DEVICE FOR CONTROLLING A FIRING PIN
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The present invention relates to means controlling a firing pin in mechanism intended particularly for use in equipment such as flame throwers, in the use of which conditions are met which are not encountered in other armament or other equipment put into operation by a firing pin.

A flame thrower is relatively bulky and dangerous to carry through underbrush unless unusual care is taken to provide protection for the firing mechanism to prevent operation thereof by snagging on twigs and the like.

Because of the special circumstances in which it is used, it is necessary to require to fire the flame thrower by remote control, the weapon having been lashed in position, for instance by a scouting party in the absence of the enemy from the point to be attacked.

Further, the flame thrower will often be laid on the ground subject to extreme dampness or even dropped in fresh or salt water, and therefore, an operating mechanism should be well protected against entry of moisture which would deteriorate the working parts.

It is an object of the invention to provide a device controlling a firing pin which can be readily attached to a flame thrower of the type in which the fuel tank is pressurized by a charge of propellant material which utilizes a cartridge for ignition.

Another object is to provide a simple and light firing mechanism provided with safety means preventing accidental release of the firing pin under the most unfavorable conditions.

With the above and other objects in view, as will appear from the following specification read in conjunction with the accompanying illustrative drawings, the invention comprises a device controlling a firing pin, which device is enclosed in a tubular housing enclosing all of the mechanism and which may be readily secured in operative position to the flame thrower or other device. The mechanism comprises a push-pull firing member and a safety member required to be operated together with the push-pull member when operating the mechanism with a push but not when operating the mechanism with a pull.

FIG. 1 is a side elevation of the trigger housing, the figure being broken to reduce its length;
FIG. 2 is a top plan view of the part shown in FIG. 1; FIG. 3 is a section on the line 3—3 in FIG. 2 drawn on a larger scale;
FIG. 4 is a section on the line 4—4 in FIG. 2 drawn on a larger scale;
FIG. 5 is a section on the line 5—5 in FIG. 4, and FIG. 6 is a detail perspective of one of the detent pawls shown in FIGS. 4 and 5.

Referring now to FIGS. 1 and 2 of the drawings, the trigger housing is indicated at 10, the housing having a mounting bolt 11 at its rear end at which an axially operated firing means or trigger 12 is mounted. The firing pin 13, shown at the forward end of the trigger housing, projects from a tubular guide 14 which is engage in a tubular member in the head (not shown) of the flame thrower. A small tubular housing 15 projects laterally from and is welded to the trigger housing toward the forward end thereof, and serves to mount both a safety pin and a safety latch member later described, both trigger and safety member requiring to be operated to fire the flame thrower after the safety pin has first been removed.

The parts arranged at the rear end of the trigger housing are shown in detail in FIG. 3 in which the tubular trigger housing 10 is shown spun inward at its rear end to retain a push or pull trigger or firing member 17 held yieldably toward, but spaced from, end 16 by a coiled spring 18 shown in relaxed condition. The position of member 17 in unoperated position is determined by the trigger operating mechanism in cocked position, as will later appear. The rear end of housing 10 is closed by a rubber cap 19 forming a water-tight closure. The rear end of member 17 is formed as a button 20 projecting through the end of housing 10 to abut against the cap 19.

Button 20 is drilled to receive a ring 21 to which a lanyard may be attached after cap 19 has been removed; if it is desired to fire the flame thrower by remote control, in this event the flame thrower is lashed to a tree or otherwise secured in position.

Member 17 is rigidly secured to a tube 22 by pin 23, the tube 22 connecting member 17 rigidly to the trigger releasing mechanism (shown in FIGS. 4 and 5) which is arranged within tubular housing 10 adjacent to the laterally projecting tubular housing 15.

The trigger releasing mechanism is mounted on a generally conical hollow member 24, shown in FIGS. 4 and 5, which acts as a pawl spreader. Member 24 is provided with a cylindrical surface 25 which is a sliding fit within the tubular housing 10. The rear end of member 24 is machined to interfit with tube 22 and is rigidly secured thereto by pin 25. The rear end of member 24 is also formed to provide double cam-surface recesses 27, 28, axial movement of member 24 in either direction bringing one or the other of the cam-surfaces into operation.

A pair of flat plate-like pawl members 29, 30, are pivotable at their forward ends on pins 31 and 32 secured in a transverse slot 33/axially bored forward closure member 33 extending for a distance into the end of the tube 10 and projecting forwardly from it to mount the forward portion or extension 34 of the housing 10. Pawls 29 and 30 are formed at their free ends with double angular cam surfaces 35 and 36, fitting in the recesses 27 and 28, and intermediate their lengths with oppositely arranged detent shoulders 37, 38. The member 24 is slotted, as indicated at 39, 40, to receive paws 29, 30, and enable them to swing about their pivots when member 24 is axially displaced in either direction. Pins 41 and 42 (FIG. 6) are arranged to project vertically from both surfaces of the free ends of the pawls, and coiled springs 43, 44 (FIG. 4) are mounted between the pins of opposite pawls and act to hold the double cam-surfaces thereof yieldably against the cam-surfaces of the pawl spreader member 24.

Intermediate the length of each pawl member 29, 30, a locking tongue 45 and 46 is provided, which curves around a central rearward projection 33A of member 33. A trigger plunger 47 is mounted in the bore of member 33, and in the cocked condition of the trigger, projects into the conical pawl spreader 24. A detent shoulder 48 is machined in the plunger 47 and is engaged by the detent shoulders 37, 38, of pawls 29, 30, in the cocked condition of the trigger.

A safety pin 49 mounted in housing 15 extends into holes, aligned in the cocked position, drilled through the locking tongues 45 and 46, through the central projection 33A of member 33 and through the trigger plunger 47. Pin 49 is secured to a cap 50 which is a push fit on the head of housing 15 which is increased in diameter at 51 and counterbored to receive a coil spring 52, the purpose of which is later explained.
An O ring seal 53 is positioned between cap 50 and the surface of the head 51.

It will be evident that until the safety pin 49 is withdrawn from engagement with the parts 45, 46 and 47, of the firing mechanism, no movement of those parts can take place.

Shank 49a of safety pin 49 is nested in a tube 54 functioning as a safety latch which is a sliding fit in housing 15 but is limited in its upward or outward movement by a threaded stud 54a mounted in housing 15 with the end of the stud engaging in a slot 56 in the wall of tube 54. A centrally apertured cap 57 is threaded onto the upper end of the tube 54, shank 49a being withdrawn through cap 57. The coil spring 52 is held under compression between the lower edge of the cap 57 and a shoulder 51a in the enlarged upper end 51 of tube 15 and holds the lower end of slot 56 against the inner end of threaded stud 54a.

The lower end of tube 54 is slotted part way through as indicated at 58 and in the unoperated position of the tube a solid surface 54b of the tube lies in position across the forward edge 24a of the spreader member 24 and prevents any forward movement of this member although it does not prevent backward movement of the spreader member. The threaded stud 54a and slot 56 act to maintain a solid surface 54b in registration with the edge of the member 24.

The forward portion 34 of the trigger housing contains the firing spring 59 which is placed under compression between the forward end of member 33 and the rearward face of a cylindrical portion 60 of the firing pin plunger 47, which is shown as reduced in diameter between the rearward portion guiding the plunger in member 33 and cylindrical portion 60. Plunger 47 continues through the extension 34 of the trigger housing and is reduced in diameter at its forward end to form the firing pin 35.

The forward movement of the plunger is limited by forming the forward end portion 61 of the housing extension of less diameter than the diameter of the cylindrical portion 60 of the firing pin plunger which abuts the forward end of the enlarged bore containing the spring when the firing pin is released.

Operation

It is assumed that the equipment such as a one-shot flame thrower, to which the trigger is secured, is in condition for use and that the operator intends to discharge the equipment in the immediate future. The trigger would have been previously cocked when loading the flame thrower, this latter operation having been effected by pushing the firing pin rearwardly until paws 29 snap over the shoulders 48 on the firing pin plunger 47.

The safety pin 49 is first withdrawn and laid aside, thus readying the equipment for use. The operator then grasps the equipment with both hands, the thumb of his right hand resting against the center of cap 19, in position to push forward against the button 17, and the thumb of his left hand in position to push the cap 57 inwardly. To fire the equipment, the operator must first push cap 57 to the limit of its movement, which is very small, and then press forward on cap 19, button 17 moving with the center of the cap, thus spreading the paws and releasing the firing pin plunger enabling the compressed firing pin spring 59 to throw the firing pin 13 forward against the detonating device or other charge releasing means. The required travel of the cooperating manually operated parts is so short that their operation may be considered to be simultaneous.

If a lanyard is to be used, owing to particular circumstances making it necessary to discharge the equipment from a distance, the cap 19 is withdrawn and, before removing the safety pin, the lanyard is secured to ring 21 which is sized so that it may be swung through the open end of tube 10, and the equipment fixed in position for instance by lashing it to a tree. A pull on the lanyard will move the spreader 24 rearwardly, since there is no obstruction to its rearward movement, resulting in spreading the cam plates and releasing the firing pin plunger.

The trigger of this invention is particularly designed for one-shot operation, that is to say, the equipment to be recharged after each discharge and the device detonated by the firing pin removed, enabling the trigger to be recoded by pushing back the firing pin before a fresh detonator is inserted.

The safety pin invention is especially well protected against accidental discharge and for complete safety while charged until the equipment is to be used, but it will be obvious that various changes may be made by those skilled in the art without departing from the scope of the invention as defined by the appended claims.

We claim:

1. A device for controlling a firing pin, comprising: an elongated tubular housing; a firing pin projectable from the forward end of said housing; resilient means mounted in said housing and placed under compression by forcing said firing pin rearward in said housing and projecting said firing pin forwardly when released from compression; dentil paw means pivoted at one end in the housing and extending longitudinally in said housing, said paw means having double cam surfaces formed at one free end and a dentil having immediate their length; paw releasing means guided for axial movement in the tubular housing and arranged to engage with said paw means, said paw releasing means having an indentation thereon adapted to engage the double cam surface on the paw means and release said paw means when the paw releasing means is moved either forward or backward in the housing; a pushpull member mounted at the rear end of the housing; a part connecting said paw releasing member to said push-pull member; and a safety firing member preventing movement, until released, of the paw releasing means by pushing movement of said push-pull member but enabling said paw releasing member to move on a pulling movement of said push-pull member.

2. A device for controlling a firing pin, comprising: an elongated tubular housing; a firing pin projectable from the forward end of said housing; resilient means mounted in said housing and placed under compression by forcing said firing pin rearward in said housing and projecting said firing pin forwardly when released from compression; a pair of plate-like members to lie in a common plane, each pivoted at one end in said housing and formed at the inwardly facing edges of the free ends with double cams, and denting shoulders intermediate their length; an elongated member transmitting force between said resilient means and said firing pin, extending rearwardly from the firing pin between said plate-like members and having denting surfaces in said rearwardly extending portion adapted to be engaged by the denting shoulders of the plates, resilient means tending to hold the shoulders of the plates into engagement with the denting surfaces of said rearwardly extending portion of said elongated member; a dent release member guided for axial movement in the tubular housing and formed with double cam surfaces fitting with the double cam surfaces of said plates and effective by movement axially in either axial direction to move said plates out of engagement with the shoulders on the rearward portion of said elongated member; a safety firing member normally projecting into the path of forward movement of said dent release member but permitting rearward movement of said dent release member; a push-pull member mounted in the rear end of the tubular housing; a part connecting said push-pull member and said dent release member.

3. A device as set forth in claim 2 and in addition comprising: said plate-like members formed with parts overlying on one another and said dent release member, the overlying parts being provided with apertures which are in alignment in the cocked condition of the device; and
a safety pin member inserted through said aligned openings to prevent any relative movement of the parts of the device until the safety pin member is moved out of said aligned apertures.

4. A device as set forth in claim 3 and in which said safety firing member is formed as a tube and the safety pin member is formed as a rod nested in said tube and formed as a pin at its inner end; a tubular housing welded at its inner end to said elongated tubular housing and enclosing said tubular safety firing member; a cap secured to said pin and removably closing the outer end of the tubular housing; a centrally apertured cap secured to the outer end of the tubular safety firing member and enclosed within the cap of the safety pin member; a member mounted in said tubular housing to limit upward movement of said tubular safety firing member but to permit downward movement thereof; and resilient means between the cap of the safety firing member and the tubular housing effective to hold said tubular safety firing member normally against said limiting member and in position to prevent forward movement of said detent releasing member.

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