March 27, 1945. B. P. JOYCE 2,372,327

FIRING CONTROL MECHANISM

Filed April 20, 1942 4 Sheets-Sheet 1

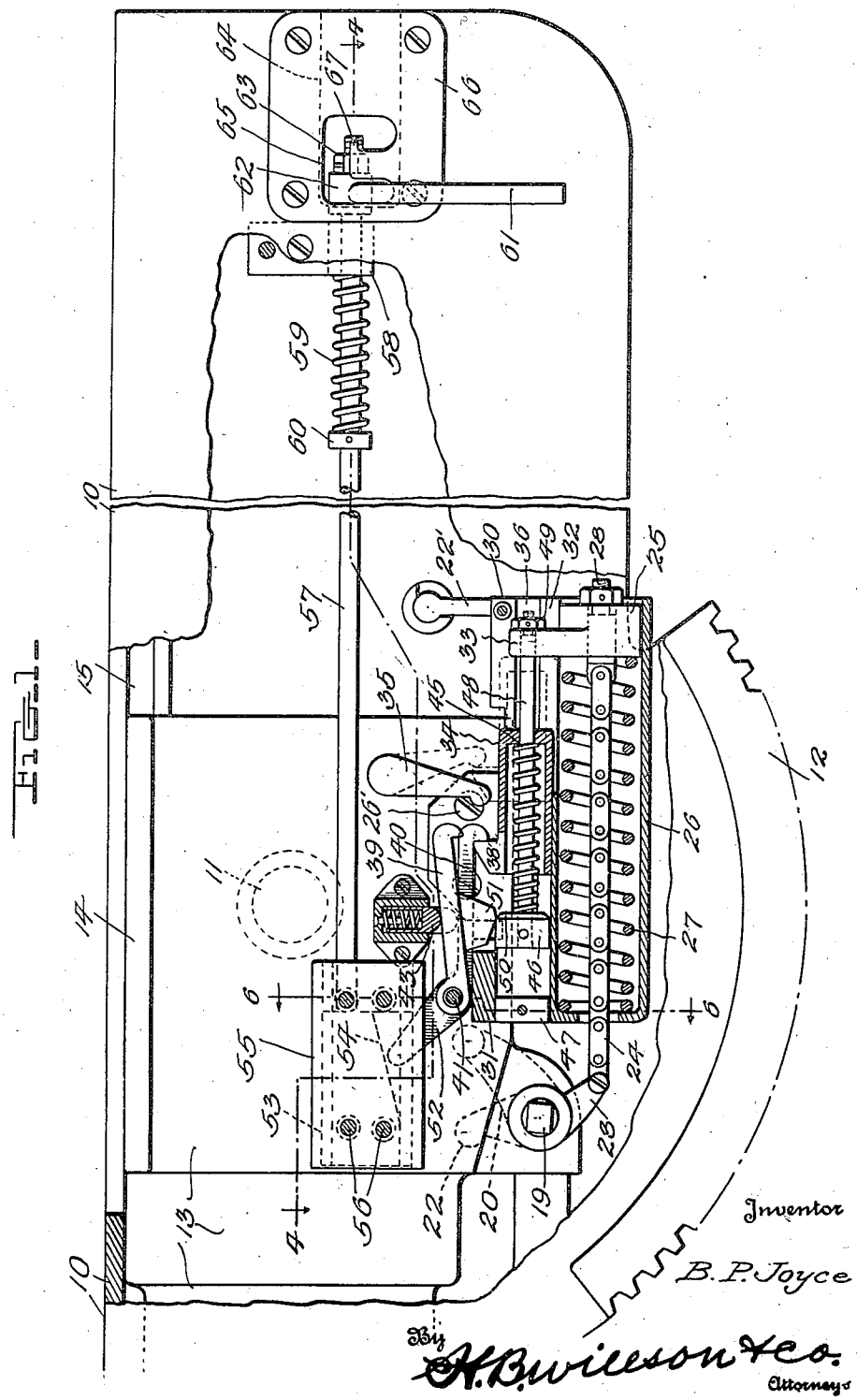


Fig. 1.

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FIRING CONTROL MECHANISM

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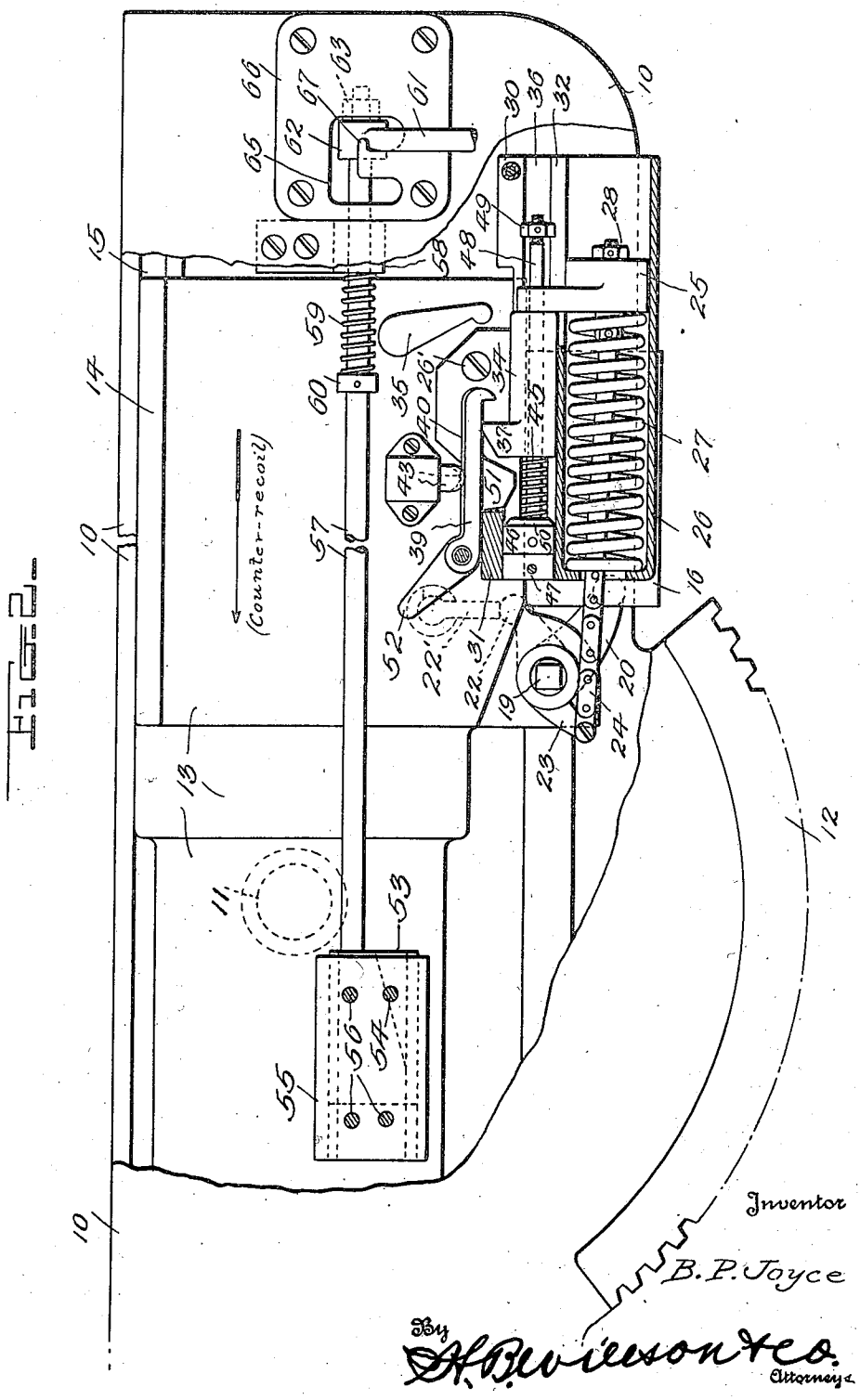


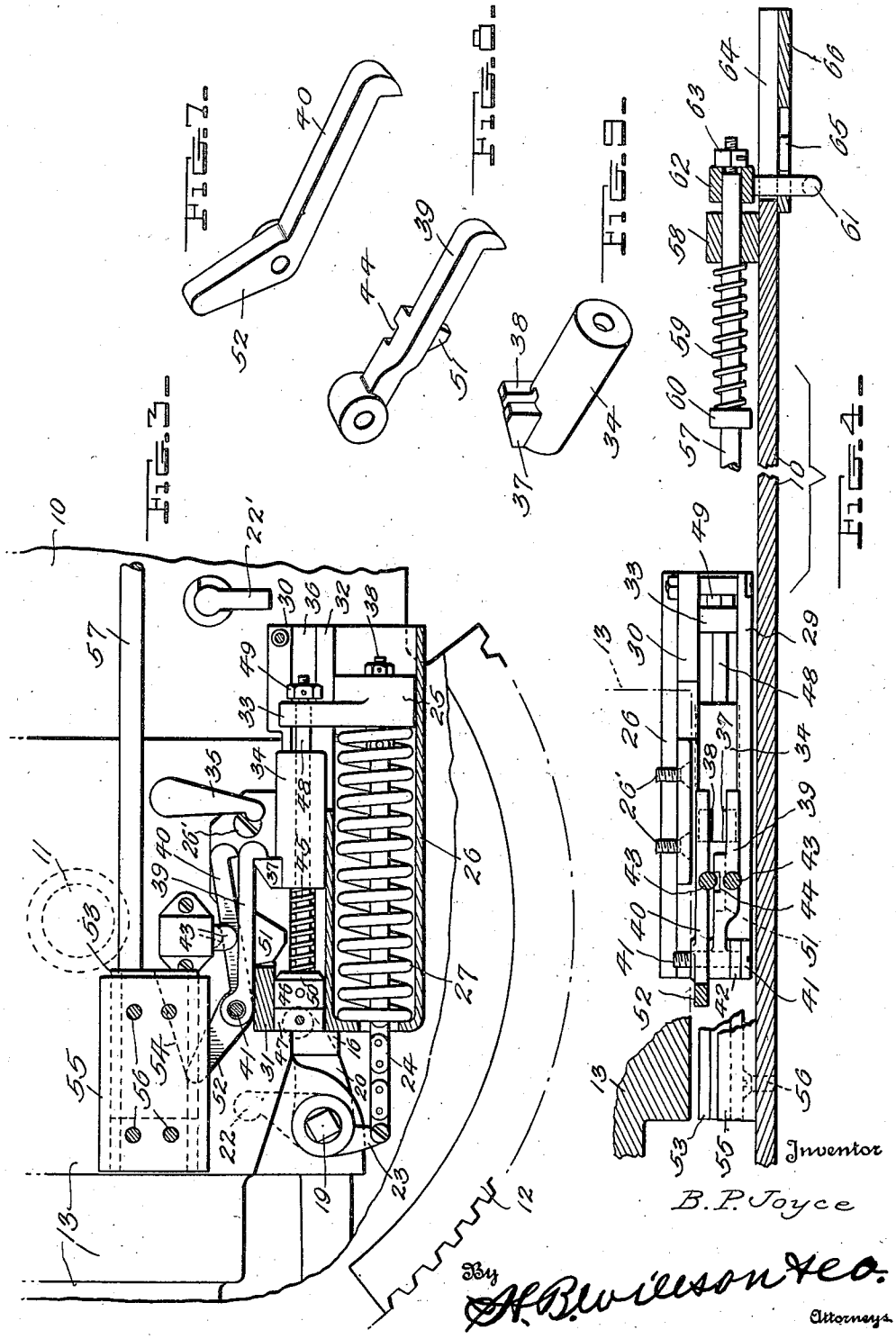
FIG. 2.

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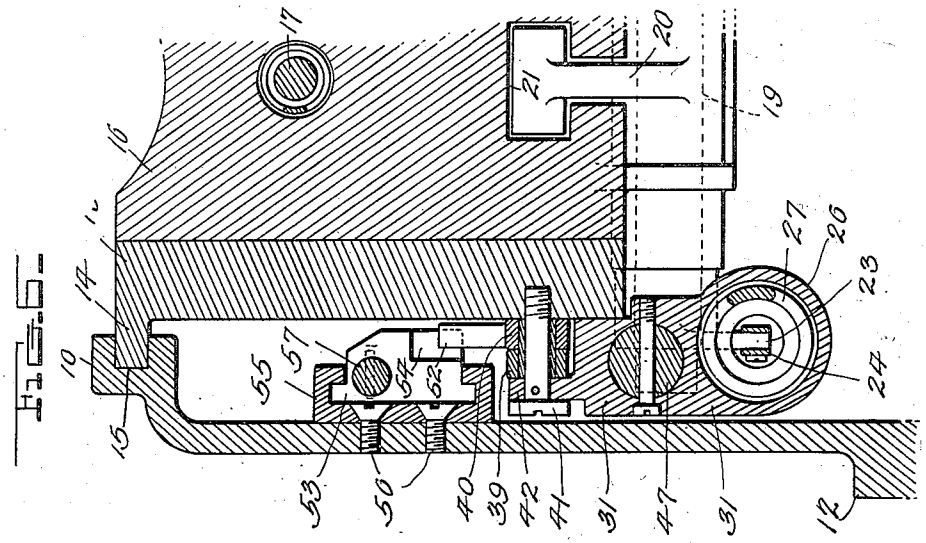
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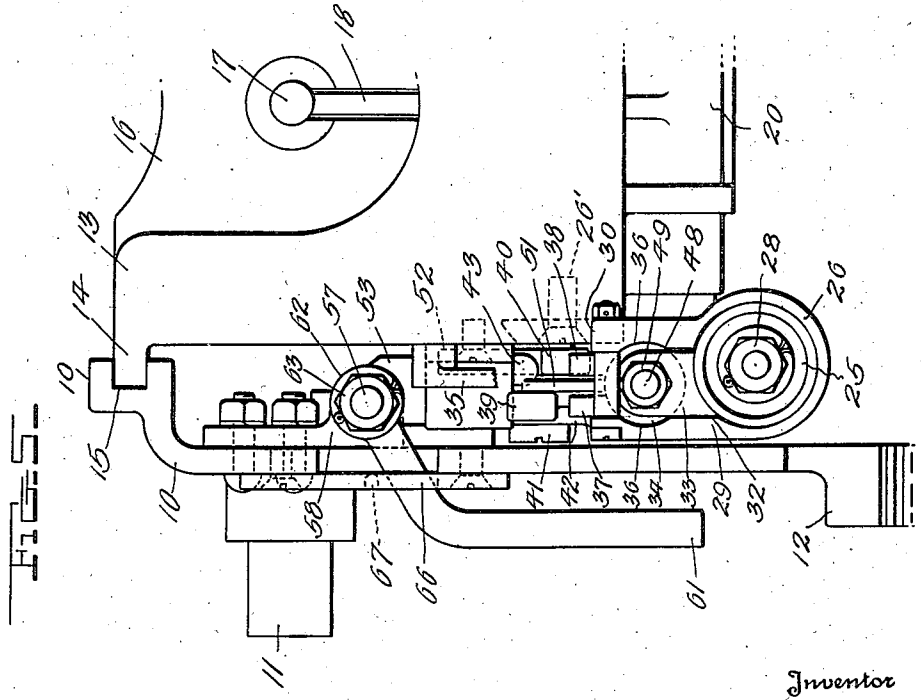


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FIRING CONTROL MECHANISM

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2,372,327

UNITED STATES PATENT OFFICE

2,372,327

FIRING-CONTROL MECHANISM

Bryan P. Joyce, East Orange, N. J.

Application April 20, 1942, Serial No. 439,743

10 Claims. (Cl. 89—27)

The invention relates primarily to an ordnance mechanism, having automatic round-feeding means, automatically and manually operable firing mechanism, and a barrel which recoils and counter-recoils on a cradle, a mechanism of this general type being disclosed in U. S. Patent #2,142,132, issued to me on January 3, 1939, on a Gun-firing mechanism.

The invention aims to generally improve and simplify the mechanism disclosed in the above mentioned patent, and it provides a structure in which costly hand-fitting of parts is not essential, whereas in the patented mechanism such fitting was necessary, to prevent accumulation of tolerances from interfering with gun operation.

With the foregoing in view, the invention resides in the novel subject matter hereinafter described and claimed, description being accomplished by reference to the accompanying drawings.

Fig. 1 is a side elevation partly broken away and in section showing the gun barrel in battery position and the firing control means in readiness for hand-firing.

Fig. 2 is a view similar to Fig. 1 but showing the firing control means set for automatic operation and illustrating the gun barrel during its counter-recoil stroke.

Fig. 3 is a fragmentary view similar to Figs. 1 and 2 but showing the gun barrel back to battery position with the parts in the positions which they occupy immediately before the final closing movement of the breech block.

Fig. 4 is a horizontal sectional view substantially on the irregular line 4—4 of Fig. 1.

Fig. 5 is a fragmentary rear elevation.

Fig. 6 is a vertical transverse section substantially on line 6—6 of Fig. 1.

Figs. 7 and 8 are perspective views of the two latches for the spring-operated trigger actuator.

Fig. 9 is a perspective view of the trigger actuator.

Preferred features of construction have been illustrated and will be rather specifically described, with the understanding, however, that variations may be made within the scope of the invention as claimed.

A portion of the gun cradle is illustrated at 10, its trunnions at 11, and one of the segments used for elevation and depression, at 12. The gun barrel which is reciprocably mounted on the cradle for recoil and counter-recoil, is illustrated at 13, the posterior portion of this gun barrel being provided with lateral ribs 14 slidable in guide grooves 15 in the side walls of the cradle 10. The gun barrel 13 is provided with a vertically slidable breech block 16 movable from a raised closed position to a lowered open position in order that empty shell cases may be ejected and rounds supplied from a magazine or the like (not shown). The breech block carries a firing pin 17 (Figs. 5 and 6) with which a sear lever 18 is associated in a known manner, for instance, as shown in Patent 2,142,132, above mentioned. At this point, it may also be stated that the breech block is locked in its lowered position in a known manner, until a round has been forced entirely into position in the rear end of the gun barrel. This breech block locking means may virtually duplicate that shown in Fig. 7 of the above mentioned patent.

A transverse rock shaft 19 mounted on the gun barrel, is provided with an arm 20 operable in a T-groove 21 (Fig. 6) in the breech block 16, for lowering said breech block when said shaft 19 is turned in one direction, and for again raising said breech block when said shaft is turned in the other direction. For turning the shaft 19 in breech block lowering direction, it is provided with an arm 22 cooperable with a one-way abutment 22' on the cradle 10 as seen in Fig. 2. During recoil of the gun barrel, the arm 22 simply clicks past the abutment 22', but upon counter-recoil, said arm is swung by said abutment as seen in Fig. 2, thus turning the shaft 19 and operating the arm 20 to lower the breech block 16. When the breech block is lowered, it is locked in lowered position by the means above mentioned or its equivalent (see Fig. 7 of Patent 2,142,132).

The shaft 19 carries a third arm 23 which is connected to the front end of a chain 24, the rear end of this chain being connected with a piston 25 slidable in a horizontal guide cylinder 26 which is secured at 26' to the rear portion of the gun barrel 13 alongside one of the vertical longitudinal sides thereof. Within the cylinder 26 and interposed between the piston 25 and the front wall of said cylinder, is a coiled spring 27. When the shaft 19 is turned in breech block lowering direction (see Fig. 2), the piston 25 is pulled forwardly and highly compresses the spring 27 and this of course occurs either when said shaft 19 is initially turned by hand to place the first round in the gun barrel or when said shaft is turned by means of the coacting elements 22 and 22' upon counter-recoil. In either case, the breech block is locked down by the means above mentioned

until the round is fully placed in the gun barrel with the latter at battery position, whereupon said means is released with the result that the spring 27 forces the piston 25 rearwardly, causing chain 24 and arm 23 to turn shaft 19 in a direction to again close the breech block.

The elements so far briefly explained are disclosed in the patent above referred to but coacting with them are new elements to be hereinafter described. It may be explained in passing that the connection between the chain 24 and the piston 25 in the improved gun, preferably includes an adjustment 28.

The cylinder 26 is provided with spaced upstanding longitudinal walls 29 and 30, the front ends of which are integrally joined to each other by a head 31, the space between the rear ends of these walls being in communication with the rear end of said cylinder 26 by means of a slot 32. The piston 25 is provided with a lug 33 projecting upwardly through this slot into the space between the walls 29 and 30. Slidably guided in this space is an actuator 34 for the usual sear or trigger 35 of the gun, said actuator 34 being in the forward path of the lug 33 to be moved forwardly to cocked position by the forward movement of the piston 25 during breech block lowering or opening. The actuator 34 is cylindrical in the present disclosure and is guided in shallow grooves 36 in the inner sides of the walls 29 and 30, said actuator being provided with two upwardly projecting lugs 37 and 38 respectively. These lugs are cooperable with two pivoted latches 39 and 40 respectively, the front ends of which latches are pivotally mounted on a screw or the like 41 which passes through an upstanding ear 42 on the head 31 at the front end of the cylinder 26, said screw being threaded into a portion of the gun barrel 13 as seen in Fig. 6. The two latches 39 and 40 are cooperable with the two lugs 37 and 38 of the trigger actuator 34 to hold the latter in its forwardly cocked position, as will be hereinafter more fully explained. Spring-pressed pins 43 are employed to exert a constant downward pressure on the two latches 39 and 40. Due to a manufacturing preference, the pin 43 for the latch 40 is not directly over the center of this latch, as seen in Figs. 4 and 5, and in order to prevent said pin from striking the latch 39, this latch is notched as seen at 44 in Figs. 4 and 8.

An operating spring for the trigger actuator 34, is shown at 45, the rear end of said spring being disposed against a portion of said actuator while the front end of said spring contacts with an abutment 46 which is slidable in the grooves 36 above described, said abutment 46 being forwardly slidable against a fixed stop 47 within the head 31 when the piston lug 33 forces the trigger actuator 34 forwardly to the extreme upon breech block opening. A rod 48 is secured to the abutment 46 and extends rearwardly through the spring 45, said rod passing slidably through the actuator 34 and through the lug 33 of the piston 25. The rear end of this rod 48 is provided with a second abutment 49 cooperable with the lug 33, said abutment 49 being preferably in the form of a nut which may be adjusted as required and then locked. The rear portion of the front abutment 46 is provided with a cam 50, which cam is cooperable with a cam lug 51 projecting downwardly from the latch 39, each time the abutment 46 moves rearwardly from the stop 47. This rearward movement of abutment 46 is effected by the lug 33 of the piston 25 striking the abutment 49 of the rod 48 and pulling this rod rearwardly, and this rearward pull does not occur until the breech block is practically closed. (See Fig. 3.) When the abutment 46 is moved rearwardly under lug 51, this lug releases the latch 39 from the lug 37 of the trigger actuator 34, thus releasing this trigger actuator to operate the trigger 35 unless the latch 40 be then in lowered position. It will thus be seen that upon final breech block closing, the trigger actuator 34 will be freed and will operate the trigger 35 unless operation of said actuator be then prevented by the latch 40. If this latter be the case, latch 40 will prevent firing of the gun until released by hand, by means hereinafter described. In this connection, attention may be invited to Fig. 1 in which the breech block is entirely closed, abutment 46 has released latch 39, and latch 40 is still holding the lug 38 of the trigger actuator 34 so that the gun cannot be fired until 40 is released by hand. Whenever the actuator 34 is released from its cocked position, it strikes the trigger 35 when it moves rearwardly, swinging this trigger as shown in dotted lines in Fig. 1 and finally coming to rest against the lug 33 of the piston 25, in readiness to again be moved forwardly to cocked position when said piston 25 is moved forwardly upon breech block opening.

The pivoted front end of the latch 40 is provided with a forwardly inclined releasing arm 52 which is instrumental in releasing said latch 40 (from the Fig. 1 position) when the gun is to be fired by hand, and is also instrumental in holding said latch 40 against engagement with lug 38 of trigger actuator 34 when the parts are set for automatic operation and the gun barrel returned to battery.

A releasing device for releasing the latch 40 by cooperation with its releasing arm 52, is shown in the form of a slide 53 mounted on the cradle 10 and having a cam 54 for coaction with said releasing arm 52. When the slide 53 occupies the forward idle position shown in Fig. 1, it is out of contact with arm 52 but is in readiness to depress said arm 52 when said slide is pulled rearwardly by hand, thus effecting hand firing of the gun. To produce single-shot operation, the slide 53 must be pulled rearwardly and promptly returned forwardly. If the slide 53 be pulled to the rearward position of Figs. 2 and 3, and locked in this position, it will first effect hand-firing of the first charge and will then be set for automatic gun operation. In this connection, consider Fig. 2 in which the gun is moving forwardly on its counter-recoil stroke, with the arm 52 of the latch 40 moving toward the rearwardly locked slide 53. As the gun reaches battery position, arm 52 strikes the cam 54 of the slide 53, thus moving said latch 40 to the released position shown in Fig. 3, leaving the trigger actuator 34 latched in cocked position only by means of the latch 39. It will be recalled that the breech block 16 is not yet entirely closed. When its final closing movement occurs, the concurrent final rearward movement of the piston 25 jerks rearwardly on the rod 48, thus causing the cam 50 of the abutment 46 on the front end of said rod to engage the lug 51 of latch 39, releasing this latch from the actuator 34 and permitting the latter to move rearwardly under the stress of its operating spring 45, causing one of the lugs of said actuator to strike the trigger 35 and fire the gun. This firing it will be seen, will occur automatically upon final breech block closing. Whenever the parts return to battery position, however, if slide 53 then occupy its forward position (Fig. 1), even though the latch 39 will be released upon final breech block clos-

ing, latch 40 will hold the actuator 34 in cocked position until said latch is released by manually moving the slide 53 rearwardly. It will, therefore, be seen that the gun may either be operated by hand or set for automatic operation.

The slide 53 in the present disclosure is mounted in a suitable guide 55 secured by screws or the like 56 to the inside of the cradle 10. A rod 57 is secured to this slide and extends rearwardly from it, the rear portion of said rod passing slidably through an appropriate guide 58 secured to the cradle. A compression spring 59 surrounds the rod in front of the guide 58 and bears against the collar 60 on said rod to normally force this rod and the slide 53 forwardly to the idle position of Fig. 1. A lateral handle 61 on the rear end of the rod 57 serves as means to pull said rod rearwardly to the latch-releasing position of Figs. 2 and 3, and said handle acts also as part of the means for locking said slide 53 in said latch-releasing position. In the present showing, the handle 61 is provided with a hub 62 rotatable upon the rod 57 and abutting the front side of an abutment 63 on said rod, said abutment being preferably in the form of an adjustable nut. The handle 61 passes outwardly through a slot 64 in the cradle 10 and through an arched slot 65 in a plate 66 secured against the outer side of the cradle. With the slide 53 in its forward idle position (Fig. 1), the handle 61 is in the front leg of the slot 65. When the gun is to be fired by hand, the handle 61 is swung upwardly and pulled rearwardly, thus causing slide 53 to coact with the releasing arm 52 of the latch 40 to release the latter. A single shot may be fired by pulling the handle 61 rearwardly and releasing it. If slide 53 is to be locked in its rearward position (Figs. 2 and 3), for automatic gun operation, this may be done by swinging the handle 61 downwardly into the rear leg of the arched slot 65. A safety finger 67 is preferably employed on a wall of the slot 65 to prevent the handle 61 from jarring out of the rear leg of said slot (see Fig. 2).

Operation

Reference is first made to Fig. 1 showing the various parts in battery position in readiness for hand firing of the gun. It will be observed that the trigger actuator 34 is held in cocked position by the latch 40, even though the latch 39 is being held in released position by the abutment 46 and cam lug 51. To fire the gun by hand, the handle 61 is swung upwardly and pulled rearwardly, thus pulling rod 57 and slide 53 rearwardly and causing the cam 54 of said slide to depress the operating arm 52 of the latch 40, thus disengaging this latch from the actuator 34 and permitting the spring 45 to force said actuator to the right as seen in dotted lines in Fig. 1, thereby actuating the trigger 35 to fire the gun. If the handle 61 be promptly returned to the front end of the arched slot 65, after firing the first shot, the parts will occupy the positions shown in Fig. 1 after recoil and counter-recoil of the barrel 13 occur, the gun being then in readiness to be fired a second time by hand. In Fig. 2, however, it has been assumed that the parts while standing as in Fig. 1, were brought into operation by pulling the handle 61 rearwardly and shifting it downwardly into the rear end or leg of the slot 65, thereby not only pulling the slide 53 rearwardly to fire the first round, but locking said slide 53 in its rear position. It has been also assumed in Fig. 2 that the first round has caused recoil of the gun barrel 13 on the cradle 10 and that counter-recoil of said barrel is now occurring. During this counter-recoil, it will be seen that arm 22 on shaft 19 strikes the one-way abutment 22', causing such turning of the shaft 19 as to open the breech block 16 for shell case ejection and reloading. This turning of shaft 19 caused arm 23 and chain 24 to pull piston 25 forwardly. The forward movement of this piston has caused the lug 33 to slide the trigger actuator 34 forwardly until the lugs 37 and 38 have clicked under and passed beyond the bills of the latches 39 and 40. This forward movement of the actuator 34 has caused compression of the spring 45 and has caused this spring to thrust against the abutment 46 and move this abutment and the rod 48 forwardly into contact with the stop 47. The lug 33, it will be observed has slid forwardly on rod 48 after this rod was arrested by the stop 47. The breech block 16 remains locked in its depressed position by the conventional means shown for instance in Fig. 7 of Patent 2,142,132 until the gun is reloaded, whereupon said locking means is released and spring 27 expands to effect breech block closing. As the gun barrel 13 continues to move forwardly from the position of Fig. 2, the releasing arm 52 of the latch 40 will strike the cam 54 of the slide 53 as will be clear from Fig. 3, causing movement of said latch 40 to released position. As the breech block is permitted to close and piston 25 moves rearwardly, the actuator 34 also moves rearwardly to the limit allowed by the latch 39, this latch serving to hold said actuator 34 in the cocked position of Fig. 3 until the final closing movement of the breech block occurs. This final breech block closing movement and the concurrent final rearward movement of the piston 25 cause the lug 33 of the latter to jerk rearwardly upon the rod 48, thus causing the cam 50 of the abutment 46 on said rod to engage the cam lug 51 of the latch 39, with the result that this latch is released, freeing the trigger actuator 34 which is then operated by the spring 45 to operate the gun-firing trigger 35.

If desired, with the parts standing as in Fig. 3, the shaft 19 may be turned by hand with the use of a suitable wrench and the first round may be placed in the gun by hand. When the breech block closes, the cam 50 will release the latch 39 and the gun will immediately fire. If the slide 53 be set as in Fig. 1, however, when performing the operation just mentioned for hand loading, the latch 40 will prevent firing upon breech block closing, until the slide 53 is pulled rearwardly by means of the handle 61.

From the foregoing taken in connection with the accompanying drawings, it will be seen that novel and advantageous provision has been made for carrying out the desired end, and while preferred details have been disclosed, attention is again invited to the possibility of making variations within the scope of the invention as claimed.

What is claimed is:

1. In an ordnance mechanism, a cradle, a recoiling and counter-recoiling gun barrel mounted on said cradle, a breech block and a firing trigger carried by said barrel, automatic operating means for opening and closing said breech block including a forwardly and rearwardly movable member mounted on said barrel, said member being movable forwardly during breech block opening and movable rearwardly during breech block closing, a spring-operated actuator for said trigger, means mounting said actuator on said barrel for forward movement to cocked position and rearward movement to trigger-operating

position, said trigger actuator being in the forward path of said forwardly and rearwardly movable member to be moved forwardly to cocked position by the forward movement of this member as the breech block opens, two latches mounted on said barrel for engagement with said trigger actuator to latch the same in said cocked position, latch-releasing means connected with said forwardly and rearwardly movable member and actuated by the final rearward movement of this member upon breech block closing for automatically releasing only one of said latches from the cocked trigger actuator, a releasing device for the other latch, said releasing device being mounted on said cradle for movement from an idle position to a latch-releasing position, and gunner-controlled means on said cradle for shifting said latch-releasing device to either of said positions, said other latch having a releasing portion located to move forwardly against said latch-releasing device to automatically move said other latch to its released position upon each counter-recoil stroke of said barrel as long as said latch-releasing device remains held in said latch-releasing position, whereby for automatic gun operation said latch-releasing device may be held in said latch-releasing position to prohibit said other latch from holding said trigger actuator in said cocked position upon freeing of said trigger actuator by the release of said one latch, and for single-shot gun operation said latch-releasing device may remain in said idle position to allow said other latch to hold said trigger actuator in said cocked position after release of said one latch until said other latch is released by manual movement of said latch-releasing device to said latch-releasing position.

2. In an ordnance mechanism, a cradle, a gun barrel mounted on said cradle for recoil and counter-recoil, a breech block and a firing trigger carried by said barrel, operating means for opening and closing said breech block including a forwardly and rearwardly movable member carried by said reciprocatory barrel and movable forwardly during breech block opening and rearwardly during breech block closing, an actuator for said trigger, means mounting said actuator on said reciprocatory barrel for forward movement to cocked position, and rearward movement to trigger-operating position, said trigger actuator being in the forward path of said forwardly and rearwardly movable member to be moved to cocked position by the forward movement of this member, a latch mounted on said reciprocatory barrel and engageable with said trigger actuator for holding said trigger actuator in cocked position, means operatively connected with said forwardly and rearwardly movable member for releasing said latch, during the final rearward movement of said member, and an operating spring carried by said barrel and engaging said trigger actuator to operate the same, said latch-releasing means having a portion for operatively stressing said actuator-operating spring as said forwardly and rearwardly movable member moves rearwardly.

3. In a gun, a barrel, a breech block and a firing trigger carried by said barrel, operating means for opening and closing said breech block including a forwardly and rearwardly movable member mounted on said barrel, said member being movable forwardly during breech block opening and movable rearwardly during breech block closing, an actuator for said trigger, means mounting said actuator on said barrel for forward movement to cocked position and rearward movement to trigger-operating position, said trigger actuator being in the forward path of said forwardly and rearwardly movable member to be moved forwardly to cocked position by the forward movement of this member, a slidable rod extending longitudinally of said barrel and passing slidably through said trigger actuator, an abutment secured to said rod in advance of said trigger actuator, an operating spring for said trigger actuator, said spring being confined between said abutment and said trigger actuator, means on said barrel for limiting the forward movement of said rod, means slidably connecting said rod with said forwardly and rearwardly movable member and effective to move said rod and abutment rearwardly as said member moves rearwardly, a latch mounted on said barrel and engageable with said trigger actuator to hold the latter in cocked position, and means on said rod for releasing said latch during the final rearward movement of said rod.

4. In a gun, a barrel, a breech block and a firing trigger carried by said barrel, operating means for opening and closing said breech block including a forwardly and rearwardly movable member mounted on said barrel, said member being movable forwardly during breech block opening and movable rearwardly during breech block closing, an actuator for said trigger, means mounting said actuator on said barrel for forward movement to cocked position and rearward movement to trigger-operating position, said trigger actuator being in the forward path of said forwardly and rearwardly movable member to be moved forwardly to cocked position by the forward movement of this member, a slidable rod extending longitudinally of said barrel and passing slidably through said trigger actuator, an abutment secured to said rod in advance of said trigger actuator, an operating spring for said trigger actuator, said spring being confined between said abutment and said trigger actuator, means on said barrel for limiting the forward movement of said rod, means slidably connecting said rod with said forwardly and rearwardly movable member and effective to move said rod and abutment rearwardly as said member moves rearwardly, and a latch mounted on said barrel and engageable with said trigger actuator for holding the latter in cocked position.

5. In a gun, a barrel, a breech block and a firing trigger carried by said barrel, operating means for opening and closing said breech block including a forwardly and rearwardly movable member movable forwardly during breech block opening and movable rearwardly during breech block closing, said member being mounted at one side of the breech portion of said barrel, a rod extending longitudinally of said barrel and having its rear end passed slidably through the upper portion of said member, an actuator for said trigger slidably surrounding said rod in front of said upper portion of said member to be pushed forwardly to cocked position thereby, a front abutment secured to the front end of said rod, an operating spring for said trigger actuator, said spring surrounding said rod and being confined between said front abutment and said trigger actuator, a rear abutment on said rod behind said upper portion of said member to cause rearward movement of said member to rearwardly pull said rod and said front abutment, an elongated guide in which said actuator and said front abutment

are slidably received, said guide being secured to said vertical side of said breech portion of said barrel, and a latch on said breech portion of said barrel and engageable with said trigger actuator to latch the same in cocked position.

6. A structure as specified in claim 5; together with coacting means on said latch and said front abutment for releasing said latch when the final rearward movement of said front abutment occurs.

7. In an ordnance mechanism, a cradle, a barrel reciprocable on said cradle, a breech block and a firing trigger carried by said reciprocatory barrel, means for opening and closing said breech block, a spring-operated actuator for said trigger also carried by said reciprocatory barrel, one latch carried by said reciprocatory barrel and engageable with said trigger actuator for holding said actuator in cocked position, automatic releasing means for said latch operatively connected with said latch and breech block and effective to release said latch upon breech block closing, a second latch carried by said reciprocatory barrel and engageable with said barrel-carried actuator to hold said actuator in cocked position after release of said one latch if single-shot gun operation is desired, a releasing device for said second latch carried by said cradle for movement from an idle position to a latch-releasing position, and hand-operated means on said cradle for moving said releasing device to said latch-releasing position to fire the gun by hand if desired, said second barrel-carried latch having a releasing portion movable rearwardly away from said cradle-carried releasing device during recoil of said reciprocatory barrel, and movable forwardly against said cradle-carried releasing device during counter-recoil whenever said releasing device is held in said latch-releasing position to move said second gun-carried latch to released position and prevent it from engaging said barrel-carried actuator, whereby said second latch cannot interfere with automatic gun operation but makes single-shot operation possible.

8. In an ordnance mechanism, a cradle, a barrel reciprocable on said cradle, a breech block and a sear-releasing trigger carried by said barrel, a spring-operated actuator for said sear-releasing trigger also carried by said barrel, a substantially horizontal latch pivoted at one end to said barrel, said pivoted latch having a bill at its other end engageable with said actuator to hold said actuator in cocked position, said one end of said pivoted latch being provided with a releasing arm depressible to release said pivoted latch, a horizontally shiftable slide having a cam for depressing said releasing arm when said slide is slid from a forward idle position to a rearward position, means mounting said slide on said cradle, whereby said releasing arm is movable rearwardly away from said cam during recoil of said barrel, and a pull rod connected with and extending rearwardly from said slide for operating the latter to effect hand firing of the gun, whereby upon each counter-recoil stroke of said barrel on said cradle said releasing arm will strike said cam and swing said latch to its released position as long as said slide is held in its rearward position, preventing said latch from engaging said actuator.

9. In an ordnance mechanism, a cradle, a gun barrel reciprocable on said cradle, a sear-releasing trigger carried by said reciprocatory barrel, a spring-operated actuator for said trigger also carried by said reciprocatory barrel, a latch carried by said reciprocatory barrel and engageable with said trigger actuator for holding said trigger actuator in cocked position, a releasing device carried by said cradle for releasing said latch, said releasing device being movable from an idle position to a latch-releasing position, and hand-operated means on said cradle for moving said releasing device to latch-releasing position, said latch having a releasing portion movable rearwardly away from said latch-releasing device during each recoil stroke of said barrel, and movable forwardly against said latch-releasing device during counter-recoil whenever said releasing device is held in said latch-releasing position.

10. In a gun, a barrel, a breech block and a firing trigger carried by said barrel, operating means for opening and closing said breech block including a forwardly and rearwardly movable member mounted on said barrel, said member being movable forwardly during breech block opening and movable rearwardly during breech block closing, an actuator for said trigger, means mounting said actuator on said barrel for forward movement to cocked position and rearward movement to trigger-operating position, said trigger actuator being in the forward path of said forwardly and rearwardly movable member to be moved forwardly to cocked position by the forward movement of this member, an abutment-carrying member mounted on said barrel and movable longitudinally thereof with respect to said trigger actuator, an abutment connected to said abutment-carrying member in advance of said trigger actuator, an operating spring for said trigger actuator, said spring being confined between said abutment and said trigger actuator, means on said barrel for limiting the forward movement of said abutment, coacting means on the aforesaid forwardly and rearwardly movable member and said abutment-carrying member for moving the latter and its abutment rearwardly as said forwardly and rearwardly movable member moves rearwardly, a latch mounted on said barrel and engageable with said trigger actuator for holding said trigger actuator in its forward cocked position, and coacting means on said abutment-carrying member and latch for releasing said latch during the final rearward movement of said abutment-carrying member.

BRYAN P. JOYCE.