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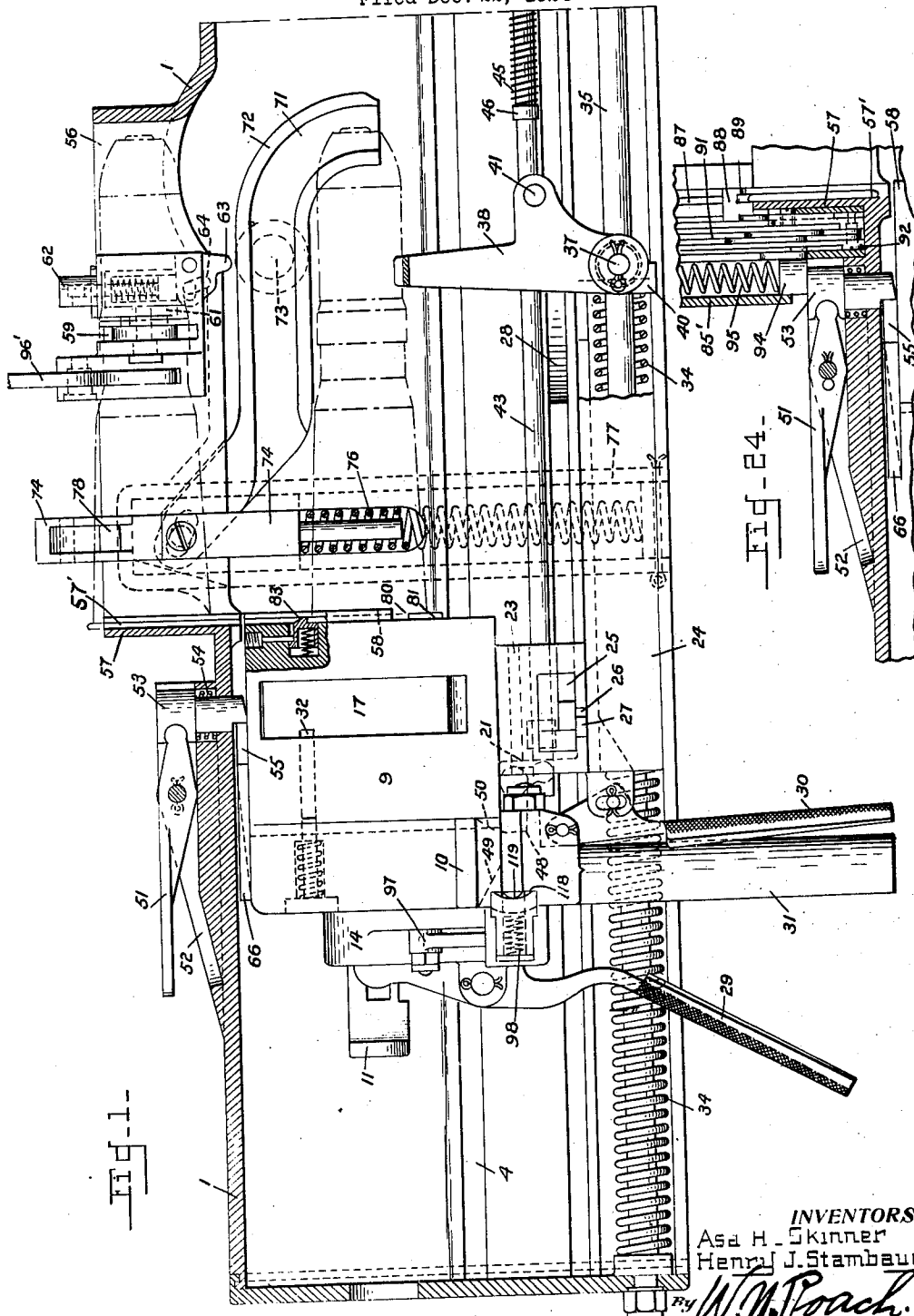
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AUTOMATIC GUN

Filed Dec. 22, 1924

8 Sheets-Sheet 1



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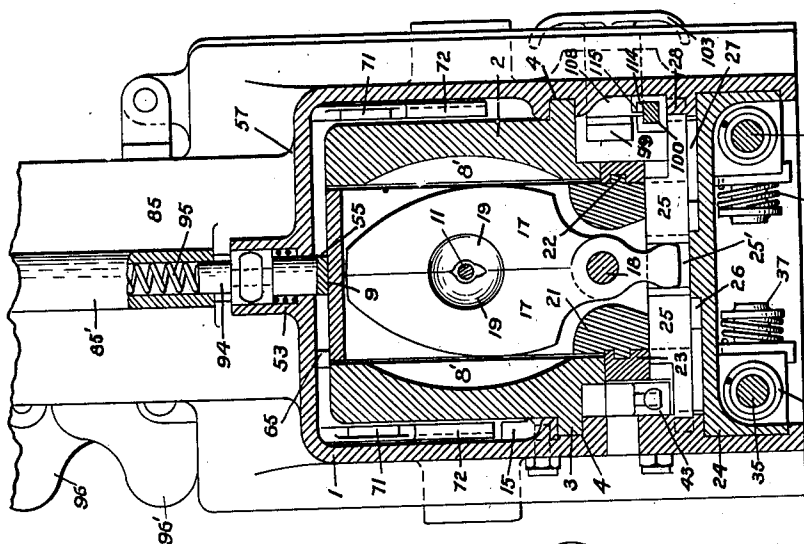


FIG. 1-

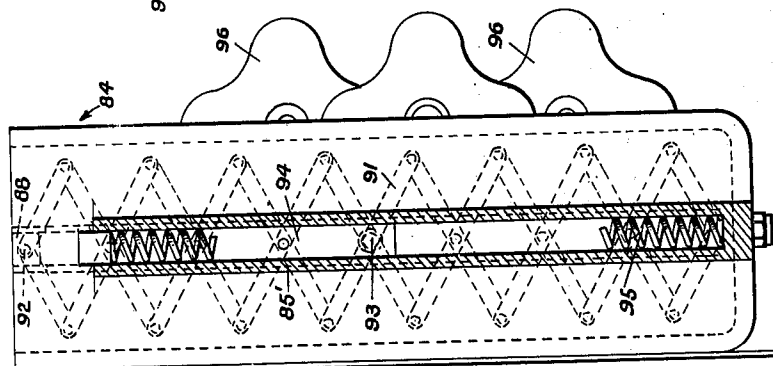
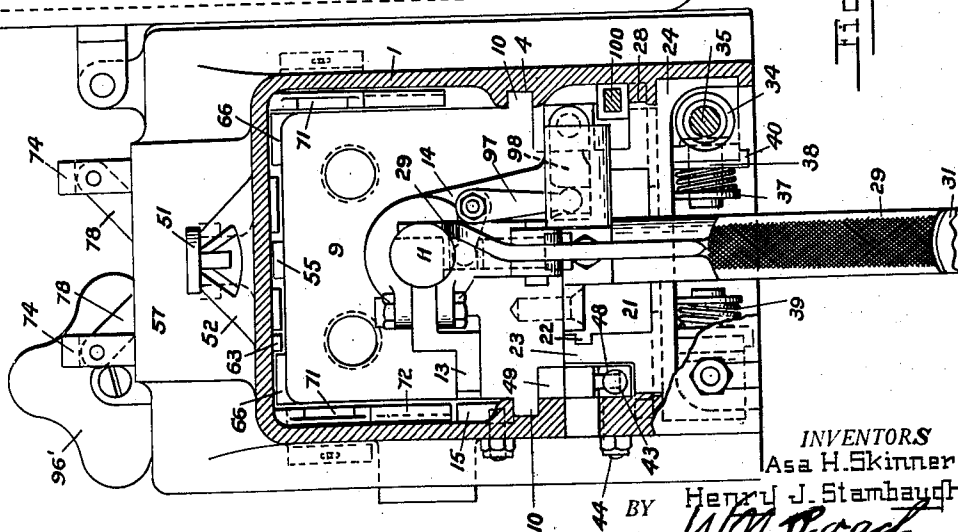


FIG. 2-



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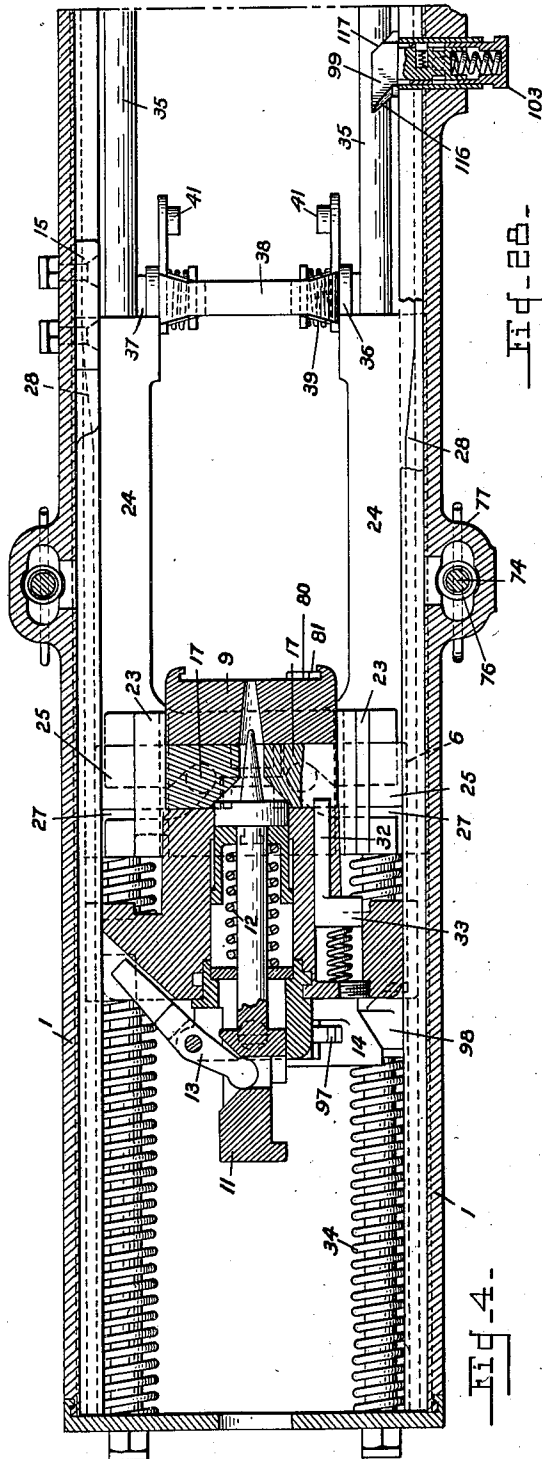


FIG-4-

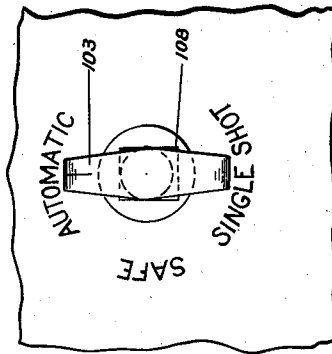
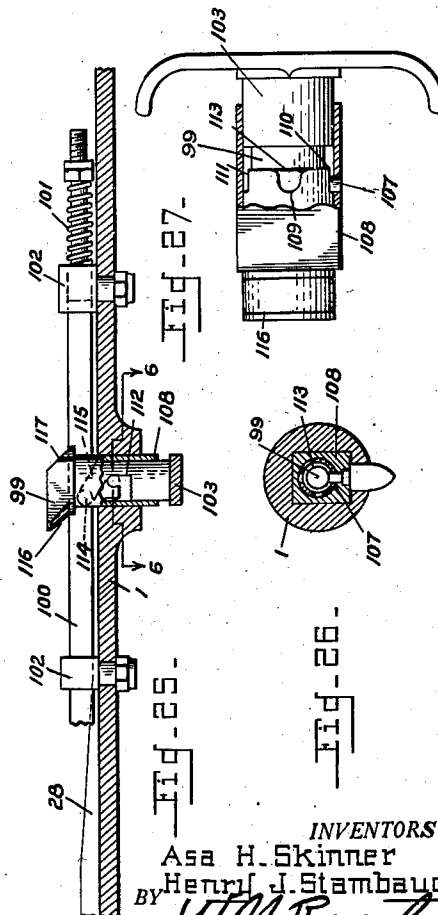


FIG-25-

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FIG-26-

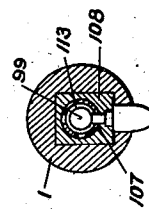
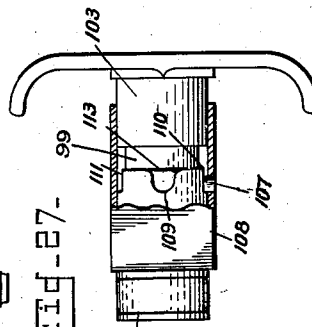


FIG-27-



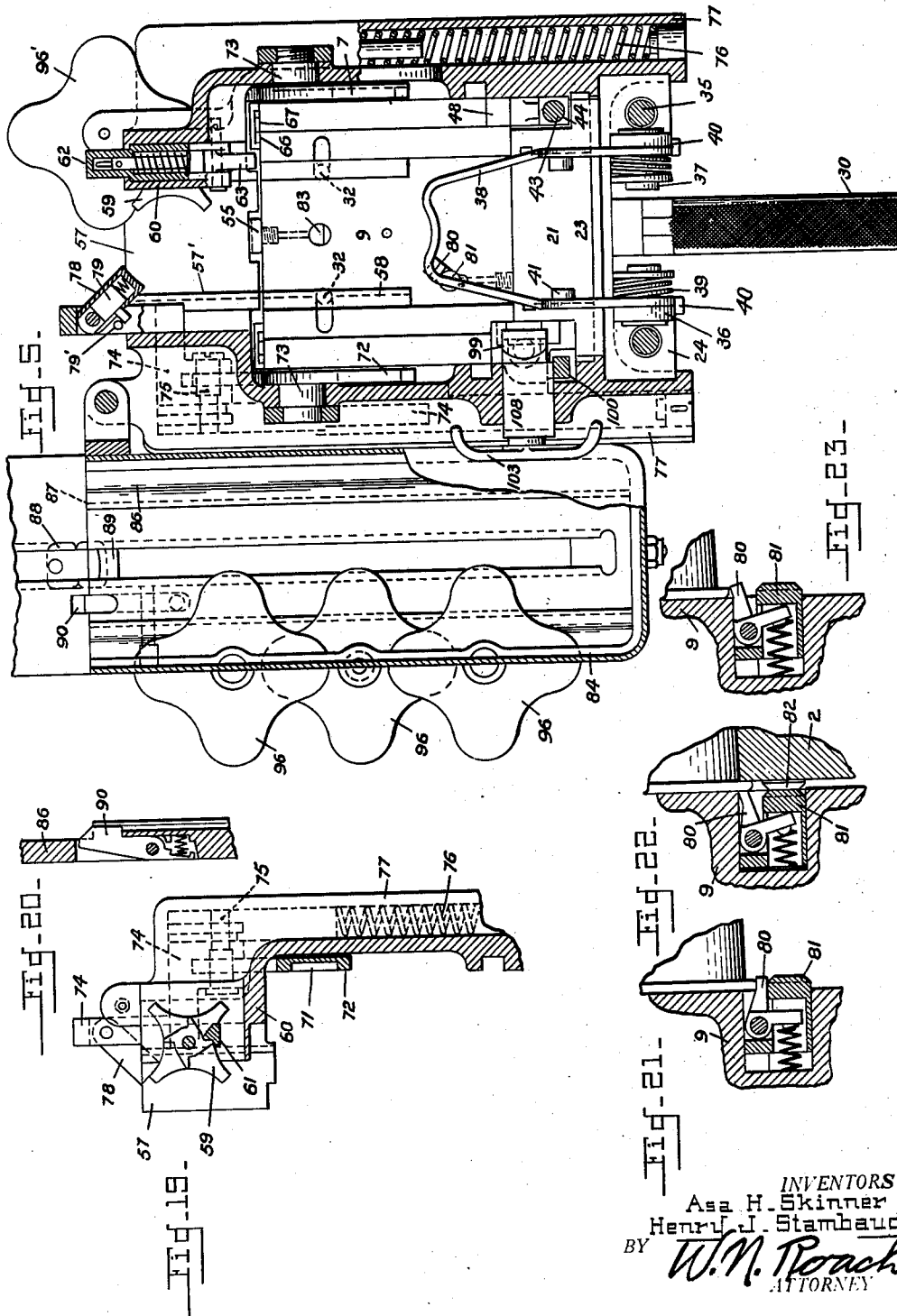
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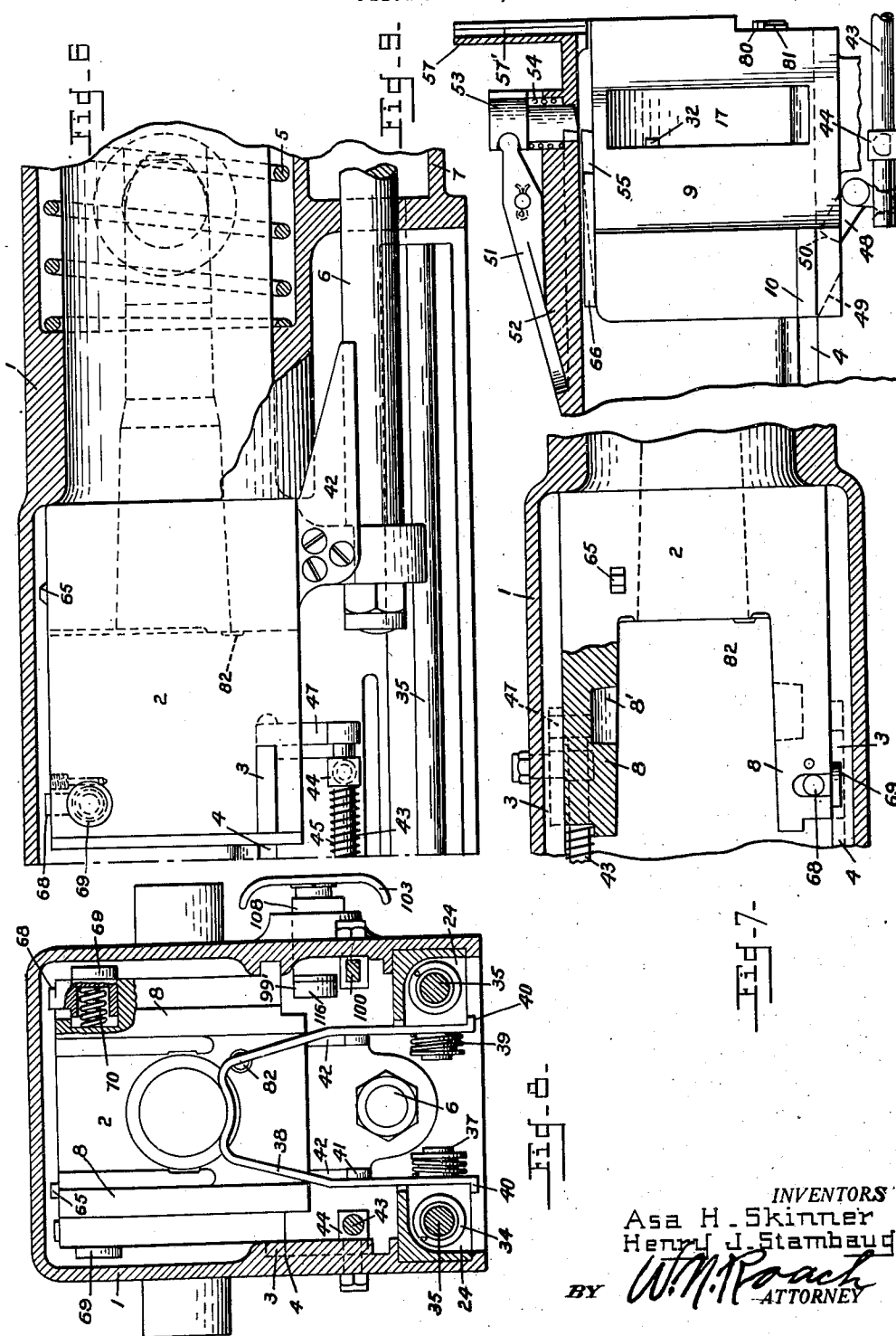
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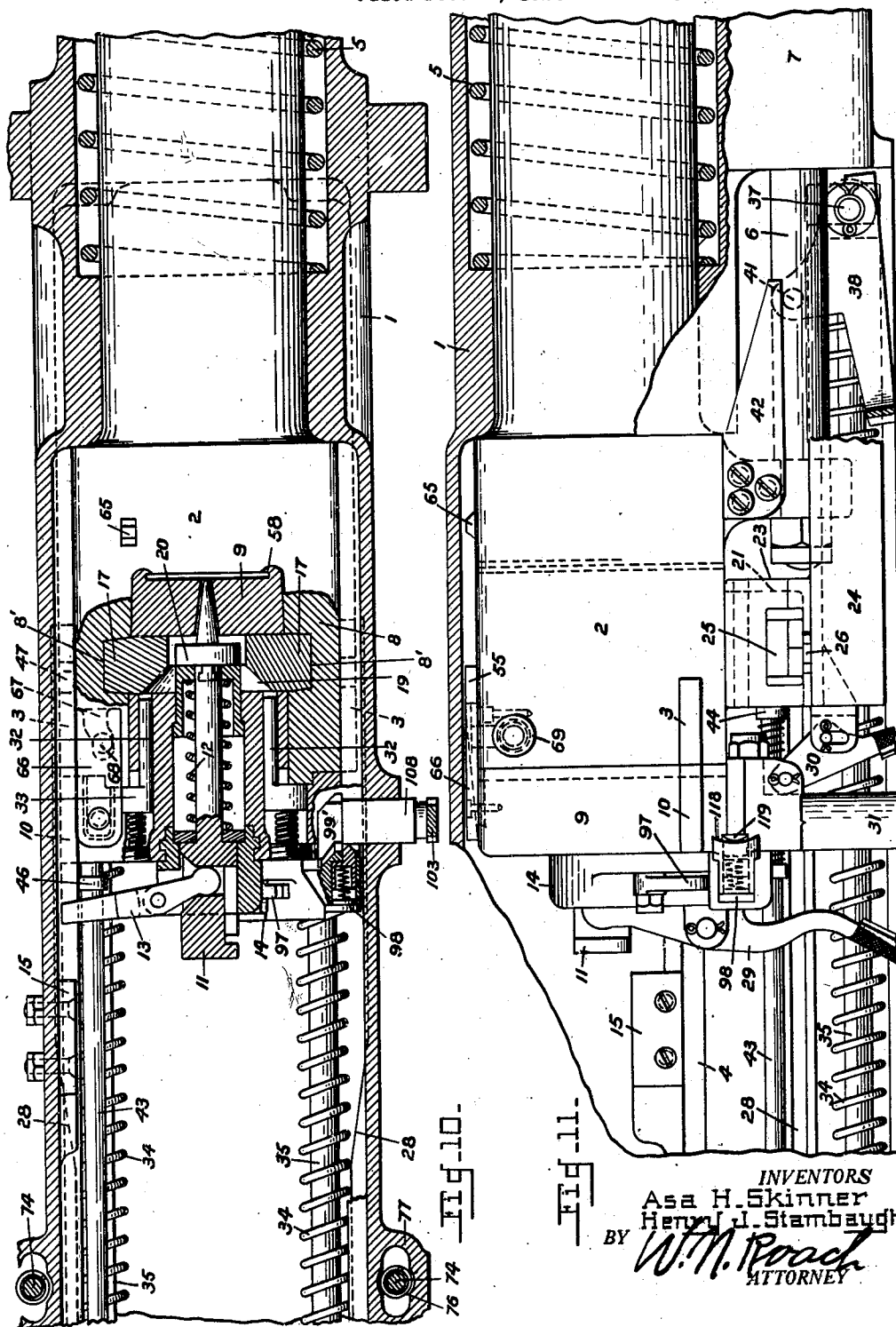
A. H. SKINNER ET AL

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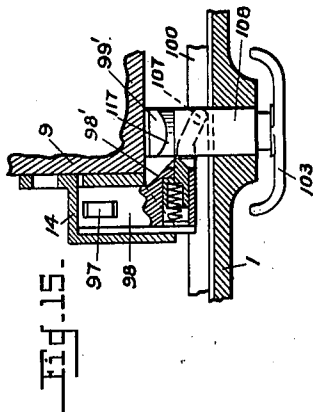
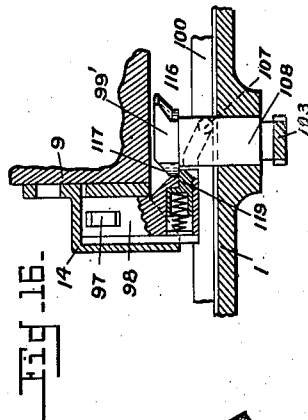
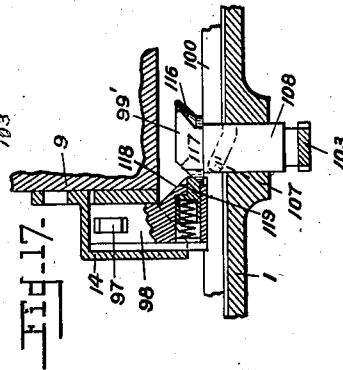
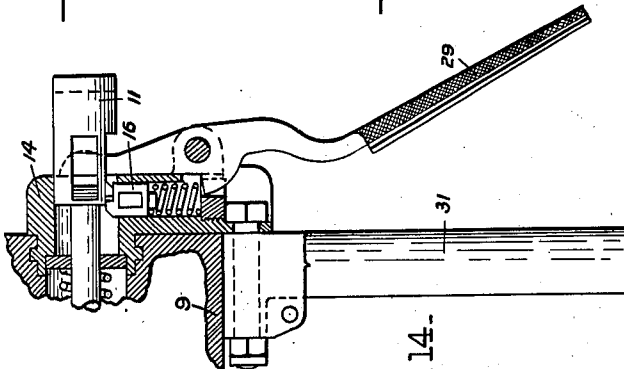
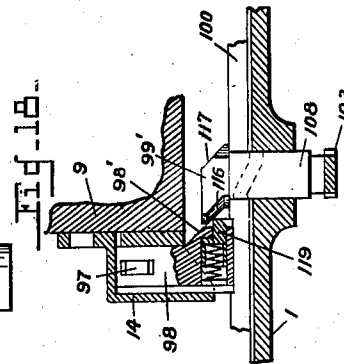
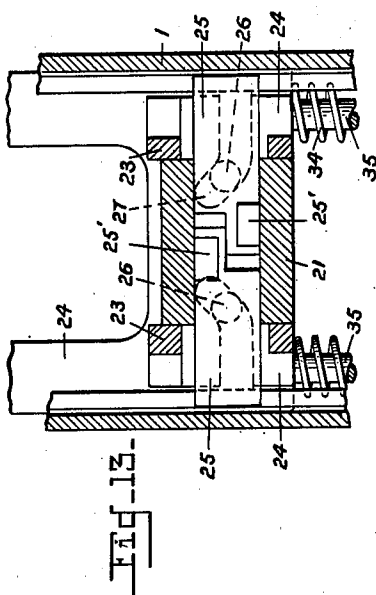
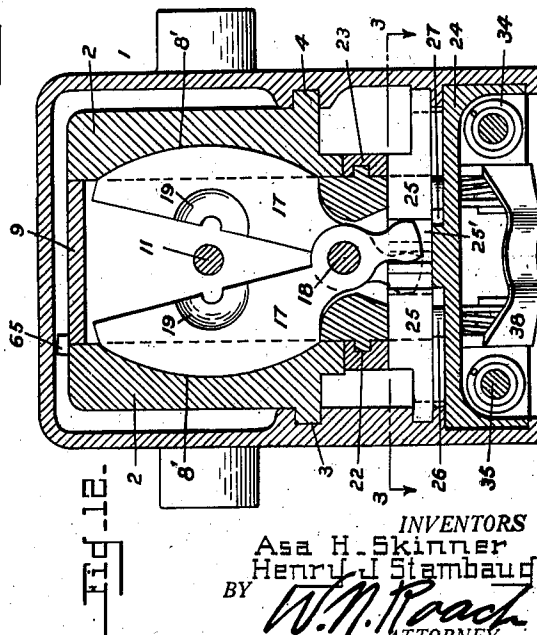
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8 Sheets-Sheet 7



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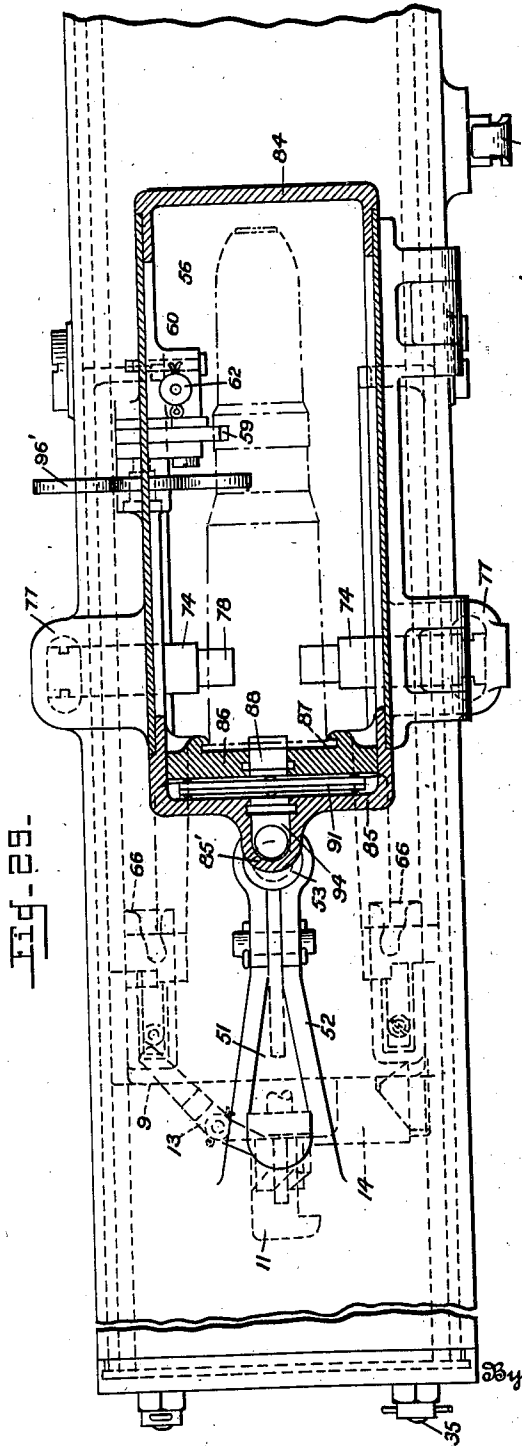
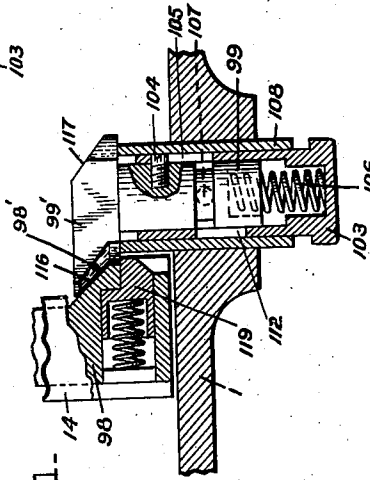
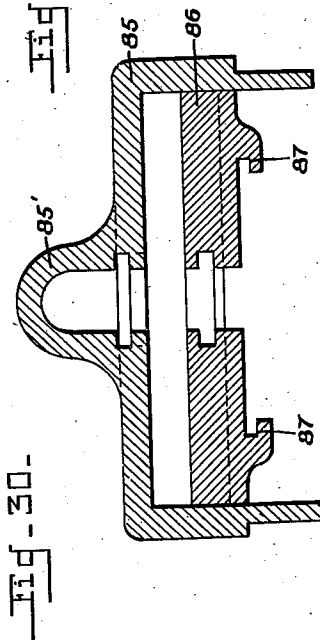
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AUTOMATIC GUN

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8 Sheets-Sheet 8



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UNITED STATES PATENT OFFICE.

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AUTOMATIC GUN.

Application filed December 22, 1924. Serial No. 757,498.

(GRANTED UNDER THE ACT OF MARCH 3, 1883, AS AMENDED APRIL 30, 1928; 370 O. G. 757.)

The invention described herein may be manufactured and used by or for the Government for governmental purposes without the payment to me of any royalty thereon.

5 The subject of this invention is an automatic gun, particularly adapted for projectiles of 37 m/m. caliber though not restricted thereto.

10 In designing automatic guns for projectiles of large calibers it is necessary by reason of the explosive nature of this class of projectiles to insure positive feeding of the rounds into the barrel and it is desirable to accomplish the feeding operation without unduly increasing the number and size of the operative elements of the gun. The weight and length of the projectile together with the correspondingly greater stroke of recoil precludes the feasibility of transposing a live
15 round from the feed belt or magazine to the chamber in a manner similar to that employed in light machine guns. It is also desirable that the gun be manually as well as automatically operable to provide for initially
20 loading the piece and for correcting stoppages.

With these and other objects in view, we have devised novel means controllable by the barrel for restraining an energized axially
30 movable breech block in counterrecoil while the barrel continues into battery, the barrel causing the incoming round to be released and actuating a feed mechanism to lower the round on to the block and subsequently after
35 an interval sufficient to complete the feeding operation, releasing the block to ram the round into the barrel chamber. In operation of the gun, mutually reciprocating slides actuate a breech lock in locking and unlocking
40 and the breech lock serves as a safety mechanism to prevent release of the firing pin until the block is fully home and locked in battery, irrespective of whether or not a novel firing post is adjusted for automatic or single
45 shot firing. The round to be loaded is held in alignment with the chamber through front and rear supports which are successively collapsed by engagement with the barrel as the block runs into battery. The action of the gun is automatically arrested when
50 the last round from the magazine has been lowered into the feed opening through the agency of the round lowering mechanism in the magazine which actuates the hand latch

provided for retaining the block in the feed position in initially loading the piece. 55

To these and other ends, the invention consists in the construction, arrangement and combination of elements, described herein-
after and pointed out in the claims forming
60 a part of this specification.

A practical embodiment of our invention is illustrated in the accompanying drawings, in which,

Fig. 1 is a longitudinal sectional view
65 through the rear end of the cradle showing the breech block in right side elevation and in the feed position;

Fig. 2 is a rear end view with the magazine open, the cradle broken away to show
70 the breech block in the feed position;

Fig. 3 is a transverse sectional view taken through the breech block in the feed position and showing a rear fragmentary view of the magazine in raised position; 75

Fig. 4 is a horizontal sectional view through the rear end of the gun, the breech block in the feed position;

Fig. 5 is a transverse sectional view through the cradle and magazine, the breech
80 block shown in front elevation and in the feed position;

Fig. 6 is a fragmentary longitudinal sectional view through the cradle, the barrel shown in right side elevation and in battery; 85

Fig. 7 is a plan view of the breech end of the barrel in battery, one of the barrel extensions partly broken away to show the relation between the barrel and the automatic latch; 90

Fig. 8 is a transverse sectional view through the cradle, the barrel in rear elevation and the cartridge support in the raised position;

Fig. 9 is a view in right side elevation of
95 the breech block held in the feed position by the automatic latch;

Fig. 10 is a plan view partly in section of the barrel and block in battery, the firing post adjusted for automatic firing; 100

Fig. 11 is a right side elevation partly in section showing the barrel and block in battery;

Fig. 12 is a transverse sectional view through the barrel and block in battery; the
105 locking members shown in the open or operative position and the cartridge support lowered;

Fig. 13 is a fragmentary sectional view taken on the line 3—3 of Fig. 12;

Fig. 14 is a fragmentary longitudinal section through the breech block in the feed position, the firing pin retracted by the locking members and the sear in operative position;

Fig. 15 is a fragmentary horizontal section through the cradle, breech block, and firing mechanism housing, the firing post set in the safe position and the slide shown in the position it would assume with the firing pin cocked and the gun in battery;

Fig. 16 is a similar view with the firing post adjusted for single shot firing and the firing rod in the forward or released position;

Fig. 17 is a view similar to Fig. 16 with the firing rod retracted, the slide shown in the position it would assume after discharge of a round and return of the block to battery;

Fig. 18 is a similar view with the firing post in the automatic adjustment, the position of the slide and block shown just before arriving in battery;

Fig. 19 is a fragmentary transverse section through the cradle showing the ratchet wheel in front elevation;

Fig. 20 is a detail sectional view through the magazine partition showing the latch for holding the round during loading of the magazine;

Fig. 21 is a fragmentary sectional view through the breech block in the feed position, the tumbler holding the incoming round in place;

Fig. 22 is a similar view with the breech block in battery, the plunger collapsed by the stud on the barrel;

Fig. 23 is a similar view to Figure 21, the plunger again extruded after ejection of the empty case and the tumbler about to receive the incoming round;

Fig. 24 is a detail view of the mechanism for retaining the breech block in the feed position when the last round from the magazine has been positioned in the feed opening;

Fig. 25 is a detail view partly in plan and partly in section of the firing rod and the firing post adjusted for automatic firing;

Fig. 26 is a sectional view on the line 6—6 of Fig. 25;

Fig. 27 is a fragmentary plan view of the adjusting handle showing the bayonet slot;

Fig. 28 is a fragmentary view of the right side of the cradle;

Fig. 29 is a plan view of the rear end of the cradle, the magazine shown in section and in position above the feed opening;

Fig. 30 is a sectional view of the rear end plate of the magazine;

Fig. 31 is a detail sectional view of the firing post assembly.

Referring to the drawings by numerals of reference:

In carrying out the invention, there is provided a frame or cradle 1 in which reciprocates a barrel 2 being guided by ribs 3 provided on the barrel near the breech end thereof and working in guides 4 (Fig. 3) on the inner faces of the sides of the cradle. Surrounding the barrel and enclosed by the cradle is a spring 5 (Figs. 6, 10 and 11) compressed during recoil for returning the barrel to battery, the return movement of the barrel being eased or retarded by a buffer mechanism (not shown) on a buffer rod 6 connected to the barrel and reciprocating in a cylinder 7 on the cradle (Fig. 6).

The breech end of the barrel 2 is squared (Fig. 8) and embodies vertically disposed extensions 8 (Figs. 7, 8 and 10) between which is received the forward portion of an axially movable breech block 9 formed with ribs 10 disposed in the guides 4 (Fig. 2). The block is provided with the usual firing pin 11 and firing pin spring 12, the pin being automatically retractable to cocked position on recoil by means of a laterally extending cocking lever 13 (Figs. 2, 4 and 10) pivoted in the firing mechanism housing 14 on the rear of the block and adapted to be swung upon its pivot striking a cocking plate 15 (Figs. 10 and 11) secured to the left side of the cradle. The firing pin is retained in the cocked position by a sear 16 (Fig. 14) mounted in the housing 14.

To provide for releasably locking the breech block and barrel in the firing position, there is mounted in a recess in the block a pair of members 17 on a fulcrum 18 and movable to open or locked position as shown in Figure 12 when the members are engaged in sockets 8' in the barrel extensions 8 and to the closed or unlocking position as shown in Figure 3 when the members are completely withdrawn within the block, suitable grooves being made in the members to accommodate the point end of the firing pin 11. The rear face of each locking member is formed with a semi-conical depression 19 (Figs. 10 and 12) whereby the breech lock in moving to closed position contacts the enlarged head 20 of the firing pin to force the already cocked firing pin an additional distance to the rear as seen in Figures 4 and 14. The breech lock therefore functions as a safety mechanism permitting release of the firing pin only when the block is fully home and locked to the barrel.

As shown in Figures 1, 2, 3, and 13, the breech block is formed on its underside with an extension 21 having ribs 22 disposed in guides in the uprights 23 of a slide 24, the slide being capable of limited movement under tension relative to the extension as indicated in Figures 1 and 11. Thereafter the

slide 24 and breech block are constrained to be moved in unison by means of transverse slides 25 disposed in a recess in the underside of the extension and passing through openings in the uprights 23 of the slide 24. The transverse slides are provided with depending pins 26 disposed in cam slots 27 in the slide 24 (Figs. 3, 12 and 13) and are formed with apertures 25' in their overlapping ends for the reception of the lower portions of the locking members 17 whereby the breech lock may be opened or closed as the transverse slides are reciprocated.

Referring to Figures 3, 10 and 12, the sides of the cradle are provided with cam plates 28, which, during recoil and after the cocking lever 13 has retracted the firing pin, force the transverse slides 25 inwardly to disengage the locking members from the barrel. This action also causes the slides 25 through their pins 26 to retract the slide 24 with respect to the extension 21 of the breech block. The same result may be attained in initial loading of the gun by manual operation of the rear lever 29, retracting the firing pin, and the front lever 30 retracting the slide 24, the movement of the slide 24 operating reversely through its cam slots 27 and the pins 26 to force the transverse slides 25 inwardly to disengage the locking member 17 from the barrel. The function of the slide 24 is again manifested after the breech block has returned to battery when it serves by reason of its additional movement to actuate the transverse slides 25 which in turn control the breech lock 17—17. To provide for manually retracting the breech block in initially loading the piece and in correcting stoppages there is secured to the housing 14 a grip 31 located between the front and rear levers.

In order to insure retention of the locking members 17—17 in the closed or unlocked position at such times when the slides 25 are not in engagement with the cam plates 28 there is provided in the breech block in rear of the breech lock recess (Figs. 1, 4, 5 and 10) a pair of plungers 32, which when the block is unlocked from the barrel are free to be moved forwardly in the path of rotation of the locking members to hold the members in the closed position (Fig. 4). These plungers are formed with an offset base 33 adapted to engage the barrel extensions 8 (Fig. 10) when the block runs into battery to retract the plungers and permit the locking members to open outwardly. The slide 24 mounted in guides of the cradle (Fig. 12) is retractable with the breech block during recoil to compress springs 34 on rods 35 stationarily carried by the cradle, the springs serving to return the slide 24 and block to battery independently of the barrel.

The arms of the slide 24 are formed at their forward ends with ears 36 (Figs. 4 and 5) carrying pins 37 on which is mount-

ed a cartridge support 38 moved by its springs 39 to the raised position (as shown in Fig. 1) when the block is in the feed position and held in the vertical by stops 40 engaging the slide 24 (Figs. 1, 5 and 8). When the breech block is returning to battery the studs 41 on the support engage cam plates 42 on the underside of the barrel (Figs. 6, 8 and 11) and the support is swung downwardly to the lowered position as shown in Fig. 11.

For the purpose of retaining the block in the feed position (Figs. 1 and 9) and separating the block from the barrel there is provided an automatically operated latch mechanism consisting of a rod 43 mounted in brackets 44 secured to the left side of the cradle (Figs. 1, 2, 3 and 6) and urged rearwardly by a spring 45 confined between the front bracket and a collar 46 on the rod. The front extremity of the rod is provided with a bent arm 47, which, as shown in Figures 6 and 7, is engaged by the rib 3 on the left side of the barrel, preventing rearward movement of the rod until the barrel moves in recoil. The rod is then free to move to the rear until the arm is brought up against the front bracket, this movement being sufficient, however, to elevate a bell crank lever 48 pivoted to the cradle and having its lower arm disposed in a slot in the rear end of the rod, as clearly seen in Fig. 9. During the final movement of the breech block to the full recoil position, the bevel portion 49 of the block temporarily depresses the lever 48 which is immediately re-elevated into position to arrest the block in counterrecoil by engaging the forwardly facing shoulder 50 of the block, the barrel consequently continuing independently into battery.

As the barrel approaches battery, the rib 3 reengages the bent arm 47 on the rod 43 drawing the rod forward to lower the lever 48 and allowing the block to return to battery. During the interval between the latching and unlatching of the breech block a cartridge is fed to the block as will be described hereinafter.

For the purpose of retaining the breech block in the feed position when it has manually retracted as previously outlined, there is provided on the top of the cradle a hand latch 51 (Figs. 1, 2, 9, 24 and 29) pivoted to a raised frame 52 integral with the cradle and adapted when raised to depress a notched bolt 53 against the tension of a return spring 54. The bolt when depressed engages a lug 55 on the breech block and holds the block in the feed position (Fig. 1) during initial feeding of a round to the block and also during replenishment of the magazine (Fig. 24) until the hand latch is manually pressed.

The upper face of the cradle is formed with a rectangular feed opening 56 (Fig. 29) defined by raised walls, the rear wall 57 (Fig. 1) provided with grooves 57' for receiving

and guiding a cartridge to grooves 58 in the front face of the breech block when the block is in the feed position (Figs. 1 and 5). The cartridge is normally held in the position shown in Figure 1, by means of a ratchet wheel 59 transversely mounted in an extension 60 (see Figs. 19 and 29) on the left wall of the opening and positioned to engage and support the cartridge at a point on its rotating band. The ratchet wheel is held against rotation by a catch 61 (Fig. 19) on a plunger 62 (Fig. 5) housed in the extension 60. Obviously, when the plunger is depressed the ratchet wheel is free to rotate allowing the cartridge in the feed opening to be forced downwardly into position on the breech block, as shown in dotted lines in Figure 1, the forward portion of the round resting on the support 38.

The under side of the plunger 62 pivotally carries a rocker 63 (Fig. 1) having a slot 64 in which an element of the plunger 62 is so disposed that the rocker may idle past the lug 65 on the barrel on recoil (Figs. 6, 7 and 8) but is tripped thereby on counterrecoil to depress the plunger thereby releasing the ratchet wheel and the cartridge.

In preparing the gun for firing, the initial round is preferably forced downward by hand but when the barrel recoils after discharge of a round, the feeding operation is automatically performed through the agency of the counterrecoiling barrel cooperating with elements mounted in the cradle. Referring to Figures 6, 8, 10, 11 and 29, the breech block is provided with plates 66 overhanging the upper surface of the barrel and formed with cam slots 67 in which are disposed the lugs 68 of laterally movable plungers 69 housed in the barrel. When the breech block and barrel move rearwardly en masse the plungers 69 are held in the "in" position but upon separation of the barrel for independent return to battery the plungers are cammed outwardly where they are held by the plunger springs 70. As the barrel approaches battery, the plungers enter grooves 71 in the feed levers 72 (Fig. 1) and in traveling along the curved forward terminals of the grooves rock the levers on their pivots 73.

The rear ends of the levers 72 (Figs. 1, 5 and 19) are disposed in slots in the under side of vertically sliding feed arms 74 and are loosely mounted on pins 75 so that when the levers are rocked the feed arms will be forced downwardly, compressing springs 76 in housings 77 on the cradle (Figs. 4 and 5) and through their fingers 78 lowering the next round (the ratchet wheel 59 having been released) into the grooves 58 on the breech block in position to enter the chamber of the barrel. When the plungers 69 in the barrel clear the feed levers 72, the springs 76 will return the feed arms 74 to the up or normal position, the finger 78 coming in contact

with the succeeding round, being rotated outwardly, and then returned to normal position by reason of the action of the plungers 79 on the pins 79' to engage said succeeding round when the feed arms have reached the limit of their upward movement.

The loaded round is retained on the face of the breech block by a tumbler 80 pivoted in a plunger 81 housed in the block, as shown in Figure 21. With the breech block locked to the barrel (Fig. 22) the round is in its chamber and supported by the barrel, the plunger 81 being collapsed by a stud 82 on the rear face of the barrel and the upper arm of the tumbler coming in contact with the rear face of the flange of its cartridge case. If the empty case has not already fallen from the block when the block is again in the feed position, the action of the feed of the incoming round across the face of the block will eject the empty case. As soon as the empty case has cleared the plunger 81, the plunger will again be extruded by its spring, the tumbler holding the incoming round in position, as shown in Figure 23, while a plunger 83 (Fig. 1) engages the upper portion of the cartridge rim to hold the round against rebound.

Hingedly mounted on the right hand side of the cradle (see Figs. 2 and 5) is a rectangular magazine 84, open at one end to receive rounds of ammunition when in the lowered position and to discharge the rounds into the feed opening 56 when in the raised position. The rear end plate 85 (Figs. 29 and 30) is provided with a partition 86 formed on its forward face with grooves 87 for receiving the flange of the cartridges and also formed with a central grooved slot (Figs. 1, 5, 24 and 30) in which is disposed a slide 88 having a curved projection or hook 89 for engaging the first round placed in the magazine, the round being held in position by a latch 90 (Figs. 5 and 20) mounted in the partition. As the slide is moved downward (Figs. 2 and 24) in loading the magazine, it causes the lazy tongs 91 to be folded by reason of the connecting pin 92 and the tongs in turn, through a connection 93 with a slide 94, compress a feed spring 95 disposed in a cylindrical housing 85' (Figs. 2 and 3) on the rear face of the end plate 85. The rounds on being inserted in the magazine are held in a horizontal position by means of spacers 96 mounted in the magazine and when the magazine is raised a similar spacer 96' on the cradle is brought into operation. When the loaded magazine is swung to the raised position, the latch 90 strikes the rear wall 57 of the feed opening and is moved to inoperative position, the rounds in the magazine then being supported by a round previously placed in the feed opening and held by the ratchet wheel.

When the last round from the magazine

has been fed into the grooves 57' on the rear wall 57 of the feed opening, the feed mechanism will be in the position shown in Figure 24, the slide 94 forced by the feed spring 5 95 to depress the notched bolt 53 into the path of the lug 55 on the breech block. During recoil of the block the bolt rides over the bevel face 55' of the lug and is again depressed to engage the lug and hold the 10 breech block in the feed position until manually released after the magazine has been replenished.

For the purpose of depressing the sear to release the firing pin, there is mounted in the 15 firing mechanism housing 14 (Figures 1 and 2) a bell crank lever 97, one arm of which is disposed in a slot in the sear and the other arm in a slot in a transverse slide 98 which is adapted to be moved laterally to rock the 20 lever through an adjustably positioned firing post 99 which in turn is moved laterally by a firing rod 100 (Figs. 3, 5 and 25). The firing rod 100 normally urged forward to inoperative position by a spring 101 is supported in brackets 102 and may be operatively connected to any suitable trigger 25 mechanism (not shown) conveniently mounted on the end or side plates of the cradle.

Referring to Figures 4 and 31, the shank 30 of the firing post 99 is mounted in a hollow handle 103 with which it is constrained to be rotated by means of a pin 104 disposed in a slot 105 in the handle while permitting independent longitudinal movement of the handle against the action of a spring 106. The 35 handle may be turned to selectively position the post in the safe, automatic, or single shot adjustment (Fig. 28) and is locked in place by means of a stud 107 mounted in a housing 40 108 (Fig. 26) and which respectively engages in recesses 109, 110 and 111 of a bayonet slot 112 in the handle (Fig. 27). The inner extremity of the stud 107 is disposed in an annular groove 113 in the shank of the firing 45 post (Figs. 26 and 31) whereby the post is laterally reciprocated when a stud 114 on the firing rod 100 working in a cam slot 115 (Figs. 3 and 25) on the under face of the housing moves the housing during retraction 50 and release of the firing rod.

The firing post is formed with an irregular head 99' shown in the vertical position in Figure 15 when adjusted to the safe position and having projecting portions with inclined walls on parallel planes, one portion 55 116 formed with a curved undercut wall and shown to the rear in the automatic setting in Figure 18 and the other portion 117 formed with a beveled overcut wall and shown to the rear in the single shot setting in Figures 60 16 and 17.

When the post is adjusted for automatic firing (Figs. 10, 18 and 31) and the firing 65 rod retracted to move the housing and post laterally outward the beveled face 98' of the

slide 98 will, as the breech block runs into battery, engage the under cut portion 116 of the post and be cammed outwardly to rock the lever 97 and release the firing pin. This action is repeated in sustained firing, the 70 trigger being held pressed and the firing post maintained in the armed position. With the gun loaded and in battery, however, the slide is constrained to be moved with the firing post assembly by reason of the engagement of the projecting portion 116 with the 75 plunger 119 (Figs. 10 and 31).

When the post is adjusted for single shot firing (Fig. 16) the breech block may return 80 to battery without any movement of the slide 98 taking place, the portion 117 of the firing post head fitting in a curved face 118 (Fig. 17) of the slide 98 and engaging the inner face of the plunger 119 in the slide. Retraction of the firing rod moves the firing 85 post head outward carrying with it, through the plunger 119 the slide 98 and the firing pin is released as previously set forth. However, should the trigger be held under compression to retain the firing post in the out- 90 ward or armed position, the slide 98 on return of the breech block to battery will be, as shown in Figure 17, in its inward or inoperative position. When the trigger is released, the firing rod through its spring will 95 be urged forwardly, the firing post head in returning to its normal position (Fig. 16) collapsing the plunger 119.

It will be understood that any suitable 100 buffer mechanism for absorbing the surplus energy of recoil may be provided on the end plate of the cradle.

In operation, assuming the gun to be clear of rounds and in battery with the magazine 105 open, the gunner seizes the grip 31, the pressure on the rear lever 29 cocking the firing pin 11 while the pressure on the front lever 30 retracts the slide 24 against the action of the springs 34, the transverse slides 25 (Figs. 11, 12 and 13) being moved thereby to dis- 110 engage the locking members 17—17 from the barrel and the movement of the locking members in turn forcing the cocked firing pin an additional distance to the rear (Figs. 4 and 14). The locking members are held in 115 this position by the plunger 32 and subsequently indirectly held by the cam plates 28 against which the transverse slides 25 are in contact on continued recoil. The breech block is then drawn to the rear further compressing the recoil springs 34 and is held in 120 the feed position by means of the hand latch 51 (Fig. 1).

A loaded round is placed in the feed opening 56 (Fig. 1) the plunger 62 manually depressed to free the ratchet wheel 59 and the 125 round forced down on to the breech block until arrested by the tumbler 80 and the support 38. A second round is then positioned in the feed opening and supported by the ratchet 130

wheel 59. After the magazine has been loaded and swung to position about the feed opening, the breech block may be released, by pressing the hand latch 51, to load the first round into the chamber. During the return to battery, and after the round has been partially inserted in the chamber, the front support 38 is folded to the position shown in Figure 11, while on arriving in battery the plungers 32 are collapsed when their offset portions 33 (Fig. 10) strike the barrel extensions 8. With the block in battery, the slide 24 under the influence of the recoil springs 34 moves forward an additional distance, forcing by means of the transverse slides 25, the locking members into the recesses of the barrel extensions, which movement allows the firing pin to move forward into engagement with the sear 16.

With the gun loaded and in battery, the firing pin may now be released to prime the cartridge by adjusting the firing post 99 for either automatic or single shot firing and by retracting the firing rod 100 causing lateral movement of the firing post and through it the slide 98 which rocks the bell crank lever 97 to depress the sear and release the firing pin.

When a round is discharged, the block and barrel move together in recoil, at first interlocked and then unlocked, the block being energized to subsequently ram a round into the barrel. In the first phase of recoil, the cocking lever 13 strikes the plate 15 to cock the firing pin, the enlarged head 20 of the pin being withdrawn a sufficient distance to permit the breech locks 17—17 to be closed by the action of the cam plates 28 on the transverse slides 25. The inward movement of the slides 25 also retracts under tension the slide 24 with respect to the breech block so that the slide 24 may mutually restore the slides 25 to normally locking position after the breech block is in battery.

Also during recoil, the rod 43 is free to be moved to the rear under influence of its spring so that the lever 48 may be rocked to engage in the slot 50 thereby restraining the counterrecoiling breech block in the feed position, while the barrel separates therefrom and continues into battery.

In separating from the breech block the plungers 69 on the barrel are extruded through the instrumentality of the overlapping breech block plates 66 and the plunger springs 70 so that they may rock the feed levers 72 to depress the feed arms 74, which through their fingers 78 lower the cartridge from the feed opening into position on the face of the breech block. Prior to this action of the feed levers and arms the cartridge support 38 is free to be elevated by its spring 39 to support the incoming round and the lug 65 on the barrel trips the rocker 63 to unlatch the ratchet wheel 59.

It will be understood that extraction of the empty case is accomplished by reason of its retention in the grooves 58 of the breech block and the case is ejected by the incoming round if it has not already dropped from the block when cleared by the counterrecoiling barrel.

Final movement of the barrel into battery causes the rod 43 to be drawn forward by reason of the bent arm 47 being engaged by the rib 3 of the barrel (Fig. 7) the consequent lowering of the lever 48 releasing the breech block to carry the round into the chamber. When the block is fully home the additional forward movement of the slide 24 actuates the breech lock as previously described in hand operation.

With the firing post adjusted for automatic firing, the bevel face 98' of the slide 98 contacts the undercut portion 116 of the post and the slide is cammed outwardly to rock the lever 97 and depress the sear; consequently, the firing pin is only restrained by the breech lock which in moving to locking position releases the pin to prime the cartridge.

Provision for stopping the action of the gun when the last round from the magazine has been fed into the feed opening 56 includes (Figs. 1 and 24) the hand latch 51, which is automatically depressed by the slide 94 in the magazine to engage the lug 55 on the breech block whereby to retain the block in the feed position until the magazine is replenished.

While in the foregoing there has been illustrated and described such combination and arrangement of elements, as constitute the preferred embodiment of our invention, it is nevertheless desired to emphasize the fact that interpretation of the invention should only be conclusive when made in the light of the subjoined claims.

We claim:

1. The combination of a cradle, a barrel adapted to reciprocate freely therein, an axially movable breech block for the barrel, said block having cartridge grooves and adapted to be energized by the barrel in recoil, a firing pin reciprocally mounted in the block, means for either automatically or manually cocking the pin, a sear for holding the pin in cocked position, breech locking members mounted in the block, mutually reciprocating slides movable with the block for automatically locking and unlocking said members, means for manually actuating one of the slides to unlock the members, said members in moving to unlocked position adapted to further retract and hold the already cocked firing pin, means mounted on the cradle and controllable by the barrel in recoil and counterrecoil for respectively latching the block in the feed position and releasing it for independent return to battery to ram a round into the chamber, a pivoted

cartridge support carried by one of the slides, normally elevated when clear of the barrel and adapted to be lowered by the barrel as the block runs into battery, means carried by the cradle for holding a round in position to be fed to the block, feed mechanism mounted in the cradle, means on the barrel operable during counterrecoil for successively releasing the round and actuating the feed mechanism to lower it into position on the block, means normally projecting from the block for stopping the rim of the incoming round, means on the barrel for rendering said aforesaid means inoperative when the round has been driven home whereby to subsequently permit ejection of the empty case by the incoming round, a firing post slidably mounted in the cradle and adjustable to either safe, automatic, or single shot position, means for moving said post outwardly, a transverse slide in the block adapted to be moved by said post when the post is in firing adjustment, a lever pivoted to the block and operable on outward movement of the slide to depress the sear, a magazine on the cradle, a manually operable latch on the cradle for holding the block in feed position, means in the magazine for automatically actuating said latch when the last round from the magazine has been moved in position to be fed to the block, and a grip for manually retracting the block.

2. The combination of a cradle, a barrel mounted to reciprocate freely therein, an axially movable breech block for the barrel, said block having cartridge grooves and adapted to be energized by the barrel in recoil, a firing pin reciprocally mounted in the block, means for either automatically or manually cocking the pin, a sear for holding the pin in cocked position, a breech lock carried by the block and adapted when in unlocked position to prevent release of the firing pin, means for either automatically or manually unlocking the breech lock, means for latching the block in the feed position while the barrel continues into battery, said latching means adapted to be tripped by the barrel as it arrives in battery to release the block, a feed mechanism actuated by the counterrecoiling barrel to lower a round onto the block, the action of the incoming round serving to eject the empty case, means associated with the block for supporting the round, cooperating means on the cradle and block for depressing the sear to release the firing pin, a magazine on the cradle, a manually operable latch on the cradle for holding the block in feed position, means in the magazine for automatically actuating said latch when the last round from the magazine has been moved in position to be fed to the block, and a grip for manually retracting the block.

3. The combination of a cradle, a barrel mounted to reciprocate freely therein, an axially movable breech block for the barrel,

said block formed with cartridge grooves and adapted to be energized by the barrel in recoil, a firing pin reciprocally mounted in the block, means for cocking the pin during recoil, a sear for the pin, a breech lock carried by the block and adapted when in unlocked position to prevent release of the firing pin, means for latching the block in the feed position while the barrel continues into battery, said latching means adapted to be tripped by the barrel arriving in battery to release the block, a feed mechanism actuated by the counterrecoiling barrel to lower a round onto the block, the action of the incoming round serving to eject the empty case, means associated with the block for supporting the round, cooperating means on the cradle and block for depressing the sear to release the firing pin, a magazine on the cradle, and cooperating means on the magazine and cradle for automatically holding the block in the feed position when the last round from the magazine has been moved in position to be fed to the block.

4. The combination of a cradle, a barrel mounted to reciprocate freely therein, an axially movable breech block, a firing pin reciprocally mounted in the block, means for unlocking the block and barrel during recoil and locking them when both are in battery, means for latching the block in the feed position while the barrel continues into battery, said latching means adapted to be tripped by the barrel arriving in battery to release the block, a feed mechanism actuated by the counterrecoiling barrel to lower a round onto the block, the action of the incoming round serving to eject the empty case, means associated with the block for supporting the incoming round, means for depressing the sear to release the firing pin, a magazine on the cradle, and means associated with the magazine and cradle for holding the block in the feed position when the last round from the magazine has been moved into position to be fed to the block.

5. The combination of a cradle, a barrel mounted to reciprocate freely therein, an axially movable breech block, a breech lock, means for actuating the lock, means whereby the block is retained in feed position while the barrel continues into battery, means for feeding a round to the block, the action of the incoming round ejecting the empty case, means for supporting the incoming round, means for automatically releasing the block to ram home the round, a firing pin in the block adapted to be cocked during recoil, means for releasing the pin, a magazine on the cradle, and means for retaining the block in the feed position when the last round from the magazine has been moved into position to be fed to the block.

6. The combination of a cradle, a barrel therein having a divided breech formed with

sockets, a separable axially moving breech block adapted to be energized by the barrel on recoil for independent return to battery, a breech lock including a pair of locking members pivoted in the block and adapted to fit in the barrel sockets, transverse slides for actuating the members in opening and closing, a longitudinal slide having relative movement under tension with respect to the block and constrained to move therewith through the transverse slides, cooperating means on the transverse and longitudinal slides whereby they are mutually reciprocated, means on the cradle for moving the transverse slides inwardly during recoil to disengage the locking members from the barrel, and the forward relative movement of the longitudinal slide when the block is in battery serving to return the transverse slides to actuate the locking members to engage the barrel.

7. The combination of a cradle, a barrel therein having a breech formed with sockets, a separable axially moving breech block adapted to be energized by the barrel on recoil for independent return to battery, a breech lock including a pair of locking members pivoted in the block and adapted to fit in the barrel sockets, and mutually reciprocating slides movable with the block for actuating the breech lock to disengage the barrel during recoil and engage the barrel after the barrel and block have returned to battery.

8. The combination of a cradle, a barrel therein having a breech formed with sockets, a separable axially moving breech block adapted to be energized by the barrel on recoil for independent return to battery, a breech lock including a pair of locking members pivoted in the block and adapted to fit in the barrel sockets, and mutually reciprocating slides movable with the block for actuating the breech lock in opening and closing.

9. The combination of a cradle, a barrel therein having a breech formed with sockets, a separable axially moving breech block adapted to be energized by the barrel during recoil for independent return to battery, a breech lock including a pair of locking members pivoted in the block and adapted to fit in the barrel sockets, and means for actuating the breech lock in opening and closing.

10. The combination of a cradle, a barrel therein having a breech formed with sockets, a movable breech block for the barrel, a breech lock including a pair of locking members pivoted in the block and adapted to fit in the barrel sockets, and mutually reciprocating slides movable with the block for actuating the breech lock in opening and closing.

11. The combination of a cradle, a barrel therein having a breech formed with sockets, a movable breech block for the barrel, a breech lock including a pair of locking mem-

bers pivoted in the block and adapted to fit in the barrel sockets, and means for actuating the breech lock in opening and closing.

12. The combination of a cradle, a barrel therein, an axially movable breech block for the barrel adapted to return independently to battery, a firing pin in the block, means for cocking the pin during recoil, a breech lock in the block, means for actuating the lock to disengage the block after the firing pin has been cocked, auxiliary means carried by the block and operable on separation of the block and barrel for holding the breech lock in unlocked position, said means adapted to be rendered inoperative only after the block has returned to battery, and means operable when the block is in battery to actuate the breech lock to reengage the barrel.

13. The combination of a cradle, a barrel therein, a breech block for the barrel, a firing pin in the block, means for cocking the pin during recoil, a sear for the pin, a breech lock in the block, means for actuating the lock to disengage the block after the firing pin has been cocked, the lock during this operation serving to retract the already cocked firing pin, and means operable when the block has returned to battery to actuate the breech lock to reengage the barrel and permit the firing pin to be released to cocked position.

14. The combination of a cradle, a barrel therein, an axially movable breech block for the barrel adapted to return independently to battery, said block formed with cartridge guides, a plunger mounted in the block, a tumbler associated with said plunger and normally in extruded position to support the base of a cartridge, a pivoted support movable with the block and normally in elevated position when the block and barrel are separated to support the forward end of the cartridge, means on the barrel whereby the forward support is lowered as the block approaches battery, and means on the barrel for positioning the tumbler in rear of the cartridge as the block arrives in battery whereby to subsequently permit ejection of the empty case.

15. The combination of a cradle, a barrel therein, an axially movable breech block for the barrel adapted to return independently to battery, said block formed with cartridge guides, means mounted in the block and normally in position to support the base of a cartridge, means movable with the block and normally in position to support the forward end of the cartridge, and means on the barrel for controlling the movement of the rear and front supports to inoperative position.

16. The combination of a cradle, a barrel therein, an axially movable breech block for the barrel adapted to return independently to battery, said block formed with cartridge guides, cartridge supports associated with the block and normally in operative position, and means on the barrel for controlling the

movement of the supports to inoperative position.

17. The combination of a cradle, a barrel therein, an axially movable breech block for the barrel adapted to return independently to battery, feed mechanism for moving a round across the face of the block, and a collapsible support normally in round receiving position for stopping the incoming round in line with the chamber.

18. The combination of a cradle, a barrel therein, an axially movable breech block for the barrel adapted to return independently to battery, said block formed with cartridge guides, means associated with the block for supporting the incoming round in line with the chamber, and means for preventing rebound of the incoming round.

19. The combination of a cradle, a barrel therein, an axially movable breech block for the barrel, a firing pin in the block, a breech lock mounted in the block, a grip for manually retracting the block, manually operable means for retaining the block in retracted position, a rear and front lever for respectively cocking the pin and unfastening the breech lock, said levers mounted to be included in the grasp of the operator when seizing the grip.

20. The combination of a cradle, a barrel therein, an axially movable breech block for the barrel, a firing pin in the block, a breech lock, grouped means for manually cocking the pin, unfastening the lock and retracting the block, and manually operable means for retaining the block in retracted position.

21. The combination of a cradle, a barrel having ribs disposed in guides of the cradle, an axially movable breech block for the barrel adapted to be energized by the barrel on recoil for independent return to battery, a rod mounted on the cradle, a spring for urging the rod rearwardly, a bell crank lever pivoted to the cradle and operatively connected to the rod, a bent arm on the forward extremity of the rod and disposed in front of one of the ribs of the barrel whereby on recoil of the barrel the rod is free to be moved rearwardly to elevate the lever in position to restrain the block on counterrecoil, and said arm reengageable by the rib as the barrel approaches battery for lowering the lever to release the block.

22. The combination of a cradle formed with a feed opening, a barrel in the cradle, plungers mounted in the barrel, a separable breech block for the barrel adapted to be energized by the barrel for independent return to battery, means for automatically and releasably holding the block in feed position, cam plates on the block for extruding the plungers on separation of the block and barrel, means carried by the cradle for holding a round in the feed opening, means controllable by the barrel on counterrecoil for re-

leasing the round, feed levers pivoted to the cradle and formed with curved cam grooves whereby the levers are rocked by the extruded plungers during counterrecoil of the barrel, feed arms mounted in the cradle for vertical sliding movement under tension and operatively connected to the levers, feed fingers pivoted to the feed arms and normally engaging the round in the feed opening whereby to lower the round onto the block as the levers are rocked to depress the arms, and means associated with the fingers for restoring them to round engaging position when the feed arms have returned to their normal up position.

23. The combination of a cradle formed with a feed opening, a barrel in the cradle, plungers mounted in the barrel, an axially movable breech block for the barrel adapted to be energized by the barrel for independent return to battery, means for either manually or automatically holding the block in feed position, means on the block for controlling the in and out movement of the plungers, means carried by the cradle for holding a round in the feed opening, means for either manually or automatically releasing the round, feed levers pivoted to the cradle and formed with curved cam grooves whereby the levers are rocked by the extruded plungers on counterrecoil of the barrel, and means operatively connected to the levers for lowering a round into the path of the block as the levers are rocked.

24. The combination of a cradle formed with a feed opening, a barrel in the cradle, plungers mounted in the barrel, an axially movable breech block for the barrel adapted to be energized by the barrel for independent return to battery, means for releasably holding the block in feed position, means on the block for controlling the in and out movement of the plungers, means carried by the cradle for holding a round in the feed position, means for releasing the round during counterrecoil of the barrel, feed arms mounted for vertical sliding movement in the cradle and normally engaging the round in the feed opening, and means operatively connected to the feed arms and adapted to be actuated by the extruded plungers on counterrecoil of the barrel to lower the round into the path of the block.

25. The combination of a cradle formed with a feed opening, a barrel in the cradle, an axially movable breech block for the barrel adapted to be energized by the barrel for independent return to battery, means for releasably holding the block in feed position, means carried by the cradle for holding a round in the feed opening, means for releasing the round during counterrecoil of the barrel, feed levers pivoted to the cradle, feed arms operatively connected to the levers and normally engaging the round in the feed

opening, means on the barrel for rocking the levers on counterrecoil to lower feed arms, and means on the block for controlling the movement of the aforesaid means to operative and inoperative position.

26. The combination of a cradle formed with a feed opening, a barrel in the cradle, an axially movable breech block for the barrel adapted to be energized by the barrel for independent return to battery, means for releasably holding the block in feed position, means carried by the cradle for holding a round in the feed opening, means for releasing the round during counterrecoil of the barrel, feed levers pivoted to the cradle, feed arms operatively connected to the levers and normally engaging the round in the feed opening and means on the barrel for rocking the levers on counterrecoil to lower the feed arms.

27. The combination of a cradle, a barrel therein, a breech block for the barrel, a firing pin and sear in the block, a transverse slide in the block, a bell crank lever pivoted to the block and connected to the sear and slide, a housing slidably mounted in the cradle, said housing normally in inoperative position and adapted to be moved laterally outward on retraction of a trigger rod, a firing post movable with the housing, said post having opposite undercut and overcut projecting portions respectively in the automatic and single shot adjustment when positioned to the rear and in the safe adjustment when positioned vertically, means for adjusting the post, an element in the slide whereby the post when in either firing adjustment and moving outward with the block in battery actuates the slide while with the post held outward in single shot adjustment and the block running into battery the slide is not actuated, said element adapted to permit return of the post to inoperative position with the block in battery, and said slide formed with an inclined forward face whereby when the post in automatic position is held outward the slide will be actuated thereby as the block runs into battery.

28. The combination of a cradle, a barrel therein, a breech block for the barrel, a firing pin and sear in the block, a transverse slide in the block, a bell crank lever pivoted to the block and connected to the sear and slide, means slidably carried by the cradle and adapted to be adjusted to safe, automatic, or single shot position, mechanism for reciprocating said means, said means when in either firing adjustment and the block in battery adapted in moving outward to actuate the slide and when held outward as the block runs into battery respectively actuating and not actuating the slide accordingly as said means is adjusted for automatic or single shot firing.

29. The combination of a cradle, a barrel therein, a breech block for the barrel, a firing

pin and sear in the block, a transverse slide in the block, a bell crank lever connecting the sear and slide, a movable firing post in the cradle adjustable for automatic or single shot firing, an element in the slide through which the slide is actuated to depress the sear when the firing post is moved outward with the gun at rest, and said slide adapted to be directly moved by the post as the breech block runs into battery.

30. The combination of a cradle, a barrel therein, a breech block for the barrel, a firing pin and sear in the block, means on the block for depressing a sear to release the pin, means movably carried by the cradle and adapted to actuate the aforesaid means for either automatic or single shot firing, and an element carried by said first mentioned means whereby in single shot firing the block may run into battery without release of the pin.

31. The combination of a cradle, a barrel therein, a breech block for the barrel, a firing pin and sear in the block, a transverse slide in the block, a bell crank lever pivoted to the block and connected to the sear and slide, and adjustable means mounted in the cradle whereby the slide may be actuated in either automatic or single shot firing.

32. The combination of a cradle, a movable breech block, a firing pin and sear in the block, a sear actuating mechanism, a housing slidably mounted in the cradle, means for reciprocating said housing, a firing post movable with the housing and adapted to actuate said mechanism, said post having opposite undercut and overcut projecting head portions respectively in the automatic and single shot adjustment when positioned to the rear and in the safe adjustment when positioned vertically, and means for adjusting the post.

33. The combination of a cradle formed with a feed opening, means for holding a round in the opening, a magazine for successively feeding rounds into position in the opening, a barrel in the cradle, a separable breech block for the barrel, a manually operable latch on the cradle for holding the block in feed position, and means associated with the magazine for automatically actuating said latch when the last round from the magazine has been discharged into the feed opening.

34. The combination of a cradle, a barrel therein, a breech block for the barrel, manually operable means for holding the block in feed position, a magazine on the cradle, and means in the magazine for automatically actuating said latch when the last round from the magazine has been moved into position to be fed to the block.

35. A gun barrel, a breech block separable from the barrel, breech locking members in the block, means for actuating the breech locking members, and means carried by the block

and releasable on separation of the block and barrel in the path of movement of the locking members.

5 36. A gun barrel, a breech block separable from the barrel, a breech lock in the block, means for actuating the breech lock and means operable on separation of the block and barrel for holding the lock in unlocked position.

10 37. A gun barrel, a breech block separable from the barrel, a breech lock in the block, means for actuating the breech lock and means carried by the block for holding the lock in unlocked position.

15 38. A cradle having a feed opening, a barrel reciprocal on the cradle, a breech block formed with cartridge guides and adapted to

be energized for independent return to battery, means for releasably holding the block in feed position, and means for preliminarily 20 holding a released cartridge in the feed opening in position to be guided to the guides on the breech block.

39. A cradle having a feed opening, a barrel reciprocal on the cradle, a breech block 25 formed with cartridge guides and adapted to be energized for independent return to battery, means for releasably holding the block in feed position, and means for preliminarily holding a released cartridge in the feed open- 30 ing.

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