

May 20, 1941.

D. M. WILLIAMS

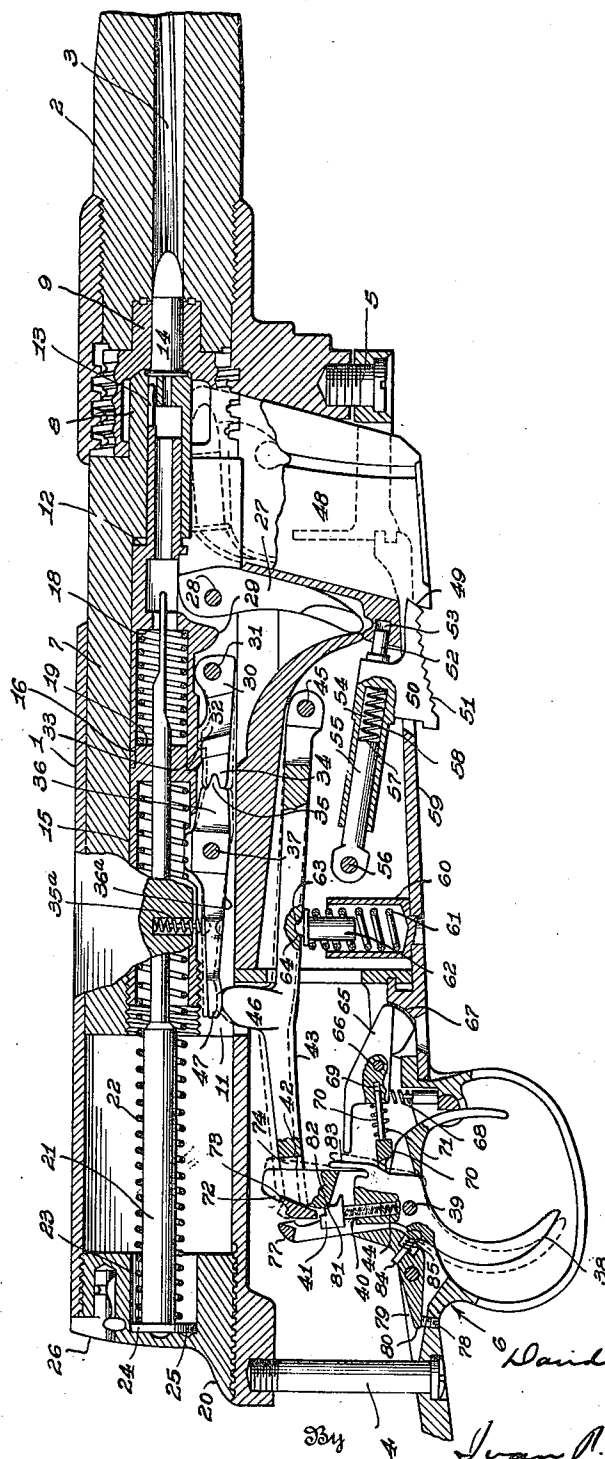
2,242,496

SEAR MECHANISM FOR FIREARMS

Original Filed Feb. 7, 1931

2 Sheets-Sheet 1

Fig. 1



Inventor,

David M. Williams

Irvin P. Tashof,

Attorney



## UNITED STATES PATENT OFFICE

2,242,496

## SEAR MECHANISM FOR FIREARMS

David M. Williams, Godwin, N. C.

Original application February 7, 1931, Serial No. 514,252. Divided and this application August 21, 1937, Serial No. 160,321

10 Claims. (Cl. 42—69)

The present invention relates to an improvement in firearms, and particularly to sear-mechanisms therefor.

One of the objects of this invention is to provide a novel arrangement for the sear and trigger mechanism such that an independent operative means furnishes the motive power for disengaging the sear from the striker mechanism of the gun.

In the sear disengaging means, as usually provided, in the prior art, the trigger is directly coupled or indirectly coupled by means of some lever arrangement to the sear and a pull on the trigger serves to disengage the sear from the striker and fire the arm. It is obvious, therefore, that the trigger pull on this type of gun, had to overcome not only the spring tending to retain the trigger in its normal position, but also had to provide sufficient force to disengage the sear from the striker. As is well-known in the art, the notch in the striker mechanism which is normally engaged by the sear, may take various shapes and usually, a very positive engagement of the sear and striker is desirable in order to prevent any accidental discharge of the firearm. In the event a deep notch is provided in the striker to be engaged by a shoulder on the sear or vice versa, the force of a strong striker spring acting on this deep notch engagement would result in a very heavy trigger pull. In some cases, it may even give rise to what is known in the art as a drag or trigger creep. In other words, the very opposite of the crisp trigger pull, which is desirable.

In the gun mechanism, in accordance with the present invention, a separate sear-releasing spring is provided which is suitably tensioned by some movable part of the gun and is arranged to be released by the trigger. In other words, a manual pull on the trigger does not furnish the motive power for the sear release. This power is furnished by a separate operative mechanism or spring, which is automatically tensioned during the operation of other parts of the gun mechanism.

The present invention is shown particularly applied to a gun of the automatic or self-loading type; however, it is obvious that it may be applied with certain minor modifications to a gun which is manually operated, such as the ordinary conventional lever or bolt action rifle. As before pointed out, the salient characteristic of the present invention is to provide a separate operative mechanism or separate spring for disengaging the sear of the gun and it is largely

immaterial as to just what moving part of the gun functions to tension this operating mechanism.

In the present invention, the opening movement of the bolt serves to perform this function, but it is obvious that by a suitable arrangement of parts, this tensioning effect could be obtained either by some other portion of the gun mechanism or by some other movement of the bolt.

One of the objects of the present invention, therefore, is to provide a gun having a uniform, light and crisp trigger pull.

A further object of the invention is to provide an actuating spring operative to disengage the sear.

It is a further object of the invention to provide an operating spring suitably tensioned by a moving part of the gun mechanism and whose stored up energy is operative to disengage the sear.

Still another object of the invention is to provide a spring operative upon the sear to disengage the same, which is tensioned by a movable part of the gun mechanism and released by the trigger mechanism.

Other objects of the invention will appear from the following disclosure and drawings illustrating the invention.

Figure 1 is a longitudinal section of a gun in accordance with the invention, the gun mechanism being shown in the closed position ready to fire.

Figure 2 is a longitudinal section similar to Figure 1, with the gun mechanism being shown in open position assumed after firing.

Referring to Figure 1, the gun comprises a receiver 1 carrying a barrel 2 having a rifle bore 3. The gun carries the usual stock secured in the usual manner by screws 4 and 5, and is provided with a guard indicated as an entity by numeral 6. Positioned within the receiver 1 is a bolt 7 having at its forward portion a projecting member 8 adapted to engage a vibrator 9. The bolt 7 is apertured centrally at 10 to receive a portion of the bolt mechanism cooperating therewith, the lowest wall of the bolt being slotted at 11 from the aperture to its periphery, this affording means for inserting the sear mechanism in said slot 11 of the bolt 7. It is understood that the bolt 7 is provided with the usual handle or other means for a manual operation, not shown. Mounted within the forward portion of the bolt aperture 10 is a striker 12 provided with a striker point 13 adapted to engage

the rim of the cartridge 14 and prime or fire the same. Mounted adjacent the rear end of the aperture 10 is a striker spring compressor element 15. The forward end 16 of the element 15 has a sliding relation with the rear portion of the striker member 12. Confined within the striker member 12 is a spring 17 bearing at its front end on the forward wall 18 of the striker, and at its rear end on the front end 19 of the compressor element 15.

Mounted in the rear end of the receiver plug 20 is an ejector 21 serving to guide the bolt spring 22 encasing the ejector rod at its rear end. The plug 20 is recessed at 23 for the purpose of seating the head 24 of the ejector 21. This head 24 is provided with a key 25 to prevent rotation of the ejector 21. The spring 22 is seated at its rear end against the face of the ejector head 24 and its front end in the forward wall of the spring compressor well. 26 indicates a retaining plunger for locking the receiver plug 20 against rotation.

Mounted in the forward end of the slot 11 is a cocking lever 27 pivotally mounted on a pin 28 carried by the bolt, and adapted to engage the striker cam 29. There is also positioned in the slot 11 a sear 30, pivotally mounted on a pin 31 carried by the bolt. The sear 30 is provided with a notch 32 adapted to engage a corresponding notch 33 in the striker 12. The rear portion of the sear 30 is provided with fingers 34 adapted to engage a finger 35 on the sear lever 36 pivoted on a pin 37 carried by the bolt.

The sear lever 36 is urged into the direction equivalent to sear engaging position by a spring 35a, which is suitably mounted in the bolt, as shown in the drawings.

The guard 6 comprises a trigger mechanism and magazine catch. Referring to the trigger mechanism, there is provided a trigger 38 pivotally mounted on a pin 39.

Slidably mounted in an aperture 40 in the trigger 38 is a trigger plunger 41 cooperating with a pawl 42 adapted to engage a set lever 43. The lower end of the plunger 41 is apertured to receive a spring 44 which urges the slidable plunger in an upward direction. The set lever 43 is pivotally mounted at 45 and is provided with a lug 46 adapted to engage tail piece 47 of the sear lever 36.

It may be noted by referring to the drawings that the sear lever 36 and the sear 30 are so mounted and dimensioned as to provide an inclined lower face 36a to the sear lever. This is particularly true when the sear is disengaged from the striker as shown in dotted line position, in Figure 1.

The gun is provided with the usual box magazine 48 and mechanism to hold the same in place. The magazine 48 is provided with a recess 49 adapted to engage a serrated finger piece 50. These serrations are shown at 51. The finger piece 50 is provided with a projecting member 52 adapted to engage a recess 53. The finger piece 50 is apertured at 54 to receive a plunger 55 pivotally mounted at 56.

The forward end 57 of the plunger bears against a spring 58. Mounted in the floor plate 59 is a set spring holder 60 carrying a set lever spring 61. Mounted in the top portion of the set lever spring is a plunger 62 having a ball point 63 adapted to engage a socket 64 in the set lever. The floor plate catch 65 pivotally mounted on pin 66 engages floor plate 59 at 67 to locate the floor plate. The floor plate catch 65 is held

in position by means of the spring 68. The floor plate catch 65 is recessed at 69 to provide a seat for pawl plunger 70 actuated by the spring 71. The spring 71 functions to push the plunger 70 against the pawl 42. The pawl 42 is provided with a hook 72 adapted to engage the portion 73 of the stirrup 74 of the set lever 43. The set lever pawl 42 is engaged at the point 75 by the end 76 of the plunger 70.

It may be noted here that in connection with the trigger mechanism there is a safety mechanism having a bow indicated by the reference numeral 77, which will not be described in detail, as it is intended to be more adequately described in another application.

The trigger mechanism is provided with means for making adjustments with regard to the trigger pull, or the amount of engagement of pawl hook 72 and portion 73. To effect the adjustment, there is provided an adjusting screw 78 which abuts against an adjusting lever 79, which has a tail piece 80 and projecting therefrom, a forward or upper portion, not shown, which abuts against the pawl 42. It may, therefore, be seen that when the tail piece is pushed in an upward direction by movement of the screw 78, that the pawl 42 will be moved to the right, and, therefore, the hook 72 will have a shorter engagement with the portion 73.

As before pointed out, plunger 41 is slidably seated in the trigger 38 and is urged to an upward position by means of a spring 44. The upper portion of plunger 41 has a cam shoulder 81 contacting the pawl 42 at the point 82 to provide a camming action which eliminates any back lash or looseness with respect to the trigger 38 and the pawl 42, and forces the pawl 42 in close contact with the finger 35 of the trigger 38. The trigger 38 is held under tension by means of a plunger 84 and plunger spring 85 mounted in adjusting lever 79.

Referring to Figure 1 of the drawings, the gun is shown in a closed position ready to fire. Cartridge 14 has been fed in a suitable manner and is in the chamber ready to fire. Striker spring 17, bolt spring 22 and sear actuating spring 61 are all under tension. The sear shoulder 32 is in engagement with the notch 33 on the striker and restrains the same from moving forward.

Upon a pull of the trigger, pawl 42 is moved in a forward direction to the dotted line position as shown in Figure 1, disengaging hook 72 from the portion 73 of set lever 43. Set lever 43 then moves in an upward direction to dotted line position about the pivot 45 under the action of spring 61. The lug 46 integral with the set lever, therefore, is moved in the upward direction, in turn moving tail piece 47 of the sear lever in an upward direction to dotted line position against the action of spring 35a. The rear portion of sear lever 36 is, therefore, moved in an upward direction about the pivot 37 and the front portion and finger 35 of the sear lever is, therefore, moved in a downward direction. The final position of sear lever and sear are also shown in dotted lines in Figure 1.

Since the finger 35 on the sear lever engages fingers 34 on the sear, the sear 30 is, therefore, moved in a downward direction, swinging about pivot 31. This movement of the sear disengages notch 32 of the sear and notch 33 of the striker allowing the striker 12 to move forward under the influence of striker spring 17 to fire the cartridge. The action of the latter augmented by the action of the gas on the vibrator 9, serves to drive the

bolt 7 to an open position, as shown in Figure 2. This action tensions the striker spring 17 through the action of cocking lever 27 on striker cam 29 and also tensions bolt spring 22. During the backwards motion of the bolt, the inclined face 36a of sear lever 36 carried by the bolt, pushes lug 46 in a downward direction and tensions spring 61 through lever 43. The depression of lever 43 during the backward or opening movement of the bolt, is best seen in Figure 2, wherein set lever 43 is shown in its lowermost position, and spring 61 is shown fully compressed.

In this position, portion 73, carried by the set lever 43 is also in a position to be engaged by hook 72 carried by the pawl 42. Pawl 42 is urged into an engaging position by pawl plunger 70 actuated by spring 71.

The bolt is now forced to a fully closed position under the action of spring 22; however, the tension on the striker spring and the sear actuating spring 61 is not fully relieved during this closing action of the bolt due to the engagement of the pawl hook 72 and portion 73 and the engagement of the sear and striker notches 32 and 33. Since the tension on the sear actuating spring 61 is not fully relieved by the closing action of the bolt, it may be noted that the possessed stored up energy for moving the sear, as hereinbefore set forth and the pull on the trigger is a relatively light one determined by the amount of engagement of portion 73 and hook 72.

This application is a division of my prior application, Serial No. 514,252, filed February 7, 1931.

#### I claim:

1. In a bolt-action firearm, the combination with the bolt-unit thereof, of a spring-pressed firing-member; a sear serving to releasably hold the said firing-member in its cocked position; a trigger controlling the said sear; spring-means urging the said sear into position to hold the said firing-member in its cocked position; and second spring-means constructed and arranged to be tensioned and relaxed by the movement of the said bolt-unit and serving when tensioned to move the said sear into position to release the said firing-member when the said trigger is operated.

2. In a firearm having a movable bolt, a spring-pressed firing member, a sear serving to releasably hold the said firing-member in its cocked position, a set lever constructed and arranged to move said sear to release said firing-member, a trigger including means coacting with said set lever to releasably hold the same in position to prevent the movement of the sear by said set lever, and spring means urging said set lever into position to move said sear to release the firing-member, said spring means being constructed and arranged to be tensioned by movement of the said bolt.

3. A sear mechanism for firearms, including in combination, a spring-pressed firing-member, a sear serving to releasably hold the said firing-member in its cocked position, a trigger including means coacting with the said sear to releasably hold the same in position to restrain the said firing-member, a plunger and a spring urging said plunger to move the said sear into its firing-member releasing position when the firearm is cocked, so as to release the said firing-member when the said trigger is operated and means to automatically render said spring operative when said firearm is cocked.

4. In a gun having a movable bolt, a firing

mechanism, a sear constructed and arranged to hold said firing mechanism in cocked position, a relatively weak spring urging said sear to holding position, a second relatively strong spring urging said sear to a released position, a trigger mechanism for preventing the movement of the sear by said second spring, and means to tension said strong spring simultaneously movable with said bolt.

5. In a gun, a firing mechanism, a sear constructed and arranged to hold said firing mechanism in cocked position, a relatively weak spring urging said sear to a holding position, a second relatively strong spring urging said sear to a releasing position, a movable bolt mechanism carrying a cam surface constructed and arranged to tension said second relatively strong spring, and a trigger mechanism for preventing the movement of the sear by said second spring when tensioned.

6. In a gun, a striker having a notch, a spring for actuating said striker, a sear having a portion constructed and arranged to seat in said notch to hold said striker in cocked position, spring means urging said sear into seated position, a second spring means urging said sear to a releasing position, means to tension said second spring, an automatically movable bolt, means on said bolt for operating said tensioning means, and a trigger mechanism for preventing the movement of said sear by said second spring when tensioned.

7. In a gun having a movable bolt and a firing mechanism, a spring urging said firing mechanism to firing position, means cooperating with the firing mechanism and movable to one position to hold the firing mechanism in cocked position and movable to another position to release the same, means including a spring constructed and arranged to move said holding means to release said firing mechanism when operatively tensioned, means including a trigger constructed and arranged to prevent movement of the holding means by the spring means in one position and to allow movement thereof in another, and means simultaneously movable with said bolt and independently of the releasing or cocking movement of the first-mentioned holding means to operatively tension said spring.

8. In a gun having a movable bolt, a firing mechanism, means movable to a first position to hold the firing mechanism in cocked position and movable to a second position to release said firing mechanism, means to move said holding means to the first position, and means to move said holding means to the second position, said last mentioned means comprising a spring operatively connected to said holding means and constructed and arranged to be tensioned by a portion of the gun mechanism simultaneously movable with said bolt.

9. In a gun having a movable bolt, a firing mechanism, means movable to a first position to hold the firing mechanism in cocked position and movable to a second position to release said firing mechanism, a spring constructed and arranged to move said holding means to the first position and a second spring constructed and arranged to move said holding means to the second position, said second spring being constructed and arranged to be tensioned by a portion of the gun mechanism simultaneously movable with said bolt.

10. In a gun, a firing mechanism including a striker and a spring urging said striker to firing position when tensioned, means movable inde-

pendently of said striker for tensioning said spring, means cooperating with said striker and movable to one position to hold the striker in cocked position and movable to another position to release the same, means including a spring constructed and arranged to move said holding means to release said striker when operatively tensioned, means including a trigger constructed and arranged to prevent movement of the hold-

ing means by the spring means in one position and to allow movement thereof in another, and means simultaneously movable with the means for tensioning the first mentioned spring, and independently of the releasing or cocking movement of the holding means to tension said second mentioned spring.

DAVID M. WILLIAMS.