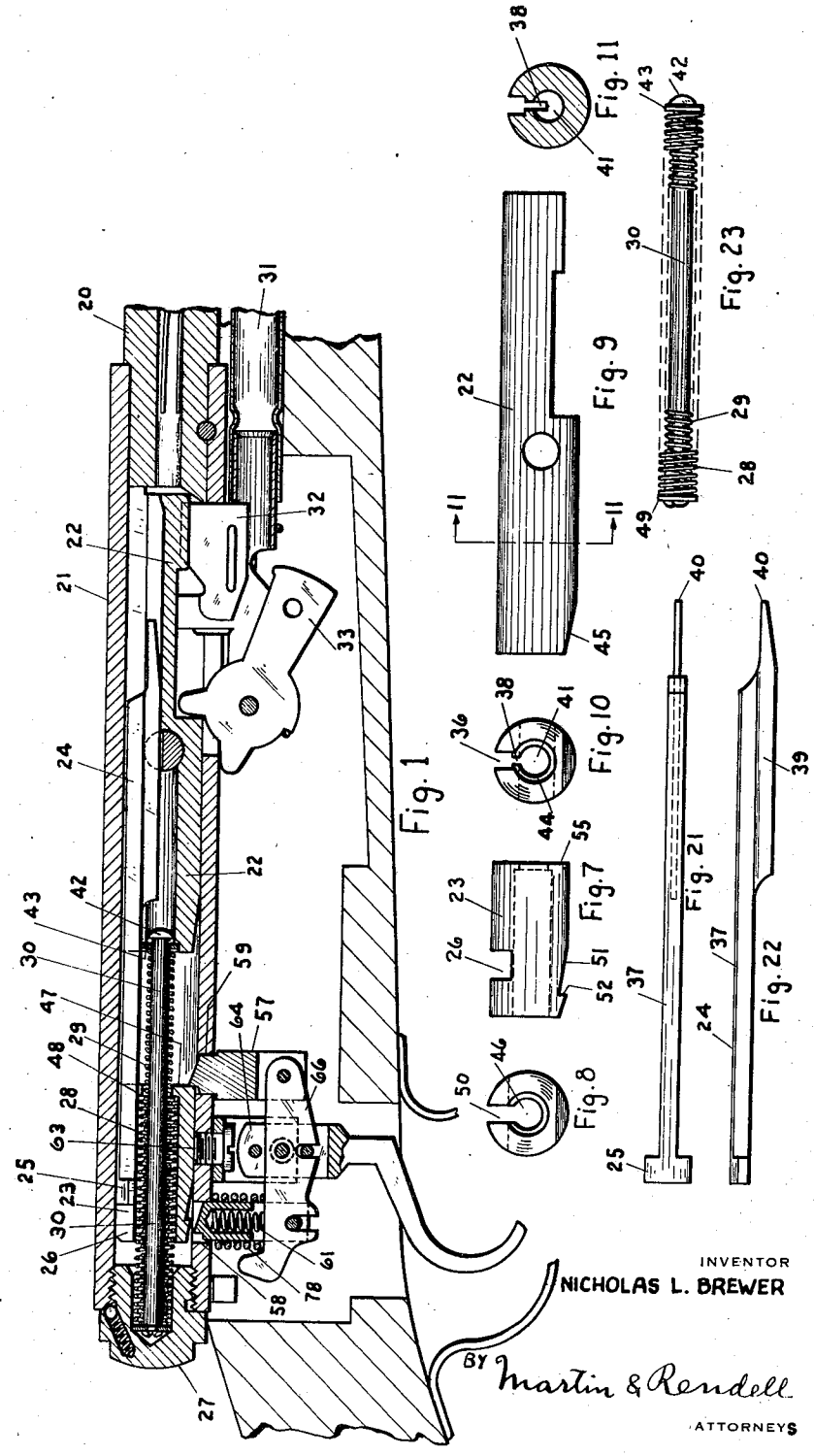
Dec. 10, 1940. N. L. BREWER 2,224,758

RELEASE MECHANISM FOR SEMIAUTOMATIC FIREARMS

Filed March 10, 1939 4 Sheets-Sheet 1



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RELEASE MECHANISM FOR SEMIAUTOMATIC FIREARMS

Filed March 10, 1939 4 Sheets-Sheet 2

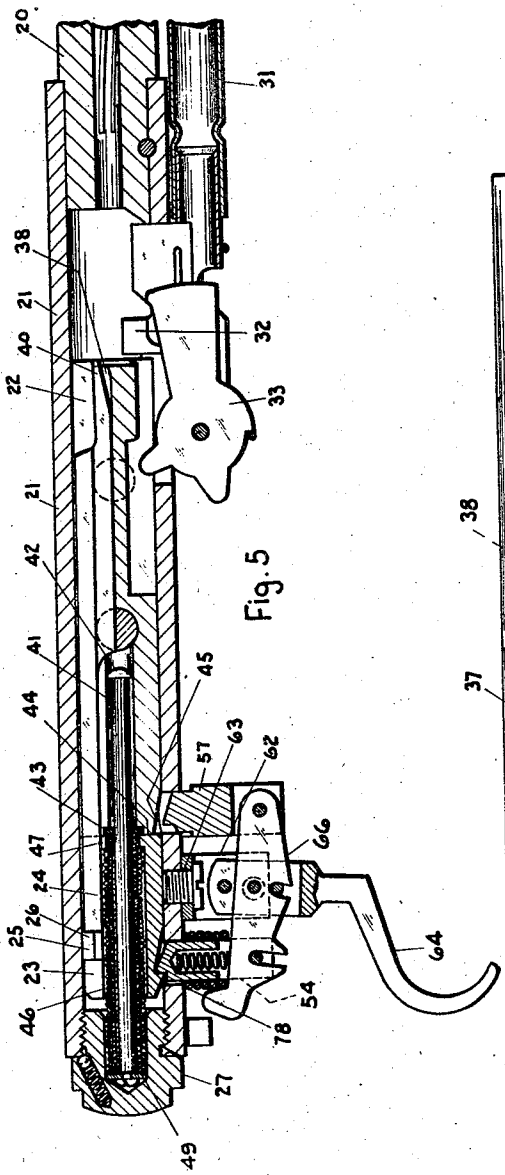


Fig. 5

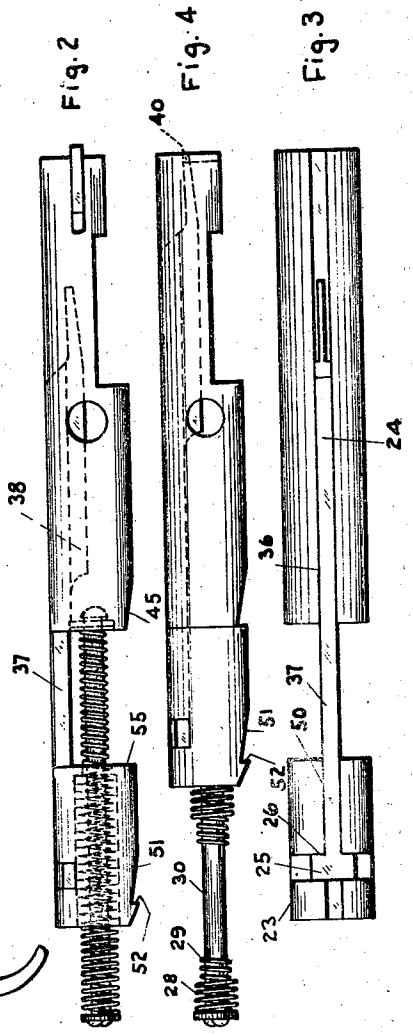


Fig. 2

Fig. 4

Fig. 3

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RELEASE MECHANISM FOR SEMIAUTOMATIC FIREARMS

Filed March 10, 1939 4 Sheets-Sheet 3

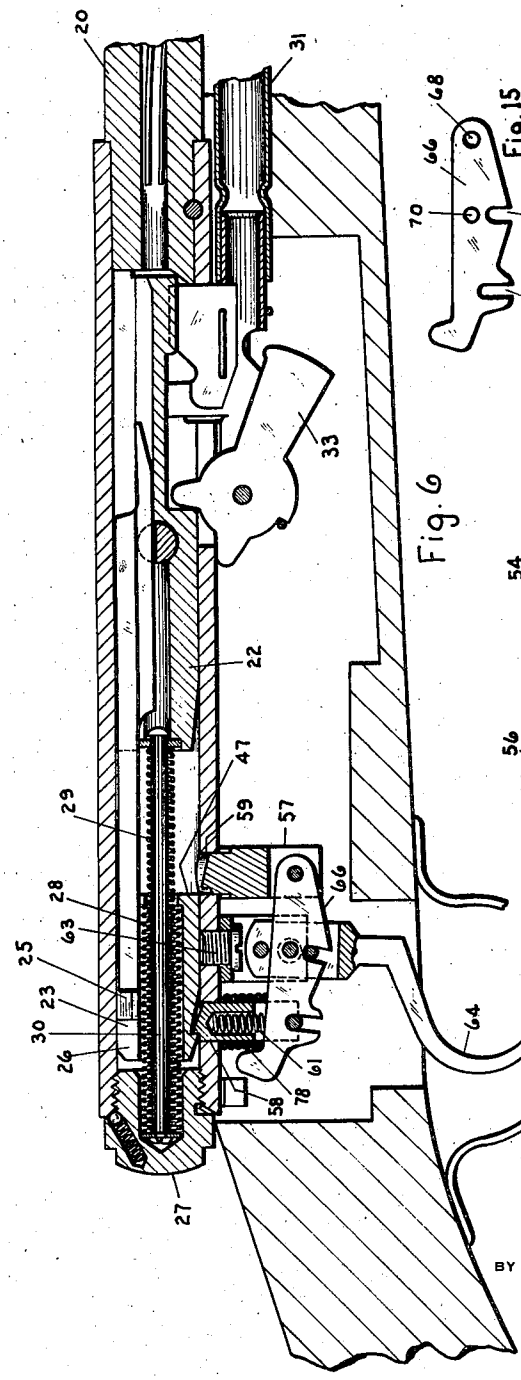


Fig. 6

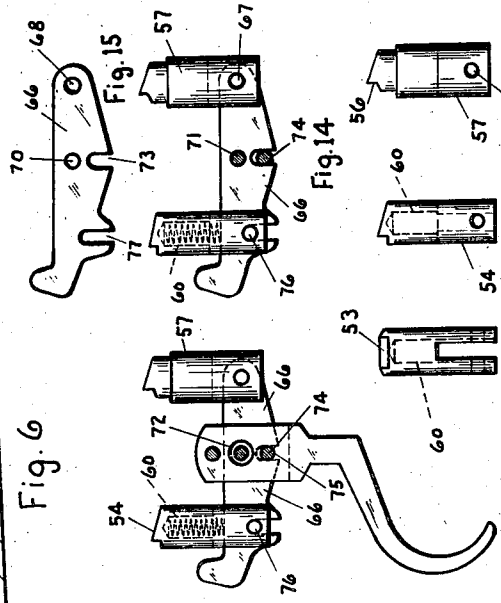


Fig. 15 Fig. 14 Fig. 13

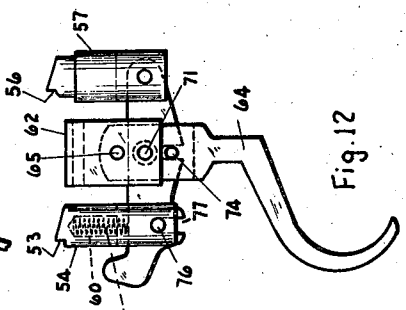


Fig. 12

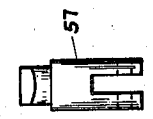


Fig. 17

Fig. 16

Fig. 18

Fig. 19

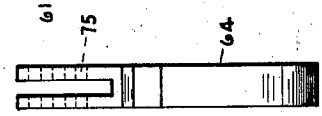


Fig. 20

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RELEASE MECHANISM FOR SEMIAUTOMATIC FIREARMS

Filed March 10, 1939 4 Sheets-Sheet 4

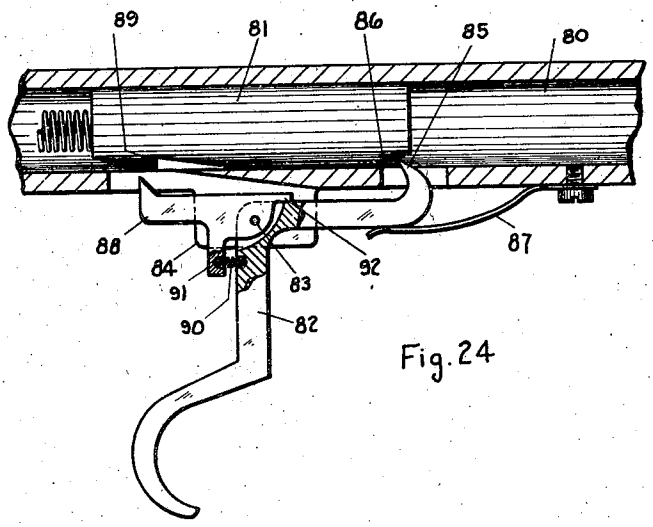


Fig. 24

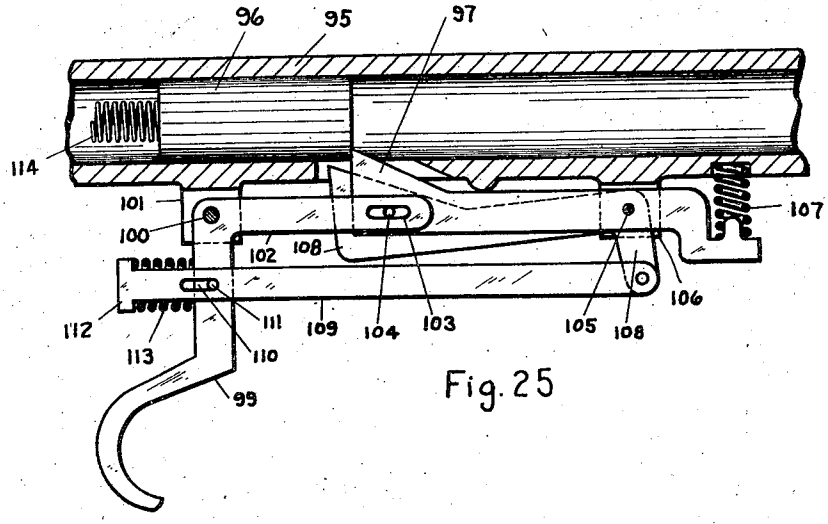


Fig. 25

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Patented Dec. 10, 1940

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UNITED STATES PATENT OFFICE

2,224,758

RELEASE MECHANISM FOR SEMIAUTOMATIC FIREARMS

Nicholas L. Brewer, North Agawam, Mass., assignor to Savage Arms Corporation, New York, N. Y., a corporation of Delaware

Application March 10, 1939, Serial No. 261,021

10 Claims. (Cl. 42—69)

This invention relates to the release mechanism of a firearm of the semiautomatic or self-loading type.

The purpose of my present invention is to provide a new and improved release mechanism for semiautomatic or self-loading firearms. As herein used release mechanism refers broadly to the mechanism including the trigger and the means operatively connecting the same to the hammer in such manner that the manual pulling of the trigger when the gun is in cocked position will release the spring tensioned hammer for a firing operation and will immediately thereafter provide for re-engaging the hammer and ultimately holding it in cocked position ready for another pull upon the trigger to fire the gun again.

One of the problems in making a semi-automatic firearm is that the pulling of the trigger to release the sear or equivalent holding member from the spring tensioned hammer necessary to effect the firing operation places the sear or hammer-holding and hammer-releasing member in a non-holding position relative to the hammer so that when the breech-bolt and hammer are driven back by the firing of the gun the sear or hammer-holding and hammer-releasing member is not in position to re-engage the hammer because the flying forward of the hammer upon its being released and the movement backward of the breech-bolt and of the hammer occur with such lightning-like speed that the shooter cannot physically release his pull upon the trigger quickly enough to have the sear or hammer-holding member in position to re-engage the hammer by the time the hammer comes to rearward position. Many types of devices have been worked out to solve this problem but most of such devices have been for various reasons unsatisfactory, unreliable or too elaborate, or inapplicable to straight-line action hammers.

It is the main purpose of this invention to provide a device which will overcome the above disadvantages by providing what I call a release mechanism wherein the trigger is so operatively connected to a hammer-holding and hammer-release member, hereinafter simply called the release member, that the pulling of the trigger will release the hammer and allow the gun to be fired in the usual way but with the mechanism providing another member, hereinafter called the detent member or detent plunger, for temporarily engaging the hammer when it comes to retracted position and adapted to temporarily hold said hammer from going forward to fire again until the shooter releases his hold or pulling actio upon the trigger whereupon the said release member at once goes into position to hold the hammer in cocked position until the trigger is again pulled.

A further purpose of this invention is to provide a release mechanism wherein is provided a release member or release plunger which normally holds the hammer in cocked position until the trigger is pulled and thereby said release plunger is disengaged from the hammer and in which release mechanism the additional member for temporarily holding the hammer back is a second plunger which automatically moves into potential engaging position relative to the hammer simultaneously with the disengagement of the release plunger from the hammer and which second plunger called a detent plunger is held under spring-tension in the path of said hammer, but so that it will be temporarily forced from said path of the hammer by the backward travel of the hammer, but with the detent plunger automatically springing into engaging position when the hammer has come to rearward position.

A further purpose is to provide a release mechanism including a trigger and two plungers, namely a release plunger and a detent plunger so operatively connected to the trigger that the pulling of the trigger will disengage the release plunger from the hammer and will at once place the detent plunger under spring tension so that after the hammer has gone forward a very short distance the detent plunger will have its inner end advance into the path of the hammer when it is driven back from forward position but with the detent plunger so connected to the trigger that said detent plunger may temporarily retreat away from the path of travel of the hammer and let the hammer pass rearwardly far enough to its rearward position to allow the detent plunger to reach its active or projected position and able to engage the hammer and arrest its further forward movement until the shooter's pressure or pull upon the trigger is release, whereupon the said release plunger will be projected into the path of the hammer and simultaneously the detent plunger will be withdrawn from engagement with, and from the path of, the hammer which will instantly advance the convenient short distance until it is engaged by the release plunger which will then hold said hammer in cocked position until the trigger is manually pulled.

A still further purpose of this invention is to provide in a release mechanism of this kind a

new and improved connection from the trigger to the releasible holding member and one wherein the angular displacement of the trigger when pulled is increased or multiplied in the release lever connecting the trigger to the said holding member and to avoid the so-called long or creeping trigger pull.

Further purposes and advantages of this invention will appear from the specification and claims herein.

Fig. 1 is a view mostly in longitudinal central section of the material portion of a rifle of the semiautomatic type embodying this invention, the rifle being seen from the right hand side and the parts being in the position they occupy when the rifle is cocked.

Fig. 2 is a side elevation as seen from the right hand side, of the breech bolt, hammer, firing pin, hammer spring, breech bolt spring and guide rod for said springs in the relative position they occupy in Fig. 1.

Fig. 3 is a top or plan view of the breech bolt, firing pin and hammer as seen when in the position they occupy in Figs. 1 and 2.

Fig. 4 is a view in right hand side elevation of the parts seen in Fig. 2 but after the rifle has been fired and with the hammer and firing pin in extreme forward position but before the firing of the cartridge has driven the breech bolt, hammer and firing pin from their forward position.

Fig. 5 is a view similar to Fig. 1 but omitting the stock and showing the parts in the position they occupy after the "firing" has driven the hammer, breech-bolt and firing pin to extreme rearward position and after these parts have gone forward a very short distance until the hammer and firing pin are temporarily arrested by the detent plunger of the release mechanism but before the breech bolt has gone any further forward.

Fig. 6 is a view similar to Fig. 5 but with the breech bolt advanced to forward position under the power of the breech bolt spring and having completed the loading of the cartridge into the chamber of the rifle, but with the hammer and firing pin still held by the detent plunger due to the finger of the shooter still engaging the trigger.

Fig. 7 is a side elevation of the hammer as seen from the right hand side and Fig. 8 is a rear end view thereof.

Fig. 9 is a right side elevational view of the breech bolt.

Fig. 10 is a rear end view of said breech bolt and Fig. 11 is a cross-sectional view thereof on line 11—11 of Fig. 9.

Fig. 12 is a right side elevation of the trigger, its mounting bracket, release lever, the holding and release plunger and the detent plunger all assembled but separate from the rifle. Fig. 13 is a view similar to Fig. 12 but omitting the mounting bracket. Fig. 14 is a view similar to Fig. 13 but omitting the trigger. Fig. 15 is a right side elevation of the release lever. Figs. 16 and 17 are respectively right side and rear elevation of the holding and release plunger 57.

Figs. 18 and 19 are respectively right side and rear elevations of the detent plunger 54.

Fig. 20 is a rear edge view of the trigger.

Figs. 21 and 22 are respectively a top or plan view and a right side elevation of the firing pin 24.

Fig. 23 is a side view of the breech-bolt spring and of the hammer spring mounted upon the spring guide rod 30, but minus the hammer and with the middle and front portion of the outer, that is, the hammer spring removed in order to clearly show the breech-bolt spring.

Fig. 24 is a view partly in section and partly in side elevation of a modified form of release mechanism embodying this invention.

Fig. 25 shows another modified form of release mechanism embodying this invention, the view being partly in side elevation of the mechanism and partly in central longitudinal section of the receiver.

Referring to the drawings in a more particular description it will be seen that the invention is illustrated in connection with a semiautomatic rifle of the blow-back type and that said rifle includes a barrel 20 of the usual type to the rear end of which is securely fastened a rearwardly extending hollow receiver 21 in the chamber of which is slidingly mounted the breech-bolt 22 and to the rear of said bolt the hammer 23 with a firing pin 24 having its forward end slidingly mounted in a longitudinal groove in said breech-bolt and with the rear end of said firing pin fixed to travel with said hammer as by laterally extending fingers 25 near the rear end of said firing pin projecting into pockets 26 provided in the upper side of said hammer.

The rearward end of said receiver is closed by a recoil plug 27 screw-threaded into the rear end of the chamber of said receiver. This plug is bored out at its forward side to form a pocket into which projects the rearward end of the hammer spring 28 and also the rear end of the breech bolt spring 29, said springs being of the helical form and concentrically arranged about the guide rod 30.

The form and co-operation of the hammer, firing pin and breech bolt and of the hammer spring, breech bolt spring and the guide rod therefor and the feature of these parts being so formed and co-operatively assembled as to be so easily removed by the removal of the screw-threaded recoil plug as briefly described and shown herein are the subject of a separate patent application filed by me February 1, 1940, as Serial No. 316,752, and are shown and described herein simply for convenient illustration of a sufficiently complete rifle to show the construction and operation of the trigger and release mechanism that forms the subject-matter of this application.

In a similar way the combined breech-bolt locking and operating bolt hereinafter described and to some extent shown on the drawings of this application, is a part of the subject-matter of said patent application filed by me February 1, 1940, as Serial No. 316,752.

It will be understood that the rifle is equipped with some proper form of magazine for the cartridges such as a tubular magazine 31 mounted below the barrel and with a proper cartridge feeding device such as illustrated in the drawings by the magazine box 32, the swinging lifter 33 and other parts co-operating therewith as by parts upon the lower side of the forward half of the breech-bolt operating as the breech-bolt is carried backward by the firing of the gun to extract the shell of the fired cartridge from the bore of the barrel and to eject the said shell from the receiver and to raise a cartridge that has come back from the cartridge magazine up into the receiver more or less into line with the bore of the barrel so that upon the forward movement of the breech-bolt the cartridge is pushed into the bore of said barrel and the breech bolt brought into closed position at the rear of said barrel and directly behind said cartridge. No further detailed description of these parts or of

these operations is deemed necessary as neither the form of the magazine nor the form or operation of the feeding mechanism nor the form of the part of the breech-bolt co-operating with said feed mechanism constitute any part of my present invention and my invention is capable of being used with various forms of magazines and with various forms of feed mechanisms and various forms of construction of the breech-bolt in its co-operation with the feed mechanism including thereunder the extraction and ejection of the fired shell and the return of the breech-bolt to closed position having meanwhile pushed the new cartridge into its position in the bore of the barrel.

Coming now to the part of the rifle which constitutes the release mechanism per se or the parts more or less closely co-operating therewith, it will be seen that the breech-bolt has at its upper side a wide slot 36 extending for the whole length of said breech-block for the sliding mounting therein of the main substantially rectangular portion 37 of the firing pin. Projecting still further from the bottom of the wide slot 36 is a narrower slot 38 for the lengthwise travel therein of the thin or key portion 39 depending from the forward half of the said firing pin as best seen in Fig. 22. The forward end of this fin or key upon the firing pin extends forwardly beyond the rectangular portion thereof and constitutes the firing point 40 of said firing pin. Extending centrally of the breech-bolt from its rearward end there is provided a bore 41 through which may travel as required the guide rod 30 and particularly its enlarged head 42 at its forward end, the rearwardly facing projecting shoulder of which head acts as a means for retaining upon the said guide rod the forward washer 43. Adjacent the rear end of the breech-bolt said bore is enlarged for a short distance forming a rearwardly facing shoulder 44 adapted to hold said forward washer 43 at the rear end of the breech bolt while allowing the head of the said spring guide rod 30 to slide through said washer and as far as needed into the bore of the breech-bolt.

Next to the rear end of the breech-bolt and on its lower or bottom side is a clearance 45 slanting downwardly to the extreme lower part of the breech-bolt as said clearance extends forwardly. The hammer 23 is annular in form and slidingly mounted in the chamber of the receiver 21 to the rear of the breech-bolt. This hammer has a longitudinally extending bore 46 of large enough diameter to freely receive therein as much as needed of the hammer spring 28. Extending into this bore adjacent the forward end of the hammer, the hammer is provided with a small annular inwardly extending flange 47 the rear face of which forms a shoulder 48 to engage the forward end of the hammer spring and so in an obvious manner place said hammer spring under compression as the hammer is moved back either by the regular firing of the gun or by the rearward manual moving of the breech bolt. The annular flange 47, however, has its aperture large enough to allow the free passage therethrough of the breech-bolt spring 29 and of its within located guide rod 30. The forward washer 43 is larger than the opening in the said flange 47 at the front of the hammer so that neither the said forward washer 43 nor the head 42 of the spring guide rod 30 can pass to the rear of the front face of the said hammer. The rear end of the two springs upon said guide rod 30 are retained upon said guide rod by a rear washer 49 which in turn is held against the rear end of said rod as by the rear extremity of said rod being made smaller in diameter than the regular diameter of the said rod so as to form a shoulder against which the washer bears while the smaller diametered extremity of the rod projects through the hole in the washer, and then the extreme end of the rod is riveted over against the rear face of the washer. In the upper side of the hammer there is provided a longitudinally extending slot 50 corresponding with and in alignment with the slot 36 in the breech-bolt for receiving the main nearly rectangular portion 37 of the firing pin 24 and from this slot 50 there project laterally the two pockets 26 to receive the two laterally extending fingers 25 already mentioned as being provided upon the firing pin near its rear end.

It will now be seen that the firing pin 24 is mounted to travel with said hammer simply by the rear part of said firing pin being set down into the slot 50 of the hammer with the fingers of the said firing pin likewise resting down into the pockets 26 of the hammer. It will be seen also that these two parts will be secured in relative position as long as they are in place in the chamber of the receiver, but that they can be readily separated when these two parts are withdrawn from the rear of the receiver after the recoil plug 27 has been removed. Similarly it will be seen that the forward end of the firing pin can slide back and forth relative to the breech-bolt and that when the hammer is advanced to its forward position relative to the breech-bolt the front end or firing point 40 of said firing pin will project the required slight distance beyond the front end of the breech-bolt and so into firing position assuming that the breech-bolt is in its forward position.

Upon the bottom of the hammer slightly forward from its rear end is a notch 51 having its forwardly directed face 52 preferably slanting forwardly slightly as it extends upward so as to form a contact face or shoulder to receive and engage the co-operating rearwardly directed face 53 upon the upper end of the detent plunger 54. The notch 51 forms a clearance space for that portion of the upper end of the detent plunger 54 to the front of said face 53 of the detent plunger as is plainly seen in Figs. 5 and 6. The lower portion of the forward end of the hammer forms a contact face 55 to be engaged by the rearwardly directed point 56 at the upper end of the main holding and release plunger 57 hereinafter simply called the release plunger.

These two plungers are suitably mounted upon the lower side of the receiver close to its rearward end with the release plunger 57 a short distance forward of the detent plunger 54 and they are so mounted relative to the receiver that they are respectively at substantially right angles to the axis of the receiver and preferably also substantially radially arranged relative to the receiver. The inner ends of these plungers are movably held in proper location by being in correspondingly shaped holes conveniently circular in cross section in the lower wall of the receiver, the hole 58 for the detent plunger and the hole 59 for the release plunger. These holes extend all the way through said lower wall of the receiver so that each plunger can be projected the required slight distance into the chamber of the receiver or retracted from the chamber of the receiver, but with each plunger still held in prop-

er position relative to the receiver by the inner portion of the plunger being still located in its hole; that is, in the wall of the receiver.

The release plunger **57** is preferably circular in cross section and cylindrical in general shape and as appears from the side views thereof as in Figs. 13 and 14 has its upper part of slightly smaller diameter fitting the correspondingly shaped and sized hole **58** therefor in the wall of the receiver as already mentioned.

The detent plunger **54** is likewise cylindrical in general shape, but may be of the same diameter throughout its length. It is, however, provided with a hole or bore **60** extending lengthwise thereof from its lower end well towards its upper end in which bore is placed the detent spring **61** the operation of which will be hereinafter described.

Fig. 12 is an assembled view of the trigger and its directly attached parts separate from the rifle. These parts are connected to the rifle by a mounting bracket **62** of inverted U-shaped form which bracket is attached to the under side of the receiver between the two plungers by a screw **63** extending through a suitable hole in the base of the bracket and into the adjacent wall of the receiver. The upper face of the base of said bracket is curved to fit the circle of the receiver and thus the bracket is securely mounted upon the receiver by the use of only the one screw **63**. Between the spaced depending arms of the bracket there is placed and pivotally connected thereto the upper bifurcated end of the trigger **64** as by a pivot pin **65** extending through the two depending arms of the bracket and the spaced upper parts of the trigger as appears in the separate view of the trigger assembly Fig. 12 and as appears in moved position of said trigger in Figs. 5 and 6. Slightly below this pivot pin **65** there is located between the separated parts of the upper end of the trigger the release lever **66** separately shown in side elevation in Fig. 15. In normal cocked position of the gun this release lever **66** is substantially in horizontal position or parallel to the axis of the receiver as shown in Fig. 1 and with the two plungers **54** and **57** extending upwardly therefrom at substantially right angles as appears in detail views Figs. 12, 13 and 14. The forward end of this release lever **66** is pivotally attached to the lower end of the release plunger **57** as by a pin **67** projecting through the forward hole **68** in said lever **66** and through aligned holes **69** in the lower end of the release lever **57** which lower end is preferably slotted to receive in said slot the forward end of said release lever.

Through a centrally located hole **70** in the release lever there extends a pin **71** which pin extends through the considerably larger hole **72** in the trigger slightly spaced down from the pivotal pin **65**. This pin projects out through said enlarged holes in the trigger and its ends are carried in the depending arms of the mounting bracket **62**. Slightly spaced downwardly from this centrally located hole **70** in the release lever **66** there begins a recess **73** extending upwardly from the lower side of said lever and of a width to receive therein the lower pin **74** the outer ends of which are mounted in the lowermost pair of holes **75** in the trigger which holes are located below the lower end of the arms of the mounting bracket.

The lower end of the detent plunger **54** is pivotally and slidably mounted upon the rearward portion of the release lever **66** as by a pin **76** secured transversely in said plunger in the separated lower ends of said plunger between which separate ends there is placed this portion of the release lever with the pin **76** located in the downwardly opening recess **77** provided in this rearward part of the lever **66**. It will be seen that this slot **77** allows the detent plunger a limited motion vertically or at substantially right angles relative to the lever **66**. The detent spring **61** is mounted in the bore **60** of said plunger **54** with its upper end bearing against the upper end of said bore and with its lower end bearing against the upper face of the release lever **66** directly over the pin **76**. This spring obviously tends to push the detent plunger upwardly relative to the left or rearward end of the release lever **66** or obviously allows the detent plunger to be depressed relative to said lever by downward pressure against the upper end of the detent plunger causing temporarily a compression of said detent spring. Coiled about the middle portion of this detent plunger in its length between the upper edge of the release lever and the lower side of the receiver there is placed a coiled holding spring **78** tending to expand and hold the release lever downward at its rear end or into substantial horizontal position as shown in Fig. 1 and so with the release plunger **57** holding the hammer in cocked position as shown in Fig. 1. The pulling of the trigger in an obvious manner pulls down the release lever **57** from engagement with the hammer, such pulling action for the time being overcoming the strength of said spring **78**.

The operation of the release mechanism, that is including the trigger and its double set of connections out to the hammer and more briefly the operation of the rest of the gun will now be described. It will be assumed that the parts of the rifle are in the cocked position as shown in Fig. 1. In this position the breech bolt **22** is in forward position in the receiver with its front end against the rear face of the cartridge assumed to be in the barrel **20**. The hammer **23** is in cocked position subject to the tension of the hammer spring **28** due to said spring being compressed by the previous rearward movement of the hammer, but the hammer is held in said cocked position by its forward lower face **55** at the front of the hammer being engaged by the rearwardly directed point **56** on the upper end of the release plunger or as it is sometimes described the releasable holding plunger **57**. When the rifle is in this cocked position the release lever **66** is in substantially horizontal position and the detent plunger **54** is in depressed position, that is with its upper end withdrawn from the chamber of the receiver **21**, but is still in its guiding hold **58** in the wall of the receiver. Upon pulling the trigger the hammer is released and moves forward carrying therewith the firing pin and effecting the firing of the cartridge. As soon as the release plunger **57** begins to be disengaged from the hammer by the pulling of the trigger, the same pulling of the trigger by reason of said release lever **66** being articulated to the upper split portion of the trigger, moves the rear end of said lever upwardly and carries the detent plunger upwardly, there being a clearance on the hammer rearwardly of the contact face **52** provided for this purpose. As soon as the hammer is released the said detent member is able to raise or move further into the chamber of the receiver and into the position relative to the receiver shown in Fig. 5. Fig. 5 shows the position of both plungers, (but not of the hammer) at the

instant the trigger has been pulled sufficiently to disengage the holding and release plunger 57 from the hammer. As already mentioned herein as constituting one of the problems of a semi-automatic firearm, the member which normally holds the hammer in cocked position in this case the plunger 57, is not projected into the path of the hammer in time to engage the hammer as the hammer is driven back by the blow back from the firing of the cartridge because the shooter physically cannot disengage his finger from its pulling position upon the trigger fast enough to let the holding plunger get into holding position relative to the hammer. By the time the hammer on the pulling of the trigger has started forward, the detent plunger has been projected into the chamber of the receiver and is in potential holding position. As the hammer is driven back and approaches rearward position, the rear lower wall of the hammer engages the slanting portion of the top of the detent plunger forward of its vertical face 54 and by an obvious camming action forces the detent plunger downwardly against the tension of its small contained detent spring 61. It will be seen from the construction already described that the detent plunger is able to thus yield downwardly without disturbing the position of the rear end of the release lever 66 and without disturbing the position of the trigger or the other parts connected to said trigger. As soon as the hammer has in its backward travel arrived at the position shown in Fig. 5 the detent plunger springs up into the notch 51 in the hammer and is then in position to hold the hammer after the hammer goes a short distance further rearwardly and engages the front end of the recoil plug 27 and then rebounds forwardly. By the time it comes to the position shown in Fig. 5 the rearward face 53 on the detent plunger positively engages the forwardly directed face or shoulder 52 of the detent notch 51 on the hammer. The trigger is still in its pulled position and the releasable holding plunger 57 is still depressed because the shooter has not been able by this time to release the pulling action of his finger upon the trigger. After the firing operation the breech bolt drove the hammer back as already described with regard to the hammer and by the breech bolt following the hammer in immediate contact until the hammer engages the recoil plug and the hammer and breech bolt then started forward still in physical engagement and with the hammer starting forward also under the impulse of its hammer spring 28 and the breech bolt under the tension of the breech bolt spring 29. The engagement of the detent plunger with the hammer shoulder 52 just described arrested the hammer in the position of the parts as shown in Fig. 5, but this left the breech bolt further to continue its forward movement from the position of the breech bolt shown in Fig. 5 until it comes to its forward position as shown in Fig. 6. After the mechanism has come to rest in this position, however, the pressure of the finger on the trigger will be released, whereupon the release lever spring or as it may be called the holding spring 78, forces the rear end of the release lever 66 downward and thereby in an obvious manner reverses the position of the two plungers relative to the chamber of the receiver. In other words, as the detent plunger is being withdrawn from the receiver and from its engagement with the detent notch of the hammer the releasable holding plunger 57 is being projected into the chamber of the receiver immediately forward of the regular holding face 55 at the front end of the hammer so that as soon as the detent plunger is entirely released the hammer can at once move forward the short distance it needs to go in traveling from its position shown in Fig. 5 to its position shown in Fig. 1 with its face 55 now directly engaged by the upraised rearwardly directed face 56 upon the said plunger 57. All of the parts have now come to cocked position as shown in Fig. 1 and thus the mechanism has completed a full cycle of its movements. It is then ready for another pull upon the trigger to start another cycle of movement of the parts of the rifle and of the trigger and release mechanism just described.

It will be seen that the release mechanism described and illustrated and the operation of which has been detailed provides a holding member which is in the path of the hammer as soon as it is driven back to retracted position which will temporarily hold the hammer until the release of the trigger from pulled position allows the regular holding plunger to move into position and to be able to engage and thereafter hold the hammer in cocked position. It will be seen also that the release mechanism of this invention is well adapted to accomplish all of the purposes and attain the advantages mentioned at the beginning of this specification.

It will be recalled that in the preferred form of the trigger and the release lever 66 as shown in Figs. 1, 5, 6, 12 and 13 the release lever is articulated to the trigger and not fastened rigidly thereto. If these two parts were rigidly fastened together or made integral, the much greater length of the trigger from its pivot point to its finger piece than the effective length of the right hand half of the lever 66 would result in a very long or "creeping" trigger pull which is very undesirable. In order to avoid having this undesirable kind of trigger-pull and yet not lose the advantages of compactness of design inherent in the mechanism, the trigger is articulated to the release lever in such a way that the movement of the release lever by the trigger is multiplied resulting in a more favorable ratio of movements of the finger piece of the trigger and the releasable holding member.

Referring to Fig. 12 particularly, it will be seen that the distance from trigger pin 65 to release lever actuating pin 74 is approximately twice the distance from trigger pin 65 to release lever pin 71. A clearance hole 72 (Fig. 13) is provided in the bifurcated upper portion of the trigger at the point where the release lever pin 71 passes through this upper portion of the trigger into the downwardly extending wings of the release bracket 62. This clearance allows the trigger 64 to swing about trigger pin 65 for a limited distance without interference from the release lever pin 71. The release lever actuating pin 74 which is held in the two wings of the upper portion of the trigger 64 at the lower end of that portion acts in slot 73 of release lever 66 so as to produce rotation of the release lever 66 about release lever pin 71 when the trigger is moved about the trigger pin 65. Since the distance between trigger pin 65 and release lever actuating pin 74 is approximately twice the distance from trigger pin 65 to release lever pin 71, it will be seen that the angular movement of the release lever produced by pulling the trigger is approximately twice the angular movement of the trigger itself over the range of movement required to effect release of the hammer. This increase in angular move-

ment between the trigger 64 and the release lever 66 compensates for the opposite ratio of linear movement between the holding member 57 and the finger piece of the trigger which would exist if the trigger 64 were one piece with the release lever 66 or if the trigger 64 were rigidly connected to the release lever 66 so that both pieces moved as one. In other words, this multiplication of movement that is obtained from the movement of the trigger to the movement of the release member enables me to get the necessary movement of the releasable holding member without an undue length of movement of the finger piece of the trigger.

Referring now to the modified form of my invention as shown in the release mechanism of Fig. 24, it will be seen that a portion of a chambered receiver 80 is shown with a hammer 81 reciprocatingly mounted therein and that the trigger 82 of generally bell crank form is pivoted at pin 83 upon a bracket 84 depending from the receiver or otherwise provided upon a suitable part of the firearm. The upper forwardly projecting arm of the trigger is provided with an up-turned hook 85 adapted to engage a forwardly directed contact face 86 near or upon the front face of said hammer. The trigger is held with its hook 85 engaging the hammer when the hammer is in cocked position by means of a spring 87 suitably projecting from an adjacent part of the receiver. Upon the pin 83 there is also mounted a separate latch member 88 having at its rear end an upturned projection adapted to engage and hold the forwardly directed face 89 upon the hammer upon its lower side toward the rear portion thereof. The latch member 88 has its rear end urged upwardly by a spring 90 interposed between a down-turned ear 91 of said member 88 and the shank portion of the trigger 82 below the pivot pin. When the trigger is holding the hammer in cocked position, the forward projection 92 on latch member 88 bears against the forwardly projecting arm of the trigger and holds the latch member 88 from going any further up or into the chamber of the receiver notwithstanding the tension of spring 90 but when the trigger has been pulled and its hook 85 disengaged from the contact face 86 the hammer is free to go forward and does go forward and after a firing operation of the gun there is produced a rapid backward movement of the hammer in an obvious manner known in this type of firearms. Meanwhile, however, the pulling of the trigger has lowered the forwardly projecting arm of the trigger 82 so that the upward projection on the rear end of the latch member 88 has gone up into the chamber of the receiver. The rearward part of the hammer as it comes back has a camming action with the upward projection of the latch 88 and cams that latch projection downwardly by compressing the spring 90 without disturbing the finger portion of the trigger which (for reasons explained early in this application) is at that time still rearward in pulled position. The hammer 81 accordingly can depress the upward projection of the rear end of latch 88 and allow the hammer to go further back than shown in Fig. 24 and then on a slight forward motion of the hammer the upward rearward projection or pawl of the latch member goes into engaging position against the forwardly directed face 89 on the hammer and temporarily holds the hammer until the shooter's finger is released from the finger portion of the trigger. At that time the spring 87 moves the hook 85 upwardly into potential engaging position relative to the forward face 86 upon the hammer and at the same time the engagement of the forward projection 92 of the latch member 88 upon the forward arm of the trigger has positively disengaged the rearward hook end of member 88 from the face 89 of the hammer. It will be seen from this brief explanation that this form of release mechanism attains the main purposes of my invention although it does not have some of the advantages of my preferred form.

It should be understood that hook 85 and the pawl projection or latch 88 have simultaneously oppositely directed movements vertically into the chamber of the receiver in such a way that hook 85 enters the chamber of the receiver before pawl projection or part 88 is wholly withdrawn and that the pawl or latch 88 enters or is urged by spring 90 to enter before hook 85 is wholly withdrawn.

Referring now to the modified form of my release mechanism shown in Fig. 25, it will be seen that it is shown partly in side elevation but with the adjacent part of the receiver 95 in central vertical section with the hammer 96 reciprocatingly mounted therein and with a hammer spring diagrammatically shown as at 114. In this form of my invention the lower portion of the forward face of the hammer forms one and the single contact face upon the hammer to be engaged at respectively spaced positions of the hammer by either the releasable holding lever 97 for cocked position of the hammer or by the detent lever 98 at a position slightly back of the cocked position of the hammer. The trigger 99 is fulcrumed at its elbow point 100 by a pin suitably projecting from a bracket 101 from the receiver or otherwise suitably provided upon some part of the firearm. From this pivoting point the trigger has a forwardly projecting arm 102 which near its forward end has a longitudinally extending slot 103 in which slides and pivots slightly a pin or stud 104 provided upon the adjacent side of the releasable holding lever 97. This lever 97 is fulcrumed as upon pin 105 projecting from bracket 106 depending from the receiver. Forward of this pivoting point said lever 97 is engaged on its upper side by a helical spring 107 which is in substantially vertical position and has its upper end held in a shallow pocket provided in the wall of the receiver. It will be obvious that this spring yieldingly holds the releasable lever 97 upward at its rear end so as to hold the hammer 96 in cocked position as shown in Fig. 25. The lever 98 is of bell crank form and is pivoted at its elbow upon the already mentioned pin 105 and from this pin said lever has a downwardly projecting arm 108 to the lower end of which is pivotally connected the forward end of a substantially horizontally arranged connecting bar 109. The rearward end of this is slidingly supported as by said bar being provided with an elongated slot 110 sliding upon a pin or projection 111 provided upon the downwardly extending shank portion of the trigger 99. Beyond this portion of the trigger the connecting bar 109 is provided with a head or enlargement 112 between the forward side of which head and the vertical portion of trigger 99 is mounted a helical spring 113. Assuming that the parts are in the position shown in Fig. 25 which is the cocked position of the firearm and particularly of the spring pressed ham-

mer 96, it will be obvious that a pulling of the finger piece of the trigger will disengage the lever 97 from its contact with the hammer 96 thus allowing the hammer to drive forward and effect a firing operation in the ordinary manner. As soon as the hammer has thus passed the now upwardly urged rearward upper end of lever 98 the detent lever 98 is free to move upward into the chamber of the receiver and does so move upward under the spring tension already imparted thereto by the spring 113 which operates in an obvious manner to draw the connecting bar 109 rearwardly and tending thus to swing the body of lever 98 upwardly. This upward movement of this rear portion of the lever 98, however, is effected only with yielding power and, upon the rapid retreat of the hammer 96, the rear portion of the hammer will come into camming position with the forwardly slanted portion near the rear point of said lever 98 and will temporarily force said lever downwardly against the tension of spring 113 and so allow the hammer 96 to pass entirely to the rear of the point of lever 98. As soon as the hammer has, however, passed to the rear of the point of lever 98 such point will again be projected into the chamber of the receiver and into the path of the returning hammer 96. It will be seen from Fig. 25 that this point of this lever 98 is slightly to the rear of the corresponding point of the other lever 97 and will hold the hammer 96 at a position slightly to the rear of the cocked position of said hammer. During the rearward movement of said hammer the trigger will remain in pulled position due to the often explained feature of the shooter being unable to release his pulling action upon the trigger by the time the hammer comes to rearward position. Accordingly the releasable holding lever 97 was still in depressed position when the hammer came back and become engaged slightly to the rear of cocked position by the upper point of lever 98. As soon, however, as the shooter's finger releases the trigger, the trigger finger piece is free to move forward and does move forward and carries therewith the point of lever 97 up into the path of the hammer under the tension imparted by spring 107. This swinging of the trigger from pulled position also effects a downward movement of the rear end of the detent lever 98 in an obvious manner by the engagement of the pin 111 in the forward end of slot 110 moving the connecting bar 109 forwardly carrying therewith the lower end of bell crank arm 108 which necessarily lowers the rear end of lever 98. It will be seen that in this construction there is only one contact face upon the hammer and that the holding of the hammer is done by the levers 97 and 98 having their operating points at the desired spaced-apart positions. This modification of my release mechanism is able to accomplish the main purposes of my preferred form, but does not have all of the advantages of the preferred form first described herein. It should be further understood that the levers 97 and 98 have simultaneously oppositely directed vertical movement with respect to the receiver in such a way that lever 97 enters the chamber of the receiver before lever 98 is wholly withdrawn and that lever 98 enters or is urged to enter before lever 97 is wholly withdrawn. It should be further understood that the levers 97 and 98 have simultaneously oppositely directed vertical movement with respect to the receiver, in such a way that 97 enters the chamber of the receiver before 98 is wholly withdrawn and that 98 enters or is urged to enter before 97 is wholly withdrawn.

What I claim as new and desire to secure by Letters Patent is:

1. In a release mechanism for semiautomatic firearms, the combinations of a chambered receiver, a hammer slidingly mounted in the receiver and moved to rearward position by the firing of the gun and having upon its lower side two spaced forwardly-directed contact faces and also a plunger-engaging cam at the rear of said rearward contact face, a hammer spring placed under compression by the rearward movement of the hammer, a release plunger and a detent plunger rearwardly thereof, said plungers being movably mounted below said receiver, the inner ends of said plungers constituting hammer-engaging parts which are spaced slightly farther apart than said contact faces on the hammer, said inner ends of the plungers on inward movement of the separate plungers being in the path of the said faces on the hammer, a trigger pivotally mounted between said two plungers on a single common supporting bracket depending from the receiver, a release lever tiltingly articulated intermediate its front and rear ends to said trigger and having its front end pivotally connected to the lower end of the release plunger and moved downwardly on pulling the trigger and having its rearward portion pivotally and slidingly connected to the lower end of the detent plunger, a release spring yieldingly raising the front of the release lever and thereby yieldingly holding the release plunger up so that its inner end engages the forward contact face of the hammer for cocked position thereof while the depressed rear end of the release lever positively holds the detent plunger down from the hammer, and a detent spring operatively connecting the detent plunger and the rear end of the release lever and yieldingly holding the detent plunger up from said lever but allowing temporary depression of the detent plunger by said cam on the hammer without moving the said lever when the trigger is pulled.

2. In a release mechanism for semiautomatic firearms, the combination of a chambered receiver, a hammer slidingly mounted in the receiver and moved to rearward position by the firing of the gun and having upon its lower side two spaced forwardly directed contact faces and also a plunger-engaging cam at the rear of said rearward contact face, a hammer spring placed under compression by the rearward movement of the hammer, a release plunger and a detent plunger rearwardly thereof, said plungers being movably mounted below said receiver, the inner ends of said plungers being mounted in socket holes in the wall of the receiver and their inner extremities constituting hammer-engaging parts which are spaced slightly farther apart than said faces on the hammer, said inner ends of the plungers on inward movement of the separate plungers being in the path of said faces on the hammer, a trigger pivotally mounted between said two plungers on a single common supporting bracket depending from the receiver, a release lever tiltingly articulated intermediate its front and rear ends to said trigger and having its front end pivotally connected to the lower end of the release plunger and moved downwardly on pulling the trigger and having its rearward portion pivotally and slidingly connected to the lower end of the detent plunger, a release spring yieldingly raising the front of the release lever

and thereby yieldingly holding the release plunger up so that its inner end engages the forward contact face of the hammer for cocked position thereof while the depressed rear end of the release lever positively holds the detent plunger away from the hammer, and a detent spring operatively connecting the detent plunger and the rear end of the release lever and yieldingly holding the detent plunger up from said lever but allowing temporary depression of the detent plunger by said cam on the hammer without moving the said lever when the trigger is pulled.

3. In a release mechanism for semiautomatic firearms, the combination of a chambered receiver, a hammer slidingly mounted in the receiver and moved to rearward position by the firing of the gun and having upon one side two spaced forwardly directed contact faces and also a plunger-engaging cam at the rear of said rearward face, a hammer spring placed under compression by the rearward movement of the hammer, a release plunger and a detent plunger rearwardly thereof, said plungers being movably mounted adjacent said receiver, the inner ends of said plungers being mounted in socket holes in the wall of the receiver and their inner extremities constituting hammer-engaging parts which are spaced slightly farther apart than said contact faces on the hammer, said inner ends of the plungers on inward movement of the separate plungers being in the path of the said contact faces on the hammer, a trigger pivotally mounted between said two plungers on a single common supporting bracket projecting from the receiver, a release lever tiltingly articulated intermediate its front and rear ends to said trigger and having its front end pivotally connected to the outer end of the release plunger and moved outwardly on pulling the trigger and having its rearward portion pivotally and slidably connected to the outer end of the detent plunger, a release spring yieldingly moving inwardly the front of the release lever and thereby yieldingly holding the release plunger inwardly so that its inner end engages the forward face of the hammer for cocked position thereof while the outwardly moved rear end of the release lever positively holds the detent plunger away from the hammer, and a detent spring operatively connecting the detent plunger and the rear end of the release lever and yieldingly holding the detent plunger inwardly from said lever but allowing temporary outward movement of the detent plunger by said cam on the rearward movement of the hammer without moving the said lever when the trigger is pulled.

4. In a release mechanism for semiautomatic firearms, the combination of a hammer guideway, a hammer slidingly mounted in relation thereto and moved to rearward position by the firing of the gun and having two spaced forwardly directed contact faces and also a plunger-engaging cam to the rear of said rearward face, a hammer spring placed under compression by the rearward movement of the hammer, a releasable holding plunger and a detent plunger rearward thereof, said plungers being mounted adjacent said hammer and having their inner ends constituting hammer-engaging parts which are spaced slightly farther apart than said contact faces on the hammer, said inner ends of the plungers on inward movement of the separate plungers being in the path of their respective co-operating contact faces on the hammer, a trigger pivotally mounted between said two plungers on a single common supporting bracket projecting from the receiver, a release lever tiltingly articulated intermediate its front and rear ends to said trigger and having its front end pivotally connected to the outer end of the releasable holding plunger and moved outwardly on pulling the trigger and having its rearward portion operatively connected to the outer end of the detent plunger, a spring yieldingly holding said holding plunger in inward position and a detent spring urging said detent plunger inwardly when the trigger is pulled.

5. In a release mechanism for semiautomatic firearms, the combination of a hammer guideway, a hammer slidingly mounted in relation thereto and moved to rearward position by the firing of the gun and having two spaced forwardly directed contact faces and also a detent-member-engaging cam to the rear of said rearward contact face, a hammer spring placed under compression by the rearward movement of the hammer, a releasable holding member and a releasable detent member rearward thereof, said members being mounted adjacent said hammer and having their inner ends constituting hammer-engaging parts which are spaced slightly farther apart than said contact faces on the hammer, said inner ends on inward movement of the separate holding and detent members being in the path of their respective co-operating contact faces on the hammer, a trigger pivotally mounted between said two members on a single supporting bracket, a release lever attached intermediate its front and rear ends to said trigger and having its front end pivotally connected to the outer end of the releasable holding member and having its rearward portion operatively connected to the outer end of the detent member, a spring yieldingly holding said holding member in inward position and a detent spring urging said detent member inwardly when the trigger is pulled.

6. In a release mechanism for semiautomatic firearms, the combination of a hammer guideway, a hammer reciprocatingly mounted in relation thereto and moved to rearward position by the firing of the gun and having a detent contact face and a holding contact face, a disengageable holding plunger having its inner end adapted at the operating position of said plunger to engage said holding contact face and hold the hammer in cocked position, a detent plunger positioned to have its inner end engage said detent contact face on the hammer when the hammer is slightly to the rear of cocked position, a hammer spring compressed by rearward movement of the hammer, a trigger, means operatively connecting the trigger to said disengageable holding plunger, including movement-reversing means connected to the detent plunger whereby pulling the trigger withdraws said holding plunger from said holding contact face and allows the projection of said detent plunger into the path of said detent contact face, a spring yieldingly holding said holding plunger in engaging position and a detent spring constantly urging said detent plunger inwardly, rearward movement of the hammer allowing said plunger under the power of said detent spring to snap in to engage said detent contact face when the trigger is pulled and when the hammer has moved back of cocked position.

7. A trigger, a single common supporting bracket to which the inner end of the trigger is pivoted, a holding member releasably engaging the hammer, and a release lever pivoted upon said support bracket below the pivotal connec-

tion of the trigger on said bracket and having a pivotal and slidable connection to the trigger below the pivotal connection of the release lever to said support bracket, an outer end of the release lever being pivotally connected to the outer portion of the releasable holding member, whereby the angular displacement given to the trigger when pulled is imparted in increased extent to the said release lever.

8. A trigger, a single common supporting bracket to which the inner end of the trigger is pivoted, a holding member forward of the trigger and releasably engaging the hammer, and a release lever pivoted upon said support bracket below the pivotal connection of the trigger on said bracket and having a pivotal and slidable connection to the trigger below the pivotal connection of the release lever to said support bracket, the forward part of the release lever being pivotally connected to the outer portion of the releasable holding member, whereby the angular displacement given to the trigger when pulled is imparted in increased extent to the release lever.

9. In combination, a reciprocatingly mounted hammer, a trigger, a single common supporting bracket to which the inner end of the trigger is pivoted, a holding member spaced in one direction from the trigger and releasably engaging the hammer in cocked position, a detent member spaced in the other direction from the trigger adapted to engage and hold the hammer in a position back of cocked position and a release lever pivoted upon said support bracket at a point vertically spaced from the pivotal connection of the trigger on said bracket and having a pivotal and slidable connection to the trigger at a point vertically spaced from the pivotal connection of the release lever to said bracket, the opposite ends of said release lever being operatively connected to the outer ends of said releasable holding member and said detent member whereby the angular displacement given to the trigger when pulled is imparted in increased extent to said release lever.

10. In combination, a reciprocatingly mounted hammer, a trigger, a single common supporting bracket to which the inner end of the trigger is pivoted, a holding member forward of the trigger and releasably engaging the hammer in cocked position, a detent member rearward of the trigger adapted to engage and hold the hammer in a position back of cocked position and a release lever pivoted upon said bracket below the pivotal connection of the trigger on said bracket and having a pivotal and slidable connection to the trigger below the pivotal connection of the release lever to said bracket, the forward end of said release lever being pivotally connected to the outer portion of the releasable holding member and the rearward part of said release lever being operatively connected to the outer portion of the detent member whereby the angular displacement given to the trigger when pulled is imparted in increased extent to said release lever.

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