenoid is energized, said pivoted lever being on the same side of said pawl and link as the offset pivot thereof, a trigger pivoted in said supporting frame, connections between said trigger and said pivoted lever so that the manual operation of said trigger will move said pivoted lever the same as if the solenoid were energized, and spring means for returning said trigger to its normal position and for moving said pawl and said link so as to cause said hooks to open.

6. A bomb releasing shackle having in combination, a supporting frame comprising a pair of spaced main side plates, bomb carrying hooks pivoted in said frame, a tie member connecting said hooks so they will operate simultaneously, a pawl pivoted to the tie member and one of its hooks, a link pivoted at one end to an intermediate portion of said pawl and at the other end to the frame, the pivot of the link and pawl being slightly offset in relation to a line drawn from the pivot of said hook and pawl to the pivot of said link on the frame when said hooks are closed, a solenoid mechanism including an actuating plunger, and a pivoted lever mounted in said frame in angular relation to said pawl and link and operatively connected to said plunger, the free end of said pivoted lever engaging the free end of said pawl when the mechanism is in bomb supporting position so that said tie member and its hooks will be held in bomb supporting position and the bomb cannot be released until the solenoid is energized, said pivoted lever being on the same side of said pawl and link as the offset pivot thereof, said solenoid and its associated mechanism all being mounted and supported between said side plates of the frame.

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