Feb. 24, 1942. G. H. GARRISON 2,274,195

FIREARM

Filed Dec. 31, 1938 2 Sheets-Sheet 1

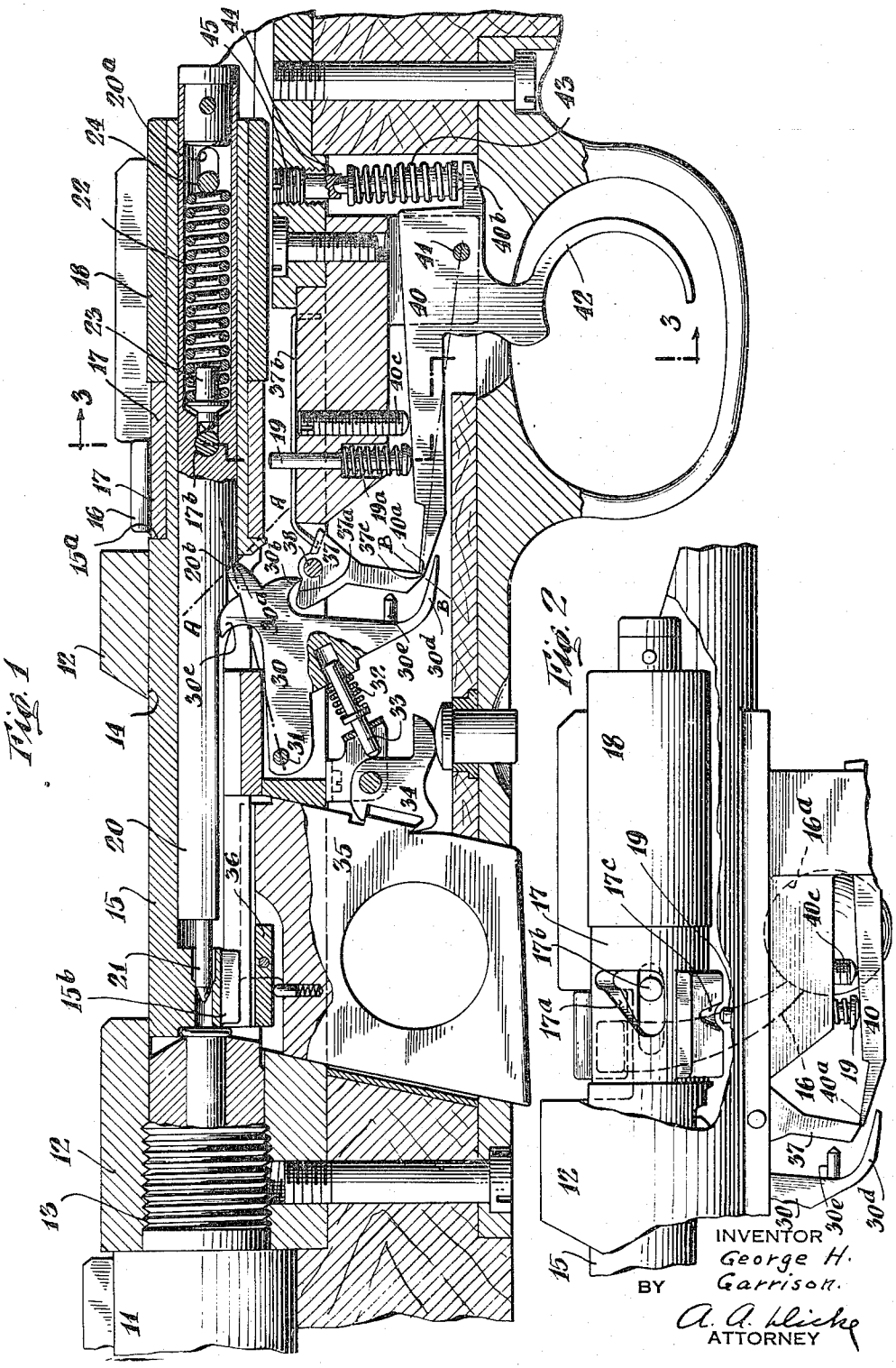


Fig. 1

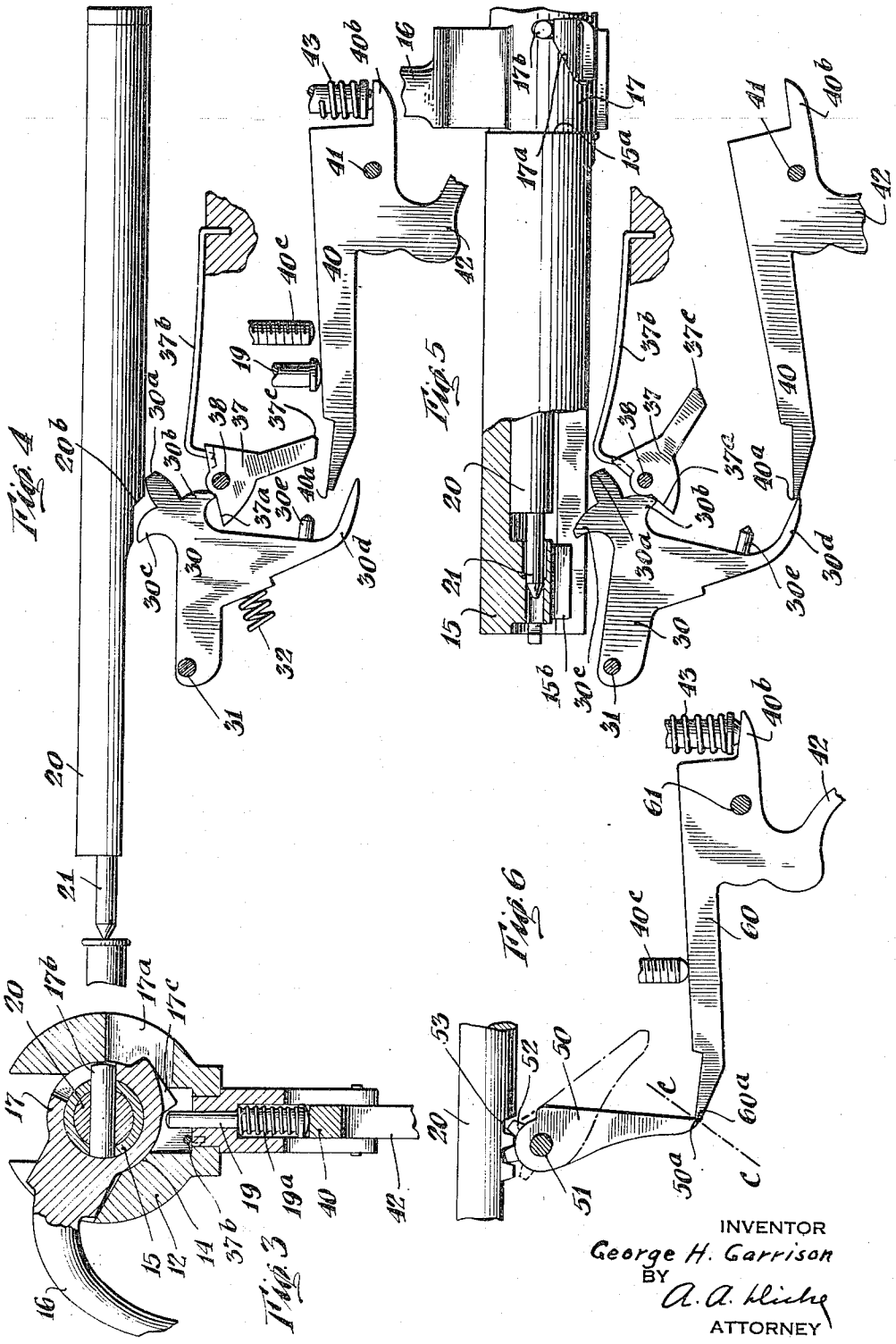
Fig. 2

INVENTOR
George H. Garrison.
BY
A. A. Hicks
ATTORNEY

Feb. 24, 1942. G. H. GARRISON 2,274,195

FIREARM

Filed Dec. 31, 1938 2 Sheets-Sheet 2



Patented Feb. 24, 1942 2,274,195

UNITED STATES PATENT OFFICE

2,274,195

FIREARM

George H. Garrison, Delphi, Ind.

Application December 31, 1938, Serial No. 248,841

3 Claims. (Cl. 42—69)

This invention relates to improvements in firearms and particularly to improvements in the firing mechanism thereof.

In firing mechanisms for firearms as heretofore usually constructed an impact device, such as a striker or hammer, is provided, which device is spring urged to a position where it or a member actuated by it, such as a firing pin, strikes the primer of the cartridge. The impact device, is, when the arm is in condition for firing, held against the action of said spring by a holding device or sear, which engages a shoulder associated with the impact device. A spring is usually associated with the sear tending to hold it in position in the notch of the impact device. The relationship between the sear and the notch is usually such that there is a slight under cut and, in any event, the parts are so shaped that if the sear spring were removed, the force developed by the impact device spring whether acting through an under cut construction or due to friction alone, will hold the sear in position within the notch. In said constructions the sear spring (which may in some cases also be the trigger spring) is made comparatively light since the friction (or under cut) at the point of engagement of the sear with the notch is so great as to approximate the desired trigger pull.

Such constructions have distinct disadvantages, among which are:

(*a*) The occurrence of "creep" in the trigger action, viz., as the shooter increases the pressure of his finger upon the trigger preparatory to shooting, the trigger may suddenly move a short distance, without however initiating firing. This "creep" is very disturbing to the shooter and interferes with accuracy; and

(*b*) Considerable trigger jump occurs, viz., as the shooter gradually increases the pressure upon the trigger, the sear is finally pulled from the notch against the friction or the effect of the undercut. When this has occurred, the only resistance to further movement of the trigger is the comparatively light sear (or trigger) spring. Therefore, the trigger moves backwardly a considerable distance frequently resulting in movement of the gun at the critical moment when firing is occurring.

It is an object of the present invention to provide improved impact firing device holding and releasing means so constructed and arranged that the trigger movement is entirely free from "creep" and "jump."

It is another object of the invention to provide such a means in which the movement of the trigger incidental to the firing of the arm is negligibly small so that no movement of the trigger noticeable to the shooter occurs.

It is another object of the invention to provide a holding means (sear) for the impact mechanism which is so associated with the impact device (striker or hammer) that the driving spring for the impact device tends to move the holding means from its holding position, means being provided, as a strong trigger spring, to hold the sear in holding position against the action of the impact device actuating spring.

It is another object to provide a firing mechanism in which the holding means or sear is held against movement by the second holding means (or sear-sear) which, in turn, is held against movement by a third sear actuated by movement of the trigger.

Other objects will become apparent from the following description taken in connection with the attached drawings showing several illustrative embodiments of the invention and wherein:

Fig. 1 is a longitudinal sectional view of the receiver portion of a firearm illustrating the present invention, certain of the parts being shown in elevation;

Fig. 2 is a view of the bolt and associated parts, the left wall of the receiver having been cut away, the striker being shown in retracted position;

Fig. 3 is a cross-sectional view on the line III—III of Fig. 1;

Fig. 4 shows the striker, the first sear, the second sear, and the trigger sear, in the position they will have immediately after firing has occurred;

Fig. 5 is a view of the parts shown in Fig. 1, the bolt handle being raised to cam the striker rearwardly and the bolt being drawn back to approximately its normal limit of movement, the trigger being shown drawn back so far as to free the bolt for removal from the receiver; and

Fig. 6 is a schematic view showing a modification.

Referring to said drawings, the numeral 11 indicates the barrel of a firearm attached to the receiver 12, as by screw threads 13. Said receiver in the form shown contains a generally cylindrical bore 14 within which is supported the usual bolt 15 for limited sliding and rotary motion. Said bolt is provided with a bolt handle 16 (see Figs. 2 and 3), connected to the sleeve 17 rotatably mounted upon the bolt between a shoulder 15*a* thereon and a sleeve 18. Housed within said bolt is a striker 20 having a firing pin 21.

Said striker is formed with a rear hollow portion within which is housed the striker spring 22, the forward portion of which bears against a spring stud 23 and the rear portion of which bears against an abutment pin 24, passing through an elongated hole 20*a* in the striker 20 and a hole in the bolt 15 and sleeve 18.

As shown in Fig. 2, the bolt handle sleeve 17 is formed with a cam slot 17*a* into which extends a pin 17*b* mounted in the striker 20. With the striker in cocked position, as in Fig. 2, the pin 17*b* is free to move forwardly as the striker falls to explode the cartridge. It will be seen however that upon the opening (lifting) movement of the bolt handle 16, as by grasping the ball end 16*a* thereof, the cam surface 17*a* will cam the pin 17*b* rearwardly and thus retract the striker 20 to and beyond the position shown in Fig. 1.

As seen in Fig. 2 and Fig. 3, the sleeve 17 is also provided with a cam ramp 17*c* which cooperates at times with a spring pressed plunger 19, the function of which will be referred to hereinafter.

The numeral 30 designates the primary sear, viz., the sear which initially holds the striker in position. The primary sear 30 is formed with a holding surface 30*a* lying in the line A—A. Said surface makes such an angle with the line from the point of engagement to the pivot pin 31 of the sear that the action of the striker spring 22 tends to force the primary sear 30 out of engagement with the holding shoulder 20*b* on the striker.

A light sear spring 32 is provided which, in the form shown, acts upon a pin 33 which tends to rotate clockwise the latch 34 serving to hold in place the member 35 which may either be a box magazine, in the case of a repeating arm, or a block to be substituted for the box magazine, and which block serves to support a loading platform member 36. These devices are, however, not involved in the present invention.

The primary sear 30 is also provided with a downwardly extending foot 30*b* engaging upon the support surface 37*a* of the secondary sear 37 pivoted upon pin 38. It will be noted that the point of engagement of 30 upon 37 is quite close to the pivot thereof.

As striker spring 22 tends to rotate primary sear 30 clockwise its pressure upon secondary sear 37 tends to rotate it counterclockwise, preferably against the action of a light spring such as the spring 37*b*. Secondary sear 37 also has a supporting surface 37*c* thereon which engages a cooperating surface 40*a* upon a tertiary sear which is pivoted at 41 and is shown as constructed integrally with the trigger 42. It will be noted that the surfaces 37*c* and 40*a* are inclined along the line B—B which again lies at an obtuse angle to the line from the point of contact to the pivot 41 so that rearward rocking of the member 37 will tend to rock the member 40 downwardly, viz., counterclockwise about its pivot 41. This movement, which corresponds to rearward movement of the trigger 42, is strongly resisted however by the powerful trigger spring 43 which bears upon a rearward extension 40*b* of the member 40 and bears at its upper end upwardly against an abutment 44, the vertical position of which is adjustable by screw 45 to permit adjustment of the trigger pull.

It will be noted that the pin 19 which is biased downwardly by its spring 19*a* bears upon the member 40, with the result that when the bolt handle is raised the cam 17*c* forces the pin 19 downwardly, thus pressing the member 40 downwardly against the action of the powerful spring 43 to permit the secondary sear 37 to move forwardly in front of the surface 40*a* when the gun is being re-cocked.

Operation

With the parts in the position shown in Figs. 1, 2, and 3, the arm is in condition for firing. The striker spring 22 is attempting to force the striker forward and on account of the angle of the shoulder 30*a* the primary sear 30 is biased downwardly, causing the foot 30*b* to press upon the surface 37*a* on secondary sear 37, and biasing said sear counterclockwise. The pressure of its surface 37*c* upon the surface 40*a* of the tertiary sear or trigger sear 40 will, on account of the obtuse angle, tend to move the member 40 and trigger 42 counterclockwise, which latter movement is however resisted by the strong spring 43 which is set for the desired trigger pull. As the shooter gradually increases the pressure upon the trigger 42, nothing whatever occurs until he applies a pressure approximately equal to the thrust of spring 43. As this point is reached, the thrust of striker spring 22 acting through 30 and 37 becomes sufficient, to overbalance the thrust of spring 43, and to rock surface 40*a* away from surface 37*c* so that surface 30*a* may rock away from surface 20*b*, thus suddenly releasing the striker 20 for firing. There is absolutely no trigger jump because while firing is occurring there is no sudden release of the resistance to the pull of the finger upon the trigger and the movement of the trigger is so slight that it would be unnoticeable.

Furthermore, no "creep" is possible. It is well known that the co-efficient of static friction is greater than the co-efficient of dynamic friction, so that when the shooter has once applied sufficient pressure to the trigger to permit the initiation of any movement whatever as between surfaces 40*a* and 37*c*, the movement will go on in view of the lower co-efficient of dynamic friction so that "creep" is absolutely prevented.

The parts are now in the position shown in Fig. 4, the striker having engaged the primer portion of the cartridge and exploded the charge. It will be noted that in the form shown, the movement of the striker is very short to give the desired speedy action. In said position of the parts it will be noted that sear springs 32 and 37*b* are stressed, the energy therefor having come from the striker spring 22. The trigger sear 42, 40 returns to normal position in engagement with set screw 40*c*. In order to reload, it is necessary to lift the bolt handle. In so doing, cam surface 17*a* engages pin 17*b* and forces the striker 20 rearwardly to a position somewhat further back than that shown in Fig. 1. Since surface 30*a* can clear surface 20*b*, springs 32 and 37*b* will serve to move the sears 30 and 37 to the position shown in Fig. 1. However, spring 37*b* would not be sufficiently strong to force the trigger sear 42, 40 downwardly as would be necessary for the end 37*c* to clear the end 40*a*. However, cam surface 17*c* has, in the meantime, engaged and pressed downwardly pin 19, which has forced the member 40 downwardly, thus enabling the member 37 to move forwardly in front of the surface 40*a* until arrested by the stop 30*e*, so that when the bolt handle is moved downwardly, the surface 37*c* will engage the surface 40*a*.

It will be noted that the member 30 has an upwardly extending horn 30*c* which serves as a bolt stop abutment with which engages the lug

15b of the bolt 15, serving to limit the rearward excursion of the bolt in normal re-loading operations.

Fig. 5 shows how the bolt stop 30c may be withdrawn to permit removal of the bolt from the receiver. For this purpose the primary sear 30 is also formed with a rearwardly extending horn 30d, located below the forward end of the tertiary sear member 40. When it is desired to remove the bolt, the trigger is pulled not only to the firing position but sufficiently far beyond so that the member 30 is rocked clockwise to the position shown in Fig. 5 so that the horn 30c is removed from the path of the lug 15b, thus permitting removal of the bolt.

While the surfaces 37c and 40a are shown so related that a rearward bias on member 37 tends to push the member 40 downwardly, it is to be noted that this is not essential. In view of the leverage, the pressure of 37c against 40a is not very great so that the friction resulting therefrom is negligible.

Various other modifications are contemplated. For example, it may under certain circumstances be desirable to omit one of the intermediate members entirely, as in the form shown in Fig. 6. In said form there is only one member intermediate the striker 20 and the trigger sear. This is the member 50 pivoted at 51 and formed with one or more projections 52, preferably in the form of gear teeth, engaging with appropriate depressions 53 in the striker 20. The member 50 has a surface 50a engaging with a corresponding surface 60a on the trigger sear 60 which is pivoted at 61 and is biased to the position shown by the powerful trigger spring 43. The surfaces 50a and 60a lie in the line C—C which forms an obtuse angle with the line passing through the pivot point 61, the angle being such that, as in the form shown in Fig. 1, it is greater than the angle of repose. It will be seen therefore that if the shooter increases the pressure applied to the trigger sufficiently to substantially overcome the force exerted by spring 43, the striker spring acting through member 50 will exert pressure at the surfaces 50a, 60a, thus camming the trigger sear 60 downwardly and permitting the striker to advance and strike the primer. During this time, the member 50 moves to the dotted line position shown. Upon reloading, when the bolt handle 16 is raised, the striker is positively cammed rearwardly by the action of cam surface 17a upon pin 17b, thus positively moving the member 50 clockwise past and in front of member 60, camming said member downwardly the slight amount required. This is made possible by the two-way connection between member 50 and striker 20. It will be seen that the trigger rocking pin 19 and the cam surface 17c on sleeve 17 is not necessary in the form of Fig. 6; the trigger setting screw 40c or its equivalent is however required.

It will be noted that the constructions shown and described will serve admirably to accomplish the objects stated above. It is to be understood, however, that the constructions disclosed above are intended merely as illustrative of the invention and not as limiting as various modifications therein may be made without departing from the invention as defined by a proper interpretation of the claims which follow:

1. In a firearm, an impact firing device, a spring tending to move said impact device to firing position, restraining means engaging said impact device, a second restraining means for said first restraining means, a third restraining means for said second restraining means, said several restraining means having co-acting surfaces so constructed and arranged that the thrust of the said spring tends to move said several restraining means to ineffective position, spring means for holding said third restraining means against the thrust of said impact device spring, and a trigger connected to compress said spring means upon actuation of said trigger, whereby said impact device spring may move said several restraining means to ineffective position and cause said impact firing device to move to firing position.

2. In a firearm, a striker, a spring tending to move said striker to firing position, restraining means engaging a shoulder on said striker, the co-acting surfaces between the restraining means and said shoulder being so inclined that the thrust of the said spring tends to move said restraining means to ineffective position, a second restraining means for opposing movement of said first restraining means against the thrust of said spring, a third restraining means pressed against said second restraining means by means of a spring, the co-acting surfaces of said second and third restraining means being so disposed that the second restraining means tends to move the third restraining means to ineffective position, and trigger means for at will overcoming the force of said last mentioned spring.

3. In a firearm, a striker, a spring tending to move said striker to firing position, restraining means engaging a shoulder on said striker, a second restraining means for said first restraining means, a third restraining means for said second restraining means, said shoulder and the co-acting surfaces of said several restraining means being so constructed and disposed that the thrust of the said spring tends to move said several restraining means to ineffective position, spring means for holding said third restraining means against the thrust of said striker spring, and a trigger connected to compress said second spring means upon actuation of said trigger, whereby said striker spring may move said several restraining means to ineffective position and cause said striker to move to firing position.

GEORGE H. GARRISON.