

April 16, 1929.

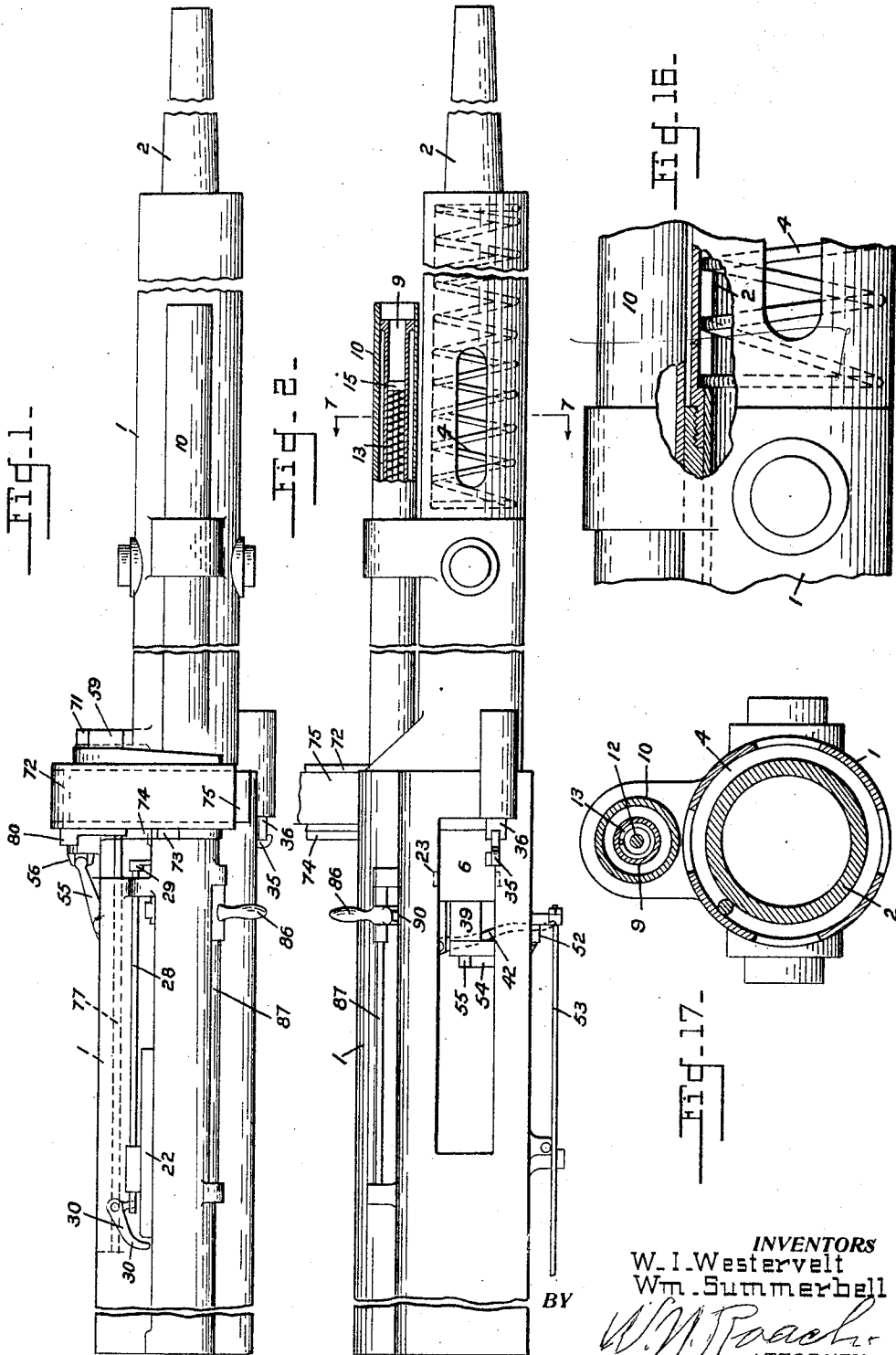
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1,709,162

AUTOMATIC GUN

Filed April 21, 1925

9 Sheets-Sheet 1



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AUTOMATIC GUN

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9 Sheets-Sheet 2

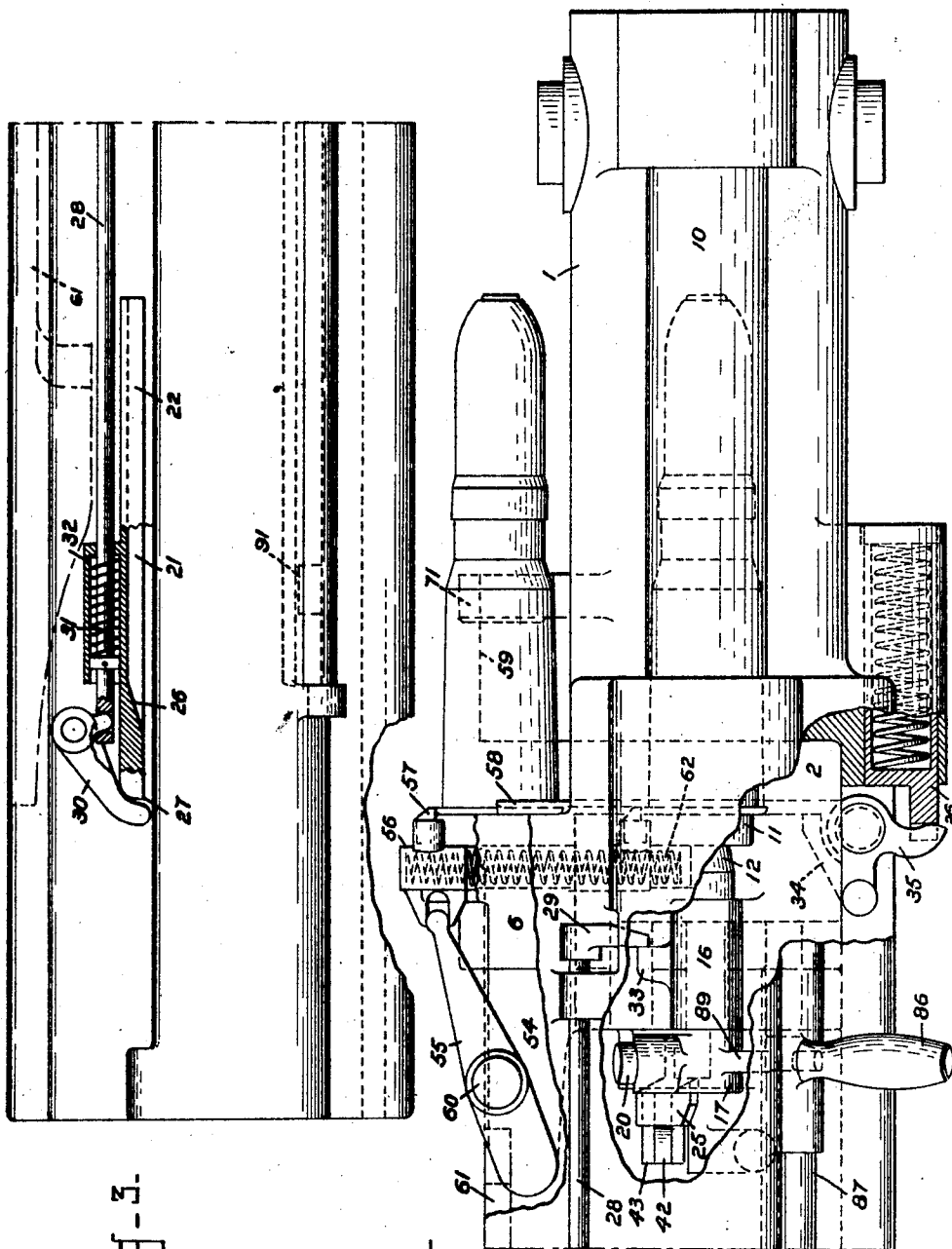


Fig. 3-

Fig. 4-

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9 Sheets-Sheet 3

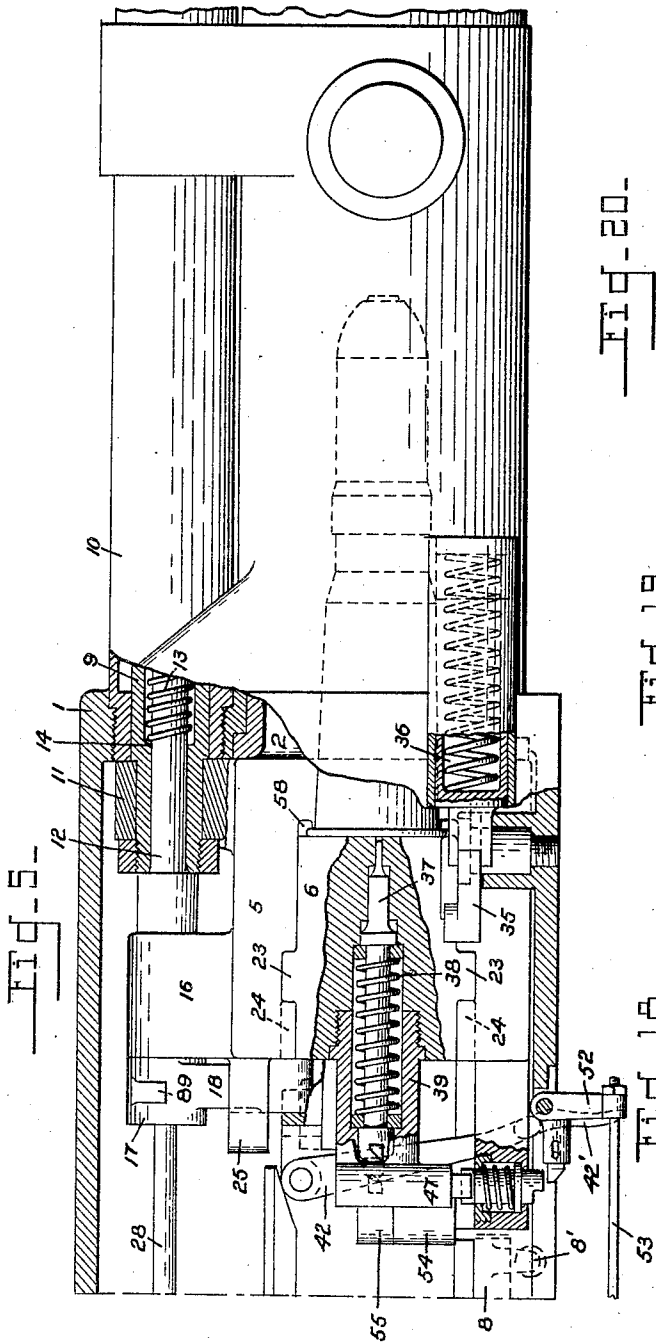


Fig. 5-

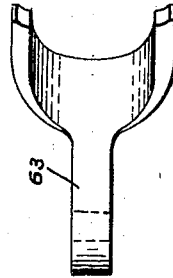


Fig. 19-

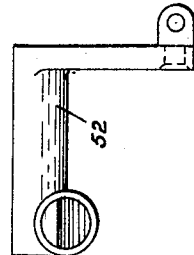
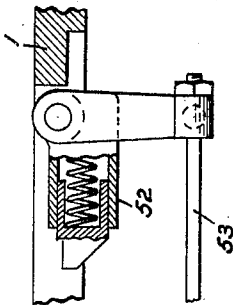


Fig. 18-



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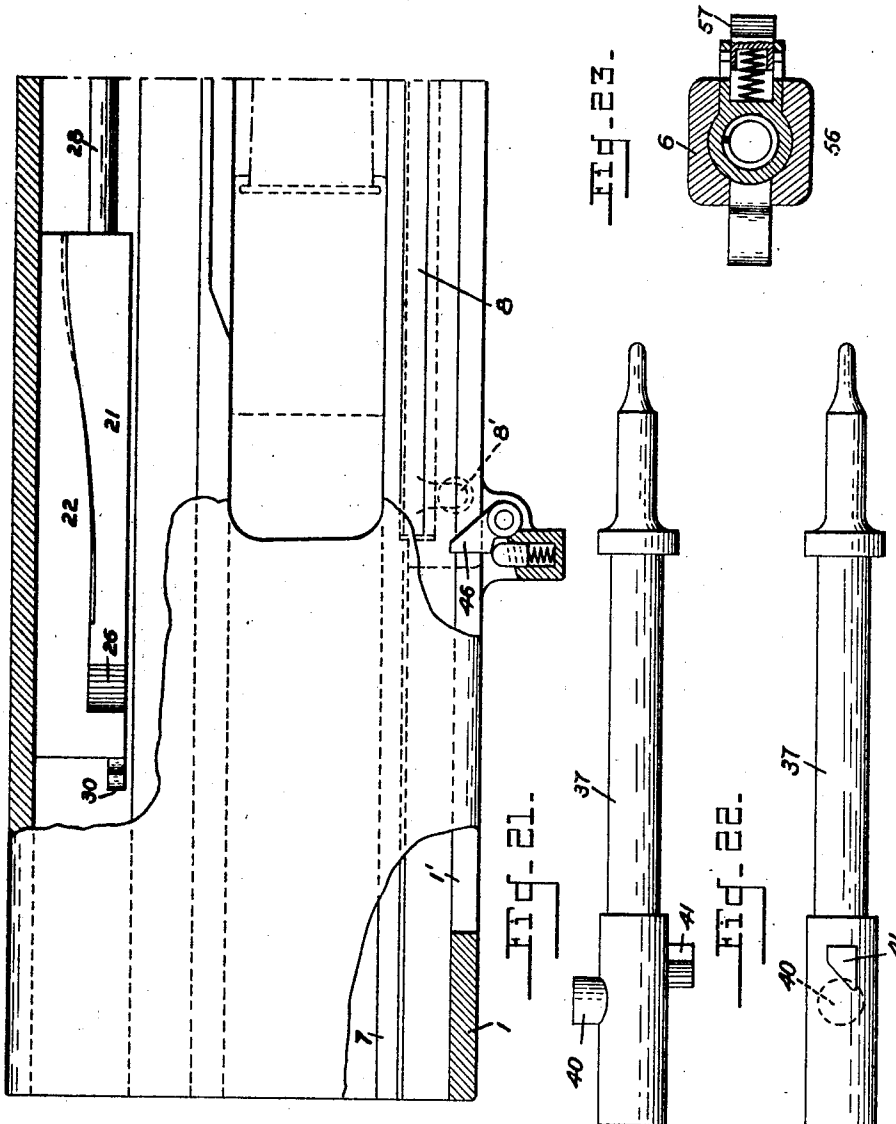
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9 Sheets-Sheet 4



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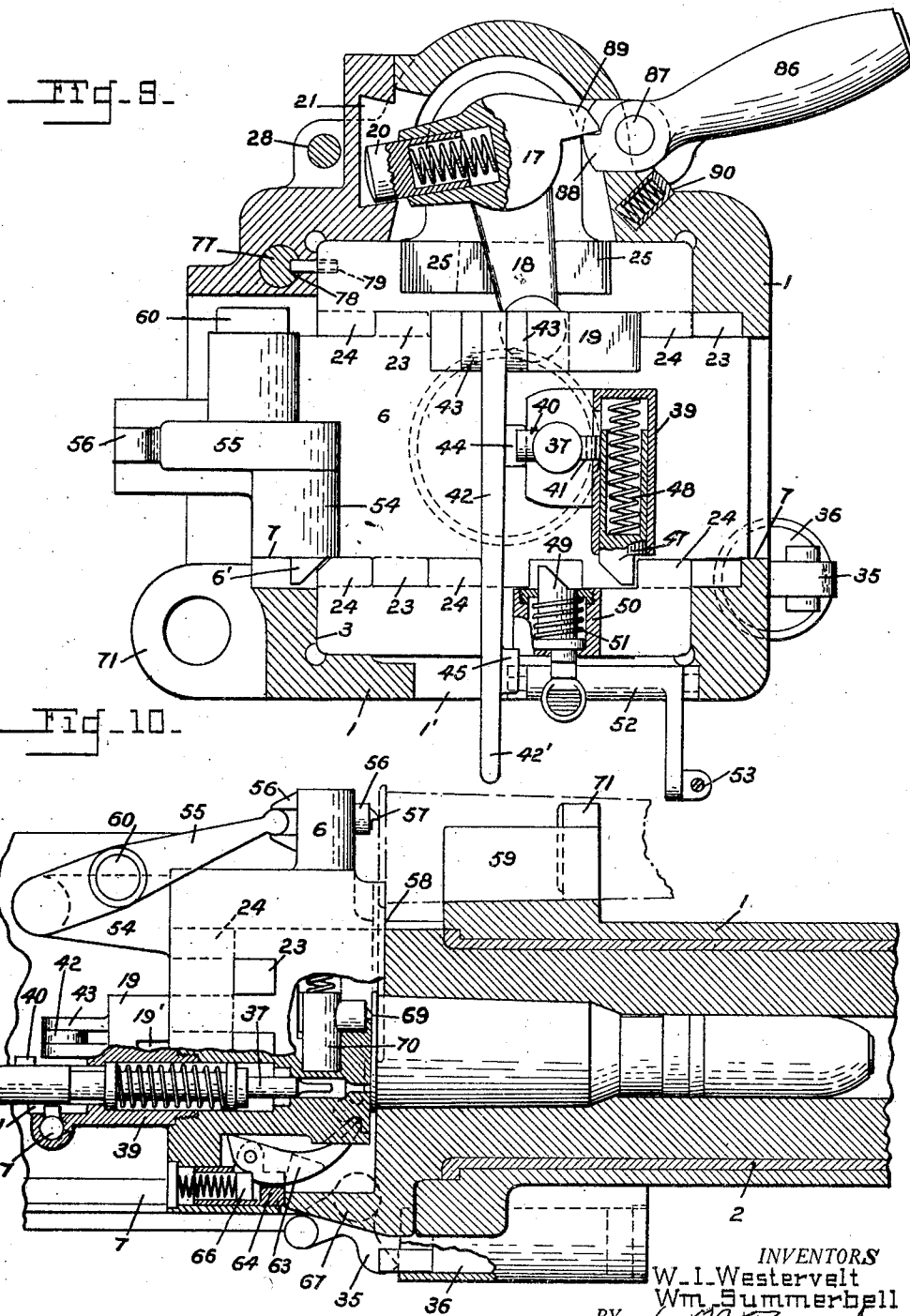
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AUTOMATIC GUN

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9 Sheets-Sheet 6



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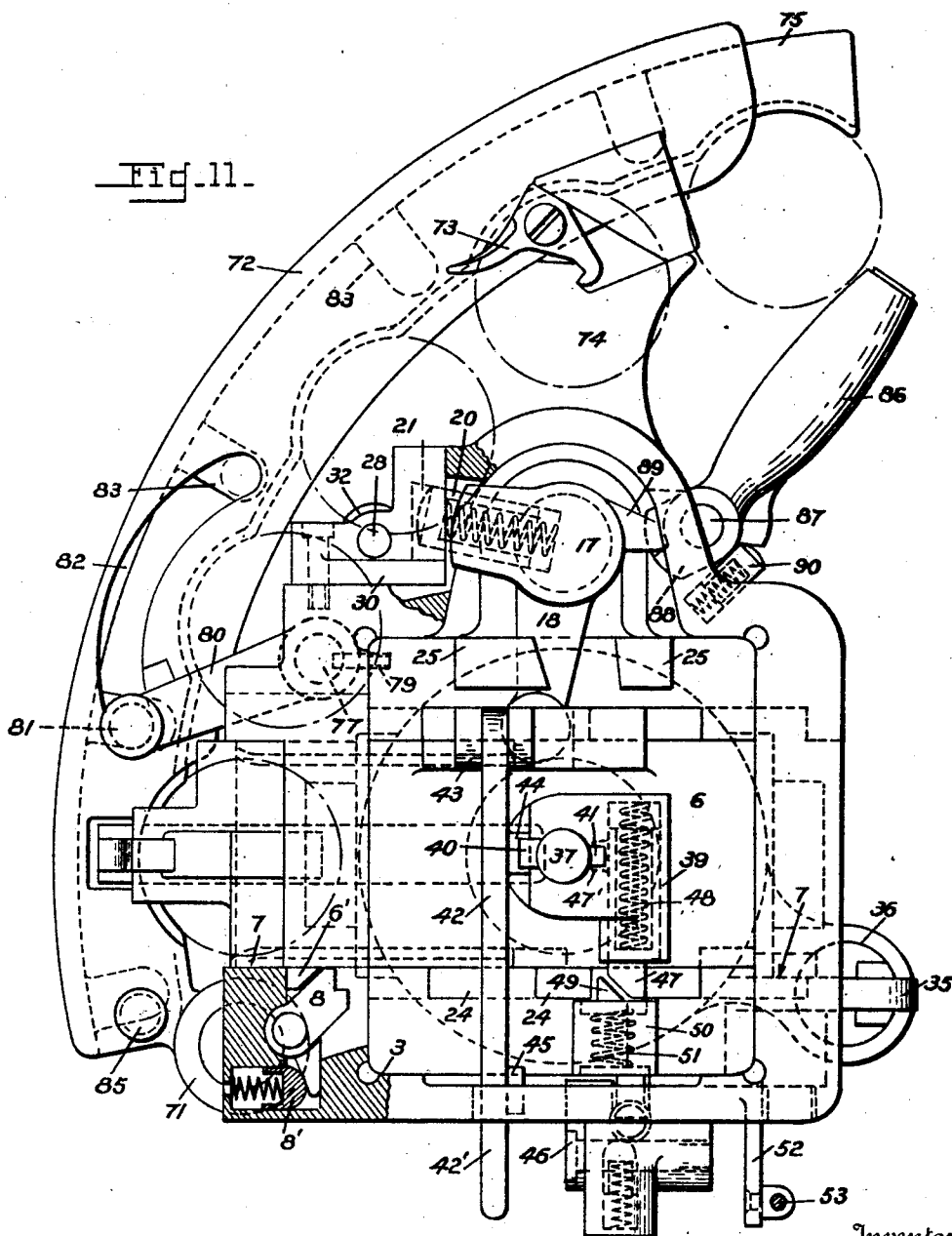
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9 Sheets-Sheet 7



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9 Sheets-Sheet 8

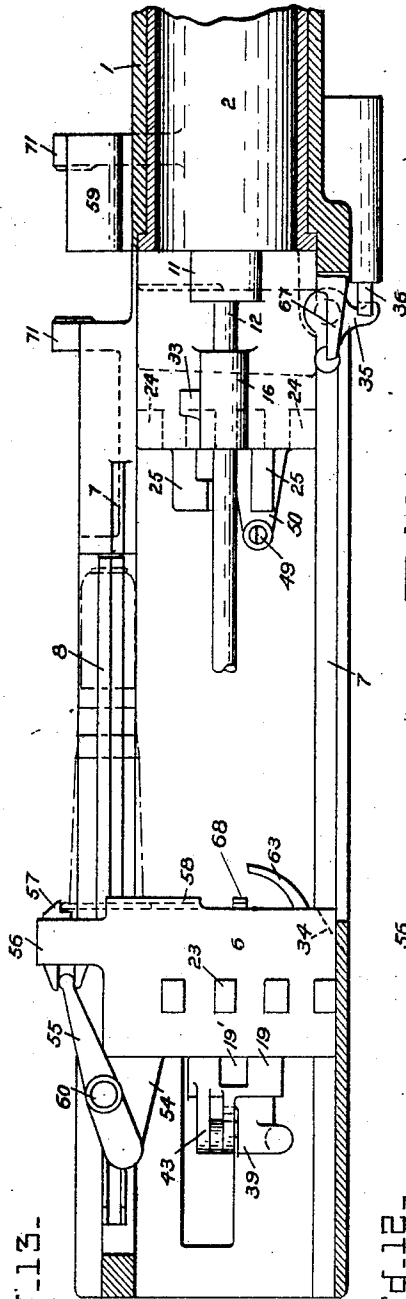


FIG. 13-

FIG. 14-

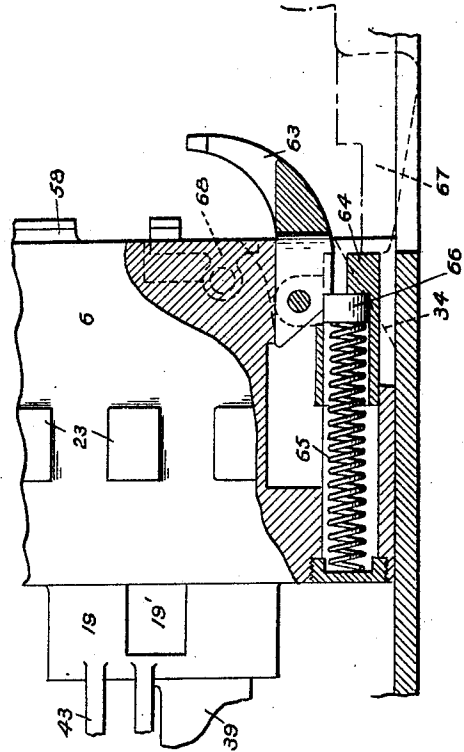
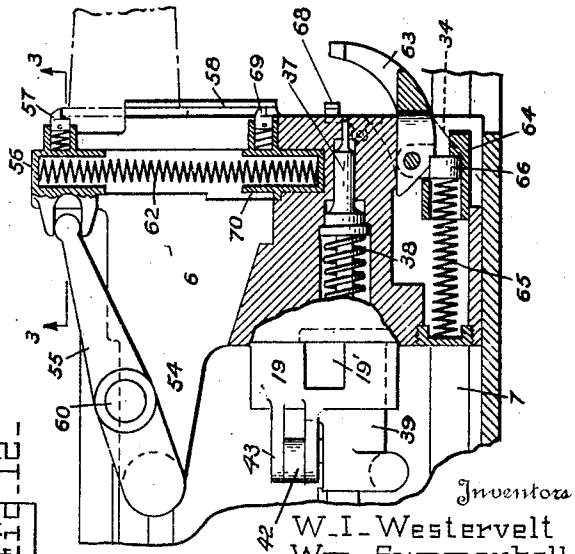


FIG. 12-



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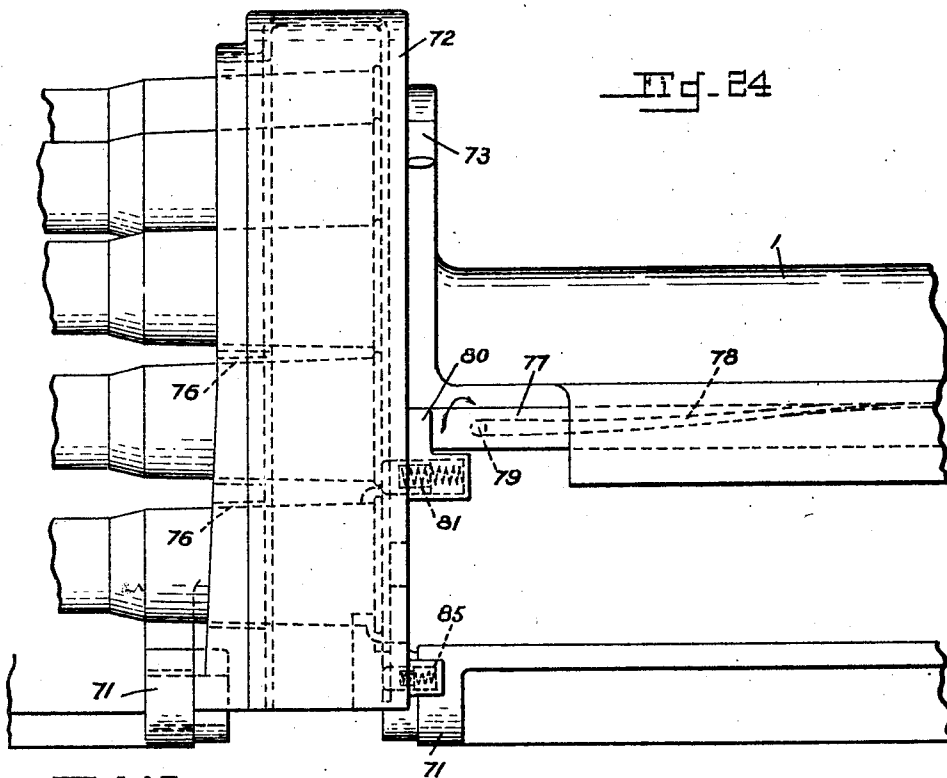
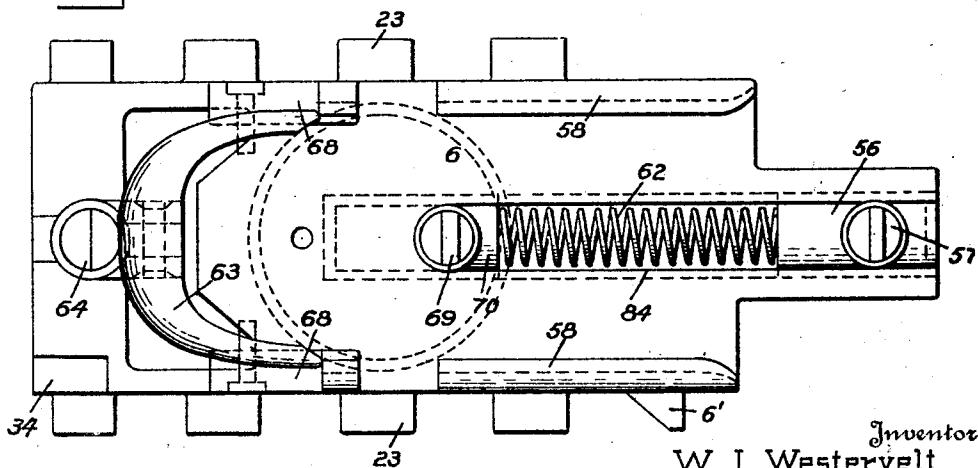


Fig. 15.



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# UNITED STATES PATENT OFFICE.

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## AUTOMATIC GUN.

Application filed April 21, 1925. Serial No. 25,074.

(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 us of any royalty thereon.

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

10 In designing automatic guns for projectiles of large calibers, it is essential by reason of the explosive nature of this class of projectiles to insure positive feeding of the round into the barrel and it is desirable to accomplish the feeding and other operations 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 longer stroke of recoil precludes the feasibility of overhead extraction of a live round from the magazine during recoil and subsequent lowering of the round into position to enter the chamber on counterrecoil of the block or bolt which is the method popularly adopted for light machine guns. It is also desirable that the gun be manually as well as automatically operable to provide for initially loading the piece and for correcting stoppages and misfires.

25 With these and other objects in view, we have devised novel means for unlocking an axially movable breech block which extracts a live round from the magazine during recoil and which moves en masse with the barrel until, in the initial stage of counterrecoil it is arrested by the unlocking means, while the barrel, continuing into battery to permit ejection and feeding respectively of the empty case and the live round, controls the release of the block and the advancement of the feed strip through the magazine. A novel buffer mechanism, for decreasing the velocity of the counterrecoiling barrel, serves to energize the block for independent return movement. The live round is fed transversely across the face of the block as the block after release, continues its return to battery and the round is brought to rest by a novel support immediately preceding its entry into the chamber, the support being subsequently collapsed as the block approaches the limit of its forward movement. An important innovation consists in the provision for buffing the breech block, the mechanism

reacting to slide the block laterally in locking. A further departure in the manner of grouping the firing pin, cocking lever, sear, and firing post renders them more accessible and enables the firing pin to be readily and directly cocked while the gun is locked in battery.

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

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

Fig. 1 is a plan view of a gun constructed in accordance with the invention;

Fig. 2 is a view in side elevation partly broken to show details of the combined counterrecoil buffer and block return mechanism;

Fig. 3 is a plan view of the rear end of the gun partly broken to show details of the block release rod;

Fig. 4 is a plan view of a portion of the gun in extension of Fig. 3 with the block locked in firing position, the cradle broken away above the breech to reveal parts in plan and section and the magazine removed from the cradle;

Fig. 5 is a fragmentary view in right side elevation and partly in section, the firing pin being released and about to prime the loaded round;

Fig. 6 is a similar view of the end of the gun in rear of Fig. 5;

Figs. 7 and 8 are horizontal sectional views through the breech end of the gun with the breech block partly in section and showing a round entering the chamber;

Fig. 9 is a transverse sectional view through the gun, the breech block unlocked in the forward position, and shown in rear elevation with parts in section;

Fig. 10 is a fragmentary plan view partly in section of the breech block cocked and in unlocked position, the barrel being sectioned to show the loaded round;

Fig. 11 is a rear elevation with the end plate removed of the gun locked in firing position and parts being shown in section;

Fig. 12 is a partial horizontal sectional view through the breech block showing the feed slide, ejector, and cartridge support;

Fig. 13 is a plan view of the separated block and barrel, the upper part of the cradle and magazine being removed;

Fig. 14 is a fragmentary view of the breech block partly in plan and partly in section to show details of the cartridge support;

Fig. 15 is a front view of the block shown in Fig. 14;

Fig. 16 is an enlarged fragmentary view partly in section of the corresponding portion of the gun shown in Fig. 2;

Fig. 17 is a sectional view on the line 7—7 of Fig. 2;

Fig. 18 is a detail view in side elevation and partly in section of the trigger bar;

Fig. 19 is a view in rear elevation thereof;

Fig. 20 is a detail view in left side elevation of the cartridge support;

Fig. 21 is a detail plan view of the firing pin;

Fig. 22 is a view in right side elevation thereof;

Fig. 23 is a detail sectional view on the line 3—3 of Fig. 12;

Fig. 24 is a fragmentary view in left side elevation of the gun with the magazine closed and loaded;

Figs. 25 and 26 are detail views, respectively, in plan and front elevation of a member of the breech block.

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 in reciprocation by rails 3 integral with the base of the cradle (Figs. 9, 11 and 13). Surrounding the barrel 1 and enclosed by the cradle is a spring 4 (Figs. 2 and 16) compressed during recoil for returning the barrel to battery, the return movement of the barrel being eased or retarded by a buffer mechanism hereinafter to be described.

The breech end of the barrel is squared (Figs. 5, 9 and 11) and embodies horizontally disposed spaced extensions 5 between which is received an axially movable breech block 6 which is guided in reciprocation after being separated from the barrel by stationary rails 7 on either side of the cradle, and also by an adjustable rail 8 (Figs. 7, 8, 11 and 13) which interrupts the left hand rail 7. The adjustable rail 8 is lowered by the breech block guide 6' as the block moves to the right in unlocking and is restored to normal position by plungers 8' when cleared by the block in counterrecoil.

As the barrel moves in recoil, it retracts a hollow piston 9 (Figs. 2 and 5) disposed in a cylinder 10 and which is constrained to be reciprocated with the barrel by reason of its attachment to the bracket 11 on the breech. Within the piston 9 is a rod 12 surrounded by a spring 13 which is confined between an internal annular shoulder 14 (Fig. 5) of the

piston and the collar 15 on the forward end of the rod (Fig. 2). This rod passes underneath a bridge guide 16 on the breech and terminates in an enlarged head 17 having a depending lever 18 whose ball end is disposed in a slot 19' formed in a rearward extension 19 of the breech block, (Figs. 8, 9, 11, 12 and 13). The head 17 is also provided with a plunger 20 adapted during recoil to traverse the cam groove 21 in a plate 22 secured to the top left side of the cradle whereby to rotate the head 17 and rod 12 in a counter-clockwise direction to move the block to the right to the position shown in Figure 9. When the block is in this position the locking studs 23 on the block have moved clear of the studs 24 on the breech ring and the lever 18 brought to rest by the right hand element of a pair of stops 25—25 on the barrel is now free to pass between the stops at the proper moment of separation of the block and barrel.

The cam groove 21 terminates in a bevel portion 26 (Figs. 3 and 6) whereby the plunger 20 after serving to unlock the block is forced inwardly but on passing the plate 22 it is again extruded so that on counter-recoil it may be brought up against the rear shoulder 27 of the plate to restrain the block while the barrel continues into battery.

During recoil and initial counterrecoil the piston 9 and rod 12 participate in the movement of the barrel and block, the spring 13 remaining idle. However, when the rod 12 is hung up by reason of the engagement of the plunger 20 on the shoulder 27 of the cam plate 22 the piston compresses the spring for the purpose of decreasing the velocity of the counterrecoiling barrel as it runs into battery while also energizing the spring to subsequently accomplish return movement of the block, the block advancing a round into the chamber.

Referring to Figures 1, 3, 4, 9 and 11 there is mounted on the upper left side of the cradle a block release rod 28, its forward extremity having a finger 29 and its rear extremity receiving an arm of a bell crank lever 30 pivoted in the cradle and normally moved to inoperative position by a spring 31 which is enclosed in a housing 32 formed integrally with the cam plate 22. As the barrel arrives in battery, a stud 33 (Fig. 13) on the barrel strikes the finger 29 to impel the rod forwardly, this action causing the lever 30 to be swung inwardly to strike the plunger 20 and release it from engagement with the shoulder 27 whence the energized spring 13 returns the block independently to battery. Separation of the block and barrel is essential to effect ejection of the empty case and insertion of a live round into the barrel chamber as will appear in detail as the description proceeds.

The block moves forward in the unlocked position, the locking studs 23 passing between

the studs 24 on the breech and the lever 18 between the stops 25—25. The lower front right corner of the block is beveled as at 34 so that in the final stage of counterrecoil the block may strike one arm of a rocker 35 on the cradle forcing it outwardly to collapse a buffer plunger 36 (Figs. 4, 5, 8, 11, 13 and 15) and thereby easing the arrival of the block in its foremost position. When the block is fully home, the cooperating plunger and rocker react to restore the block to battery moving it from right to left, the studs on the block lining up in front of the studs on the breech to securely lock the block in battery. As the block moves to the left, the unlocking lever 18 is restored to its initial position against the left hand stop 25 and the plunger 20 is elevated where it may enter the cam groove 21 during the next cycle of operation. Also during the locking movement, the guide 6' on the under side of the block is sufficiently forward to clear the left front rail 7 so that on recoil the guide will be on the outside of the adjustable rail 8 as shown in Figure 11.

Referring to Figures 5, 9 and 10, the block is provided with the usual firing pin 37 and firing pin spring 38 partially mounted in a housing 39 threaded into the rear of the block. The base of the firing pin (Figs. 21 and 22) is formed with a round stud 40 on its left side whereby it is retracted to cocked position and a beveled stud 41 on its right side whereby it is held in cocked position. A cocking lever 42 pivoted between ears 43 on the extension 19 and depending through a longitudinal slot 1' in the bottom of the cradle is formed with a stud 44 (Figs. 9 and 11) disposed in front of the round stud 40 and is also formed with a lug 45 adjacent its lowermost extremity. When the block is moved to the right in unlocking, the cocking lever is moved therewith laterally across the slot, the lug 45 idling over a trip 46 secured to the bottom of the cradle at the right hand side of the slot (Fig. 6) in such a manner that on counterrecoil the cocking lever is rotated rearwardly to cock the firing pin.

Mounted in an offset portion of the housing 39 is a sear 47 (Figs. 5 and 9 and 11) including a beveled stud 47' normally held in the path of the beveled stud 41 of the pin by the sear spring 48. As the pin is retracted to cocked position, the stud 41 of the pin engages the sear stud 47' to cam the sear upward, the sear being subsequently lowered by the sear spring to position the sear stud 47' in front of the firing pin stud 41 thereby holding the firing pin in cocked position as shown in Figure 10.

With the block locked in battery (Fig. 11), the sear 47 is positioned above a firing post 49 mounted in a housing 50 extending rearwardly from the breechring (Fig. 13) and normally held in lowermost or inoperative position by a

spring 51 (Fig. 9). The firing post may be elevated to release the sear by means of a trigger bar 52 pivoted to the cradle and actuated by a rod 53 connected to any suitable type of trigger mechanism (not shown). The contacting faces of the sear and firing post are complementarily beveled so that in the event the trigger is held compressed for the purpose of sustaining fire, the firing post will be correspondingly maintained in the elevated position and the sear will be automatically raised thereby as the block moves to the left in locking, as clearly indicated in Figure 9.

Referring to Figures 8, 10, 12, and 13 an extension 54 on the lower left hand side of the block pivotally carries a feed lever 55 whose free end is operatively connected to a transversely movable feed slide 56 provided with a yieldable feed finger 57 adapted to move a round from left to right across the front face of the block, the round being guided and supported in flangeways 58. The round to be fed into the gun is supported on a tray 59 on the cradle (Fig. 4) and is initially gripped by the flangeways as the block when locking in battery moves from right to left. Consequently, on recoil, the round is extracted from the magazine 72 (Fig. 11) and is carried to the rear by the recoiling block. For the purpose of positioning the round concentric with the chamber in the barrel there is mounted on the feed lever 55 a plunger 60, which during counterrecoil of the block after being released engages a cam plate 61 on the left side of the cradle (Figs. 7 and 8) whereby it is moved crosswise, compressing the feed slide spring 62 which is subsequently restores the lever to its outermost position. It will be noted from Figure 13, that despite the length of the round the loading operation is completed on a comparatively short counterrecoil stroke since the cross feeding of the round may be taking place between the spaced extensions 5 while the nose of the round is traversing the breech end of the barrel.

To prevent the round from feeding beyond the mouth of the chamber, there is provided in the block a bifurcated support 63 (Figs. 8, 10, 12, 13, 14 and 15 and 20) pivotally carried by a plunger 64 and normally extruded to round receiving position by means of the plunger spring 65 acting on a block 66 which engages a notch on the outer side of the support. As the block approaches battery, the plunger strikes a projecting arm 67 on the barrel and is forced rearwardly carrying with it the support 63. When the block is fully home the fingers of the support have ridden over and are engaged in rear of rockers 68, which are positioned in the block behind the rim of the loaded round (Fig. 10). In this way the support is held in retracted position where it will not interfere with ejection of the empty case. After ejection is completed the support under the influence of the spring 65 is

free to again be moved to round receiving position, the rockers being rotated to release the fingers of the support.

When the block is fully home but unlocked the feed finger 57 and a similarly constructed ejector 69 are in the position shown in Figure 10 being collapsed by reason of contact respectively with the base of the round in the tray 59 and the loaded round in the chamber. As the block is moved to the left in locking, the feed finger and ejector move with it to engage the rim of the respective rounds as shown in Fig. 4. During the intermediate stage of recoil the block, as has been previously described, is moved to the right in unlocking but the ejector remains stationary by reason of its contact with the rim of the empty case. This action energizes the feed slide spring 62, the inner end of which is confined in the ejector casing 70 to subsequently expel the empty case from the face of the block, when, during independent return of the barrel to battery, the mouth of the chamber clears the forward end of the empty case.

To facilitate ejection of the empty case and to prevent jamming, the flangeways 58 are of minimum length, retaining merely a sufficient hold on the rounds to perform its dual extracting operation. It will be noted from Figure 15 that when the block is moved in locking to grip the round in the magazine, the flangeways will be clear of the loaded round but will again grip the empty case to extract it as the block is unlocked during recoil. The live round, however, is clear of the magazine before unlocking takes place and consequently it is still retained by the block as the flangeways reengage the empty case.

Referring to Figures 8, 11, 13 and 24, the cradle is provided with ears 71 positioned on its left side adjacent the breech end of the barrel when in battery. Pivotaly mounted on the ears 71 and overlying the cradle is a curved magazine 72 which when closed is supported by, and locked with a latch 73 to a standard 74 formed integrally with the top of the cradle. The magazine is suitably grooved to receive a metallic strip 75 in which a number of rounds are retained by resilient split rings 76 riveted to the strip.

Mounted in the cradle is a shaft 77 formed with a cam groove 78 in which is disposed a pin 79 on the breech ring (Figs. 9, 11 and 24) whereby during recoil and counterrecoil of the barrel the shaft is rotated. On the forward end of the shaft is a lever 80 having a scarfed plunger 81 which projects through an arcuate slot 82 in the rear face of the magazine to engage slots 83 in the strip. During recoil, the lever is raised so that on counterrecoil the strip may be fed through the magazine until the lowermost round is brought to rest by the tray 59 in position to be gripped by the flangeways of the block

as the block is moved from right to left in locking. The feed finger 57 is adapted on locking of the block to project through a slot 84 in order to engage the rim of the round on the tray. The magazine is also provided with a scarfed plunger 85 engageable in the slots 83 to hold the strip while the lever is being raised during recoil. When the last round from the strip has been gripped by the block and extracted from the magazine, the strip is free to pass through the magazine and fall clear. To provide for uninterruptedly feeding rounds through the magazine the individual strips may be hooked together in any well known manner.

For the purpose of initially loading the piece and correcting stoppages, there is provided a handle 86 slidably mounted on a rod 87 secured on the upper right side of the cradle (Figs. 1, 4, 9 and 11). The pivot end of the handle is formed with a slotted projection 88 (Figs. 9 and 11) which forwardly engages a lug 89 on the head 17 of the rod 12. The handle is normally held in the raised or inoperative position as shown in Figures 9 and 11 by a plunger 90.

To open the block the handle is turned downwardly in a clockwise direction (Figs. 9 and 11) and through the lug 89 rotates the head 17, the lever 18 moving the block to the right to disengage the locking studs 23 from the studs 24 on the breech ring. The handle is then drawn to the rear carrying with it the block and may be latched in a recess 91 (Fig. 3) sufficiently far to the rear to allow the lug 45 of the cocking lever to ride over and get behind the trip 46 and also a suitable distance from battery to clear stoppages or manually insert a new round.

As a provision for remedying misfires the extremity of the cocking lever 42 is formed into a finger grip 42' protruding below the cradle (Figs. 5, 9 and 11) so that with the block locked in battery the gunner may reach underneath the cradle and by directly pressing the cocking lever the firing pin will be cocked. On pulling the trigger, the firing pin may again be released and if the misfire persists the round may be cleared and a new round inserted.

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

In operation, to load the piece, assuming the gun to be locked in the firing position and a loaded strip in the magazine, the handle 86 is turned down and operates through the lever 18 to move the breech block from left to right in unlocking, the block assuming the position shown in Figure 9 so that it will not extract a round from the magazine as it is retracted. The block is then manually drawn to the rear and latched in place where the initial round may be inserted in the

flangeways 58 until the yieldable feed finger 57 grips the outer rim of the case. On the release of the block for return to battery the cocking lever 42 is actuated by the trip 46 to cock the firing pin and the feed lever 54 is moved crosswise by means of the cam plate 61 until the round is brought up against the support 63 whence it is advanced into the chamber by the counterrecoiling block, the support being forced rearwardly into the block when its plunger 64 strikes the arm 67 on the barrel (Fig. 10). The block is eased on completion of its return movement by the cooperating rocker 35 and buffer 36 which react to automatically slide the block laterally into the firing position, the lever 18 moving therewith until brought up against the left stop 25 on the barrel. The gun is then in the position shown in Figure 4, the flange 57 of the block picking up the lowermost round in the magazine (Fig. 11) and the feed finger 56 and ejector 69 engaging respectively the rim of the incoming and the loaded round.

When a round is discharged the block and barrel move together in recoil, at first interlocked and later, after the incoming round has been withdrawn clear of the magazine, unlocked. The unlocking of the block is automatically accomplished by the plunger 20 on the enlarged head 17 of the return rod 12 working in the cam groove 21 of the plate 22, the block moving from left to right while the ejector is held stationary to energize the spring 62 by reason of its engagement with the rim of the empty case. Also during unlocking, the flangeways 58 reengage the rim of the empty case so that subsequently on separation of the barrel and block the empty case will be extracted from the chamber.

During the initial stage of counterrecoil, the plunger 20 engages the rear shoulder 27 of the plate 22, (Fig. 3) to restrain the block while the barrel continues uninterruptedly and is eased into battery by compressing the spring (Fig. 2) which is thus energized to subsequently return the block independently to battery. When the chambered end of the barrel has cleared the forward end of the empty case, the ejector expels the case from the flangeways 58 freeing the rockers 68 for rotation to allow the support 63 to be released to round engaging position.

As the barrel approaches battery (Figs. 3 and 4), a stud 33 thereon strikes the finger 29 of the release rod 28, this action causing the bell crank lever 30 to be swung inwardly to release the plunger 20 from the cam plate 22 whence the energized spring 13 effects the independent return of the block.

On release of the block the pivoted feed lever 55 engages the cam plate 61 to move the feed slide 56 transversely of the block until the incoming round is stopped concentric with the chamber by the support 63 at which time the block will have advanced to a point

where the round is about to enter the chamber. After accomplishing its function the feed lever is returned to its normal outward position by the feed slide spring 62.

Also on initial release of the block, the cocking lever 42 is rotated rearwardly by the trip 46 to retract the firing pin 37 to cocked position, the stud 41 of the pin displacing the sear 47 which reacts to hold the pin in cocked position. By reference to Figures 9 and 11, it will be noted that the firing pin and primer of the round and also the sear 47 and firing post 49 are only aligned when the block is locked in the firing position so that in the event of accidental release of the pin while the block is unlocked no damage will result.

During recoil and counterrecoil of the barrel the lever 80 on the shaft 77 is rocked to advance the strip 75 through the magazine until the lowermost round rests on the tray 59 in position to be gripped by the flangeways 58 as the block is automatically locked by the combined rocker buffer 35 and 36.

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 mounted to reciprocate freely therein, an axially movable breech block for the barrel, cooperating means on the block and cradle for sliding the block laterally in unlocking during recoil, said means adapted during counterrecoil to arrest the block while the barrel continues into battery, a buffer mechanism for the counterrecoiling barrel adapted to react to return the block independently, means mounted on the cradle and controllable by the barrel in counterrecoil for releasing the block, an ejector mounted in the block and energized in unlocking of the block for expelling the empty case when clear of the chamber, feed mechanism mounted in the block for moving a round transversely across the face of the block, a support carried by the block for stopping the incoming round in line with the chamber, means on the barrel for collapsing the support as the block arrives in battery, means in the block for holding the support inoperative until ejection of the empty case, a buffer mechanism for easing the return of the block, said mechanism reacting to lock the block, a transverse flangeway formed on the face of the block, said flangeway gripping a live round on locking of the block and regripping the empty case on unlocking, a firing pin and spring in the block, a sear therefor, means for automatically cocking the pin during counterrecoil of the block, a firing post carried by the barrel,

means for actuating the post to displace the sear, an arcuate magazine pivoted to the cradle and overlying the same, means controllable by the barrel in recoil and counterrecoil for advancing a feed strip through the magazine, means for manually unlocking and retracting the block and means whereby the firing pin may be cocked with the gun locked in firing position.

2. The combination of a cradle, a barrel mounted to reciprocate freely therein, an axially movable breech block for the barrel, cooperating means on the block and cradle for sliding the block laterally in unlocking, said means adapted during counterrecoil to arrest the block while the barrel continues into battery, a buffer mechanism for the counterrecoiling barrel adapted to react to return the block independently, means mounted on the cradle and controllable by the barrel in counterrecoil for releasing the block, an ejector for expelling the empty case when clear of the chamber, feed mechanism for moving a round transversely across the face of the block, a support for stopping the incoming round in line with the chamber, means for collapsing the support as the block arrives in battery, means for holding the support inoperative until ejection of the empty case, a buffer mechanism for easing the return of the block, said mechanism reacting to lock the block, a transverse flangeway formed on the face of the block, said flangeway gripping a live round on locking of the block and regripping the empty case on unlocking, a firing pin and spring in the block, a sear therefor, means for automatically cocking the pin, a firing post carried by the barrel, means for actuating the post to displace the sear, a magazine pivoted to the cradle, means controllable by the barrel in recoil and counterrecoil for advancing a feed strip through the magazine, means for manually unlocking and retracting the block, and means whereby the firing pin may be cocked with the gun locked in firing position.

3. The combination of a cradle, a barrel mounted to reciprocate freely therein, an axially movable breech block for the barrel, cooperating means on the block and cradle for sliding the block laterally in unlocking, said means adapted during counterrecoil to arrest the block while the barrel continues into battery, a buffer mechanism for the counterrecoiling barrel adapted to react to return the block independently, means mounted on the cradle and controllable by the barrel in counterrecoil for releasing the block, an ejector for expelling the empty case when clear of the chamber, feed mechanism for moving a round transversely across the face of the block, a support for stopping the incoming round in line with the chamber, means for collapsing the support as the block arrives in battery, a buffer mechanism for eas-

ing the return of the block, said mechanism reacting to lock the block, a transverse flangeway formed on the face of the block, said flangeway gripping a live round on locking of the block and regripping the empty case on unlocking, a firing pin and spring in the block, a sear therefor, means for automatically cocking the pin, a firing post carried by the barrel, means for actuating the post to displace the sear, a magazine pivoted to the cradle, means controllable by the barrel in recoil and counterrecoil for advancing a feed strip through the magazine.

4. The combination of a cradle, a barrel mounted to reciprocate freely therein, an axially movable breech block for the barrel, cooperating means on the block and cradle for sliding the block laterally in unlocking, said means adapted during counterrecoil to arrest the block while the barrel continues into battery, a buffer mechanism for counterrecoiling barrel adapted to react to return the block independently, means mounted on the cradle and controllable by the barrel in counterrecoil for releasing the block, an ejector for expelling the empty case when clear of the chamber, feed mechanism for moving a round transversely across the face of the block, a support for stopping the incoming round, a buffer mechanism for easing the return of the block, said mechanism reacting to lock the block, a transverse flangeway formed on the face of the block, said flangeway gripping a live round on locking of the block and regripping the empty case on unlocking, a firing pin and spring in the block, a sear therefor, means for automatically cocking the pin, a firing post carried by the barrel, and means for actuating the post to displace the sear.

5. The combination of a cradle, a barrel mounted to reciprocate freely therein, an axially movable breech block for the barrel, cooperating means on the block and cradle for sliding the block laterally in unlocking, said means adapted during counterrecoil to arrest the block while the barrel continues into battery, a buffer mechanism for the counterrecoiling barrel adapted to react to return the block independently, means controllable by the barrel in counterrecoil for releasing the block, an ejector for expelling the empty case when clear of the chamber, feed mechanism for moving a round transversely across the face of the block, a buffer mechanism for easing the return of the block, said mechanism reacting to lock the block, a transverse flangeway formed on the face of the block, said flangeway gripping a live round on locking of the block and regripping the empty case on unlocking, and a firing mechanism mounted in the block.

6. The combination of a cradle, a barrel mounted to reciprocate freely therein, an axially movable breech block for the barrel adapted to be energized by the barrel, said

block formed with a flangeway for extracting a live round from a magazine and an empty case from the chamber, means for unlocking and locking the block, means for arresting the block in counterrecoil while the barrel continues into battery, means for ejecting the empty case, means for releasing the block for independent return movement, means for feeding the live round across the face of the block, and a firing mechanism in the block.

7. The combination of a cradle, a barrel therein, formed with a divided breech having internal spaced lugs, a separable axially movable block having external spaced lugs, cooperating means on the block and cradle for sliding the block laterally during recoil to unlock the lugs, means whereby the block is separated from the barrel for independent return movement, a buffer mechanism on the cradle for moving the block laterally on completion of its return movement whereby to lock the lugs of the block in front of the lugs on the barrel, and a rail movable in unlocking of the block for supporting the block on independent return movement.

8. The combination of a cradle, a barrel therein formed with a divided breech having internal spaced lugs, a separable axially movable block having external spaced lugs, cooperating means on the block and cradle for sliding the block laterally during recoil to unlock the lugs, means whereby the block is separated from the barrel for independent return movement, a buffer mechanism on the cradle for moving the block laterally on completion of its return movement whereby to lock the lugs of the block in front of the lugs on the barrel.

9. The combination of a cradle, a barrel therein formed with a divided breech having internal spaced lugs, a separable axially movable breech block having external spaced lugs, cooperating means on the block and cradle for sliding the block laterally during the recoil to unlock the lugs, means whereby the block is separated from the barrel for independent return movement, and means on the cradle for moving the block laterally on completion of its return movement whereby to lock the lugs.

10. The combination of a cradle, a barrel therein formed with a divided breech, a separable axially movable breech block for closing the breech, said block adapted to be energized for independent return movement, and cooperating means on the block and barrel whereby the block in sliding laterally is locked and unlocked.

11. The combination of a cradle, a barrel therein formed with a divided breech, a separable axially movable breech block having a laterally sliding movement in locking and unlocking, and a collapsible rail for supporting the block in counterrecoil.

12. The combination of a cradle, a barrel

therein, a breech block for the barrel, said block having a laterally sliding movement in locking and unlocking, and collapsible means for supporting the block when unlocked.

13. The combination of a cradle, a barrel therein, a separable axially movable breech block adapted to be energized for independent return movement and having a laterally sliding movement in locking and unlocking, and a buffer mechanism for easing the return of the block, said mechanism reacting to move the block laterally in locking.

14. The combination of a cradle, a barrel mounted to reciprocate freely therein, a breech block for the barrel, a hollow piston movable with the barrel, a rod within the piston and operatively connected to the block, a spring surrounding the rod and confined by the rod and piston, a cam plate on the cradle for rotating the rod to unlock the block, said rod and plate cooperating to arrest the block during counterrecoil while the barrel returns to battery to compress the spring, and means for releasing the block.

15. The combination of a cradle, a barrel mounted to reciprocate freely therein, a breech block for the barrel, cooperating means associated with the barrel and block for buffing the barrel on counterrecoil and for energizing the block for independent return movement, the means associated with the block constituting part of a breech block unlocking and restraining mechanism.

16. The combination of a cradle, a barrel mounted to reciprocate freely therein, a breech block for the barrel, cooperating means associated with the barrel and block for buffing the barrel on counterrecoil and for energizing the block for independent return movement, the means associated with the block constituting part of a breech block restraining mechanism.

17. The combination of a cradle, a barrel mounted to reciprocate freely therein, a breech block for the barrel, cooperating means associated with the barrel and block for buffing the barrel on counterrecoil and for energizing the block for independent return movement, the means associated with the block constituting part of a breech block unlocking mechanism.

18. In an automatic gun a cradle, a barrel mounted to reciprocate freely therein, a breech block for the barrel, cooperating means associated with the barrel and block for buffing the barrel on counterrecoil and for energizing the block for independent return movement.

19. The combination of a cradle, a barrel mounted to reciprocate freely therein, an axially movable breech block for the barrel, a rod operatively connected to the block, a spring surrounding the rod and adapted to be energized on counterrecoil of the barrel for

returning the block independently, a plunger on the rod, a cam plate on the cradle whereby the plunger serves to rotate the rod during recoil to unlock the block, said plunger adapted during counterrecoil to engage the end of the cam plate whereby to arrest the block, and means controllable by the barrel on counterrecoil for disengaging the plunger from the cam plate to release the block.

20. The combination of a cradle, a barrel mounted to reciprocate freely therein, an axially movable breech block for the barrel, a rod operatively connected to the block, a spring surrounding the rod and adapted to be energized on counterrecoil of the barrel for returning the block independently, a plunger on the rod, a cam plate on the cradle whereby the plunger serves to rotate the rod during recoil to unlock the block, said plunger adapted during counterrecoil to engage the end of the cam plate whereby to arrest the block, and means for releasing the block.

21. The combination of a cradle, a barrel mounted to reciprocate freely therein, an axially movable breech block for the barrel, means for either automatically or manually sliding the block laterally in locking and unlocking, means for manually retracting the block, and means for holding the block in retracted position.

22. The combination of a cradle, a barrel mounted to reciprocate freely therein, an axially movable breech block for the barrel, means for either automatically or manually sliding the block laterally in locking and unlocking, and means for manually retracting the block.

23. The combination of a cradle, a barrel mounted to reciprocate freely therein, an axially movable breech block for the barrel adapted to slide laterally in locking and unlocking and to return independently to battery, flangeways formed on the face of the block for extracting a live round from a magazine and an empty case from the barrel, a feed slide in the block, a yieldable feed finger on the slide for gripping the live round, a movable casing in the block, a yieldable ejector on the casing for gripping the empty case, a spring confined between the slide and casing, a feed lever pivoted to the block, said lever adapted during independent return of the block to move the slide across the block and to be returned by the spring to initial position, and means for stopping and supporting the live round concentric with the chamber of the barrel.

24. The combination of a cradle, a barrel mounted to reciprocate freely therein, an axially movable breech block for the barrel adapted to slide laterally in locking and unlocking and to return independently to battery, flangeways formed on the face of the block for gripping a live round and an empty case, means energized on unlocking of the

block for ejecting the case, cooperating means on the block and cradle for feeding the live round transversely across the flangeways during independent return of the block, and means for stopping and supporting the incoming round.

25. The combination of a cradle, a barrel mounted to reciprocate freely therein, an axially movable breech block for the barrel adapted to slide laterally in locking and unlocking and to return independently to battery, flangeways formed on the face of the block for gripping a live round and an empty case, means carried by the block for ejecting the empty case, cooperating means on the block and cradle for feeding the live round transversely across the flangeways, and means for stopping and supporting the incoming round.

26. The combination of a cradle, a barrel mounted to reciprocate freely therein, an axially movable breech block for the barrel adapted to return independently to battery, means for moving a live round horizontally across the face of the block during independent return movement of the block, said block adapted to extract an empty case from the barrel, and means for ejecting the empty case from the block.

27. The combination of a cradle, a barrel mounted to reciprocate freely therein, an axially movable breech block adapted to return independently to battery, means for automatically moving a live round horizontally across the face of the block, and means associated with said means for ejecting an empty case.

28. The combination of a cradle, a barrel mounted to reciprocate freely therein, an axially movable breech block adapted to return independently to battery, means for automatically moving a live round horizontally across the face of the block, means on the block for supporting the round during such movement, and means for ejecting an empty case.

29. The combination of a cradle, a barrel mounted to reciprocate freely therein, an axially movable breech block adapted to return independently to battery, means for automatically moving a live round horizontally across the face of the block and means on the block for supporting the round during such movement.

30. The combination of a cradle, a barrel mounted to reciprocate freely therein, an axially movable breech block for the barrel adapted to slide laterally in locking and unlocking and to return independently to battery, a flange-way formed on the face of the block and adapted to successively extract a live round from a magazine on recoil and the empty case from the chamber on counterrecoil.

31. The combination of a cradle, a barrel

mounted to reciprocate freely therein, an axially movable breech block adapted to slide laterally in locking and unlocking, means whereby the block is returned independently to battery, and a flangeway formed on the face of the block and adapted on locking of the block to grip a live round from a magazine, and on unlocking to grip the empty case in the chamber.

32. The combination of a cradle, a barrel mounted to reciprocate freely therein, an axially movable breech block for the barrel adapted to be separated from the barrel for independent return to battery, feed mechanism for moving a round across the block, a support for stopping the incoming round in line with the chamber, a plunger in the block to which the support is pivoted and by which the support is normally held in round receiving position, means on the barrel for collapsing the plunger to withdraw the support, and means in the block controllable by the empty case whereby the support is held inoperative during separation of the barrel and block.

33. The combination of a cradle, a barrel mounted to reciprocate freely therein, an axially movable breech block for the barrel adapted to be separated from the barrel for independent return to battery, feed mechanism for moving a round across the block, and a bifurcated support carried by the breech block and normally in round receiving position for stopping the incoming round in line with the chamber.

34. The combination of a cradle, a barrel mounted to reciprocate freely therein, an axially movable breech block for the barrel adapted to be moved laterally in locking and unlocking, a firing pin in the block, a cocking lever depending from the block, means for tripping the lever on counterrecoil to retract the pin, a sear mounted vertically at the rear of the block for holding the pin in cocked position, a rearward extension on the barrel, a vertically mounted firing post in said extension, said sear and post formed with adjacent complementary beveled faces, and means for elevating the firing post to release the sear from firing pin engagement.

35. The combination of a cradle, a barrel

mounted to reciprocate freely therein, an axially movable breech block for the barrel adapted to be moved laterally in locking and unlocking, a firing pin in the block, a cocking lever depending from the block, means for tripping the lever to retract the pin, a sear mounted vertically at the rear end of the block for holding the pin in cocked position, a rearward extension on the barrel, a vertically mounted firing post in said extension, and means for elevating the firing post to release the sear from firing pin engagement.

36. The combination of a cradle, a barrel mounted to reciprocate freely therein, an axially movable breech block for the barrel, a firing pin in the block, a cocking lever depending from the block and protruding through the bottom of the cradle whereby it may be manually actuated, means for automatically actuating the cocking lever during counterrecoil of the block, and a sear for holding the pin in cocked position.

37. The combination of a cradle, a barrel mounted to reciprocate freely therein, an arcuate cartridge feed way pivoted to the cradle, mechanism for successively feeding a round to a position at one side of the barrel, means for extracting the round from the cartridge feed way during recoil, and means for moving the round transversely into position to enter the barrel chamber.

38. The combination of a cradle, a barrel mounted to reciprocate freely therein, an arcuate cartridge feed way pivoted to the cradle, and mechanism controllable by the barrel for successively feeding a round to a position at one side of the barrel.

39. The combination of a cradle, a barrel mounted to reciprocate freely therein, an arcuate cartridge feed way pivoted to the cradle, and mechanism for successively feeding a round to a position at one side of the barrel.

40. In a gun, a barrel, an axially movable breech block having a transverse movement in locking and unlocking, and an ejector energized on unlocking of the block.

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