March 24, 1942. W. C. ROEMER 2,277,561

TRIGGER-MECHANISM FOR FIREARMS

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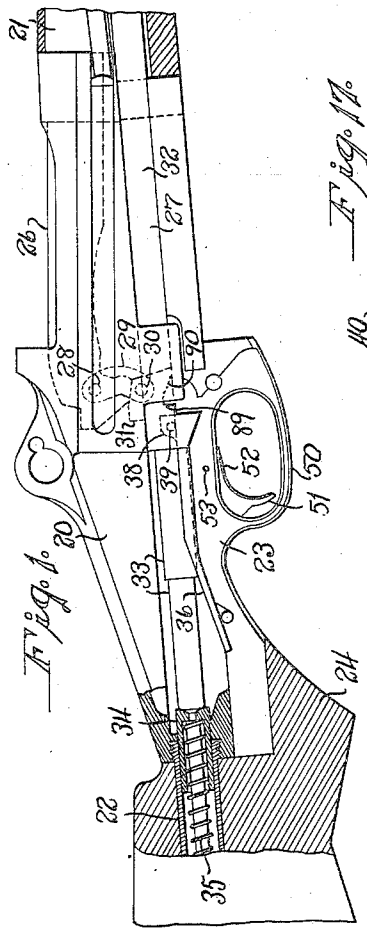


Fig. 1.

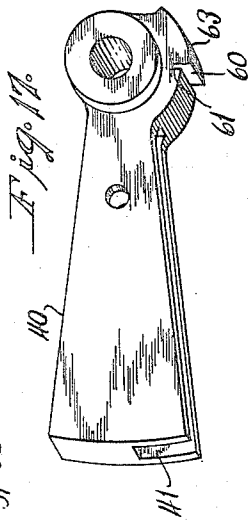


Fig. 11.

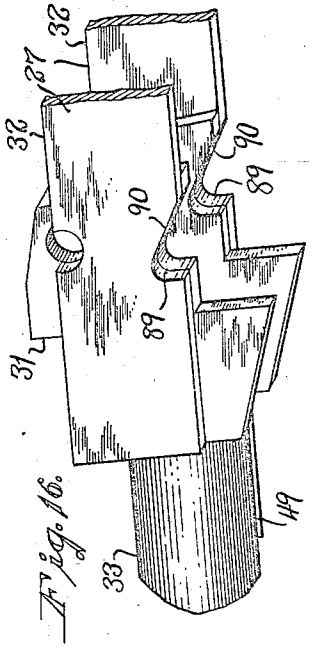


Fig. 16.

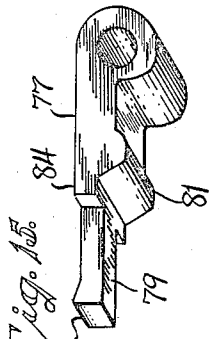


Fig. 15.

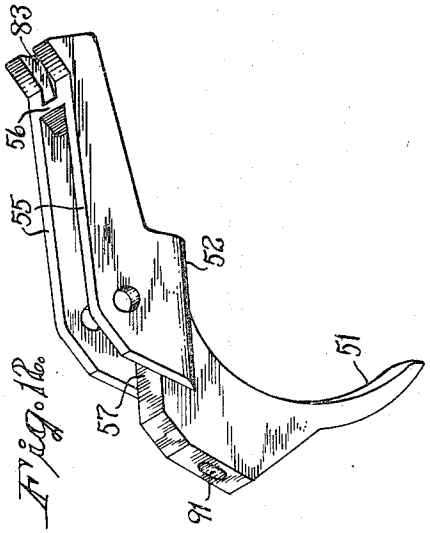


Fig. 12.

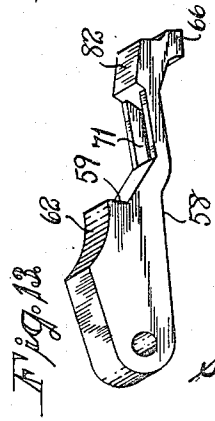


Fig. 13.

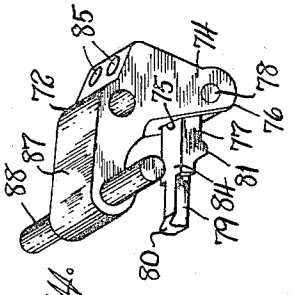


Fig. 14.

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TRIGGER-MECHANISM FOR FIREARMS

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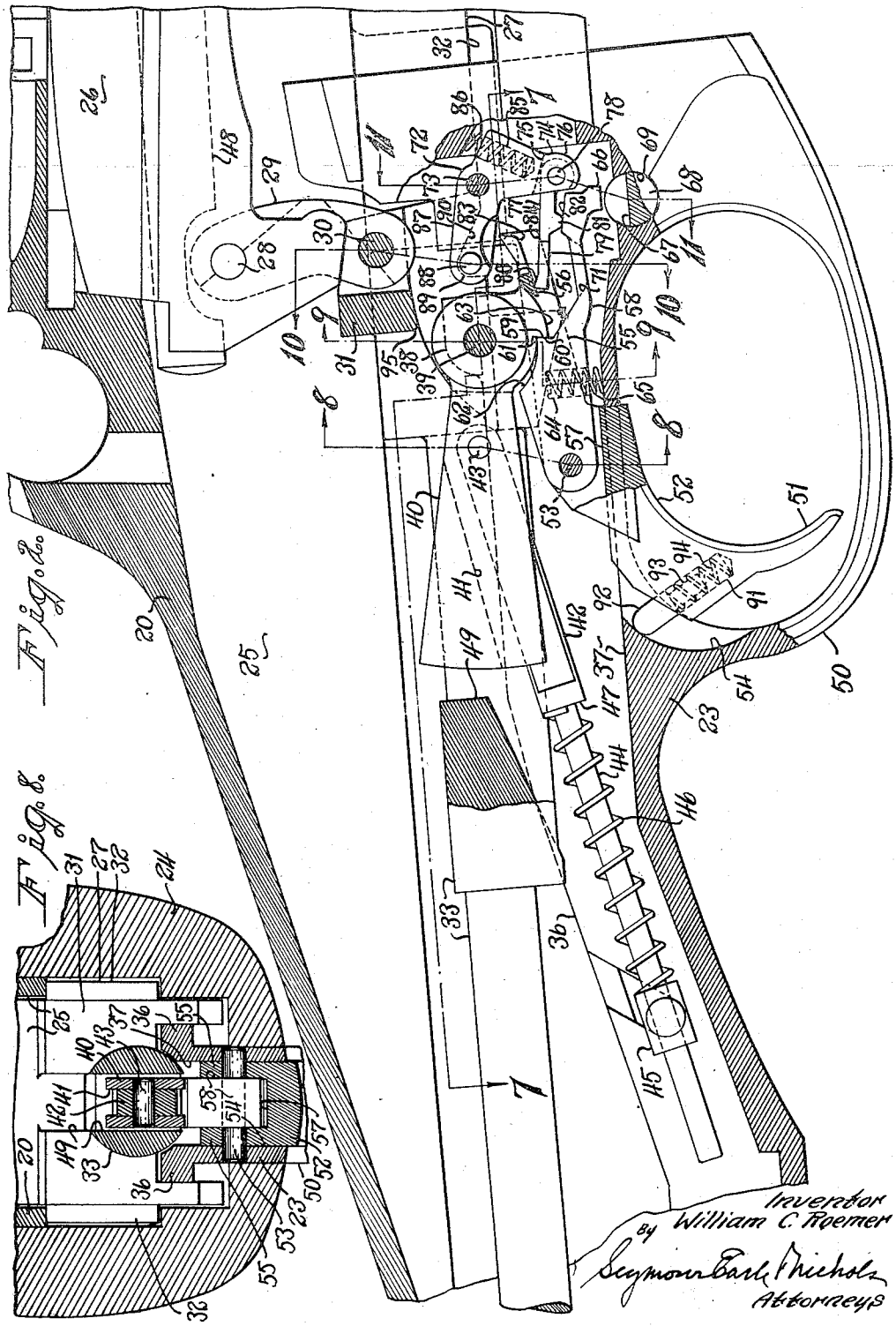


Fig. 2.

Fig. 8.

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TRIGGER-MECHANISM FOR FIREARMS

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Fig. 3.

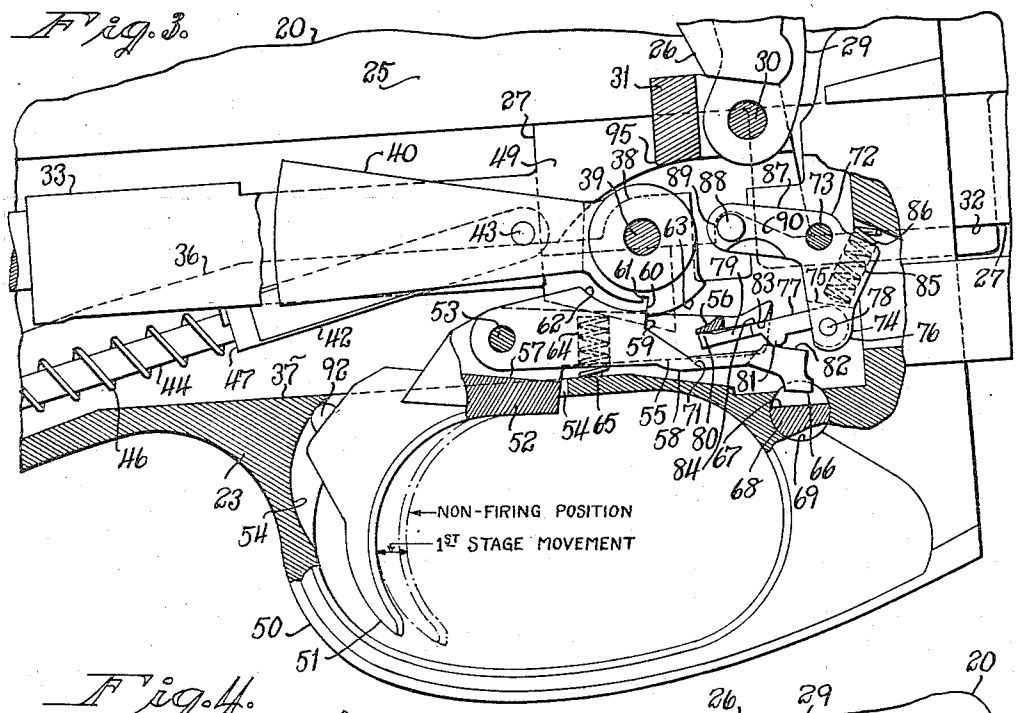
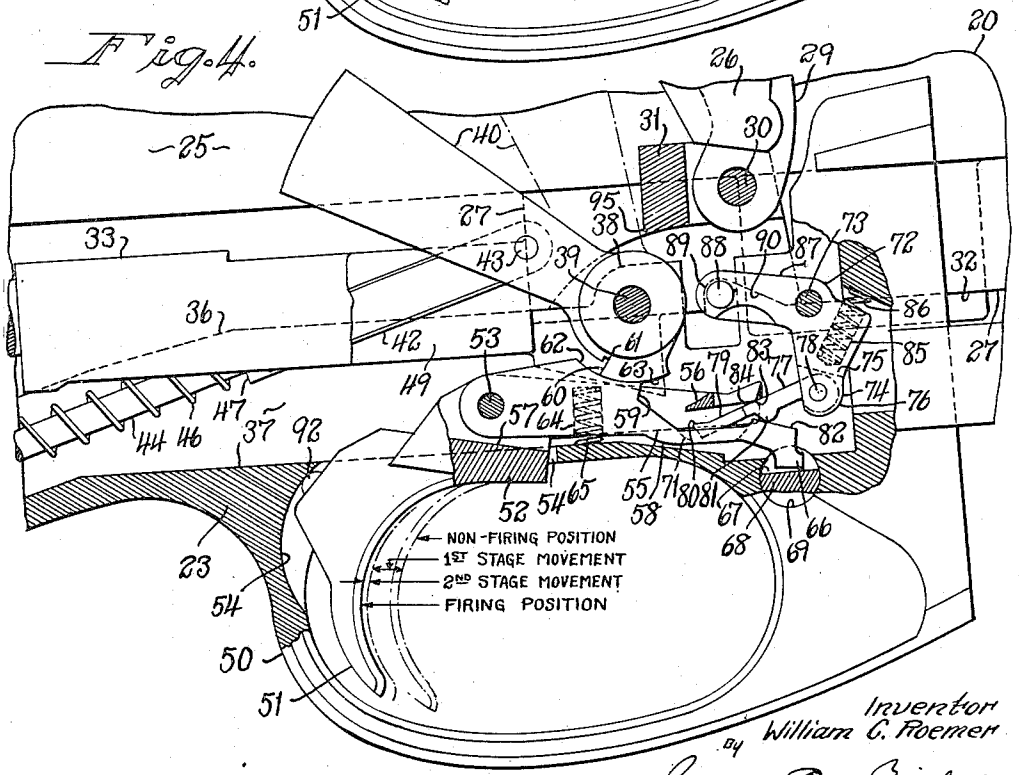


Fig. 4.



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Fig. 5.

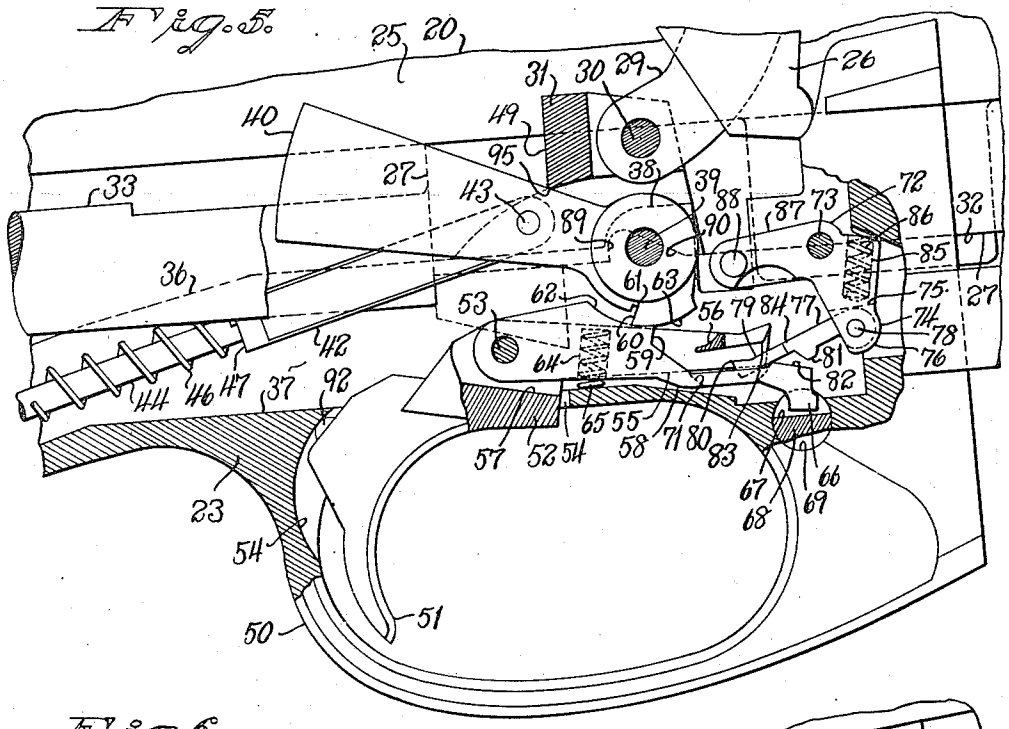
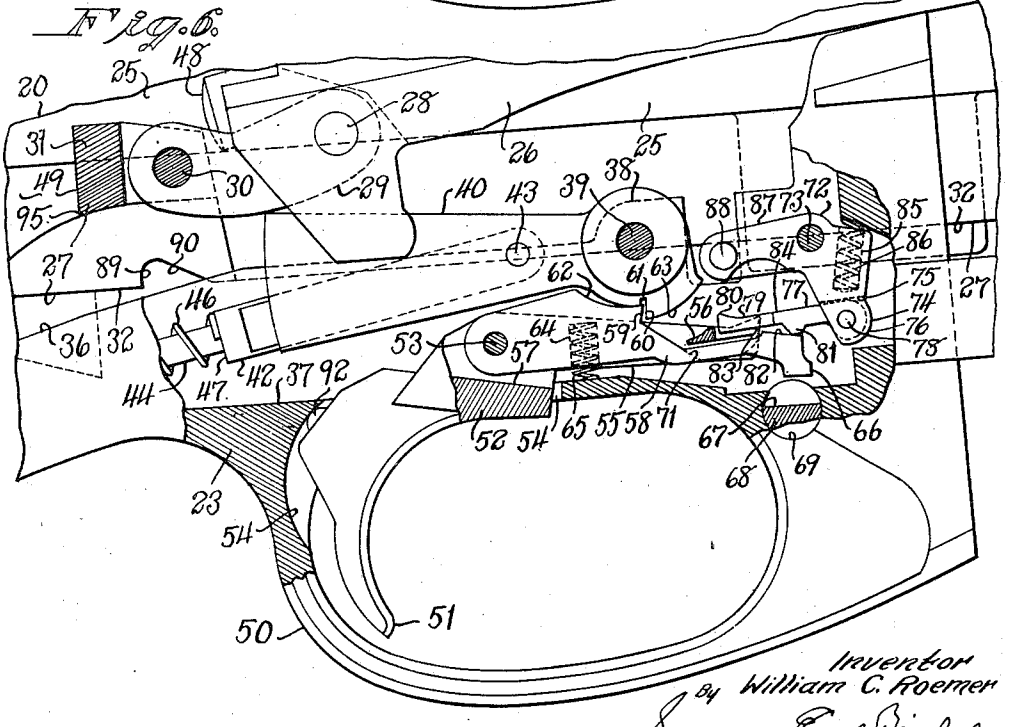


Fig. 6.



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TRIGGER-MECHANISM FOR FIREARMS

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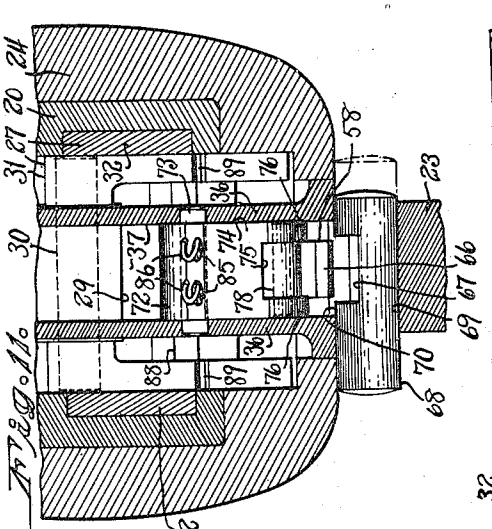


Fig. 11.

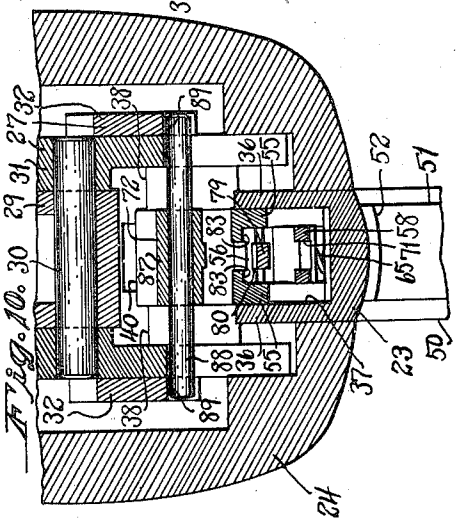


Fig. 10.

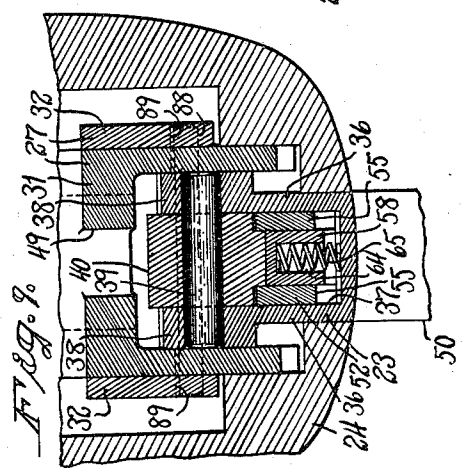


Fig. 9.

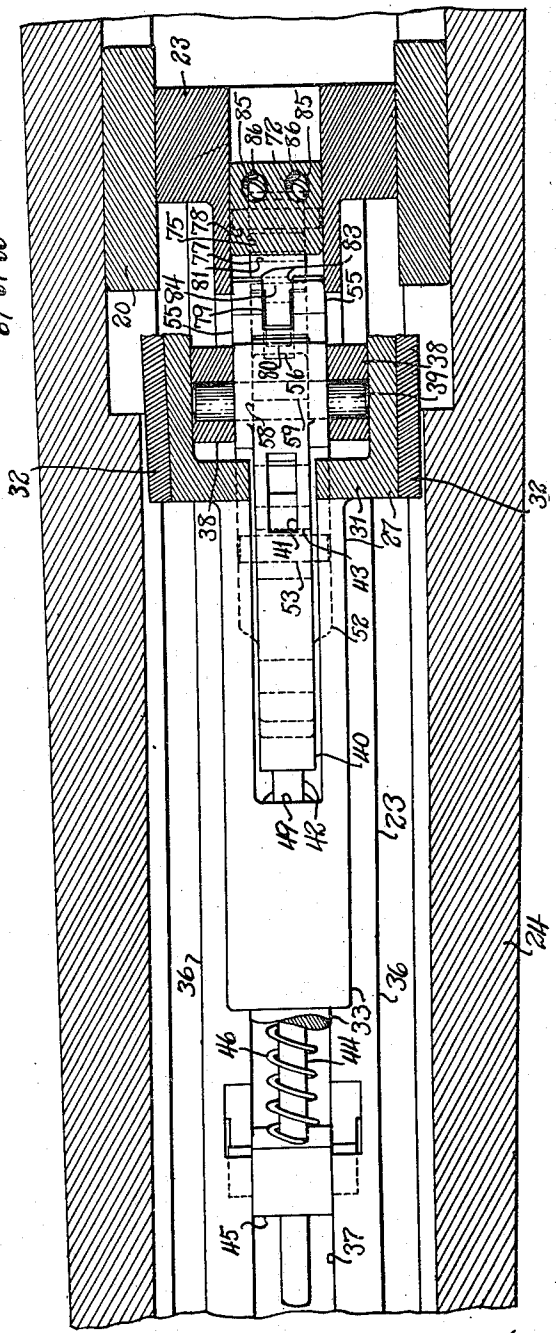


Fig. 7.

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Patented Mar. 24, 1942 2,277,561

UNITED STATES PATENT OFFICE

2,277,561

TRIGGER MECHANISM FOR FIREARMS

William C. Roemer, New Haven, Conn., assignor to Western Cartridge Company, New Haven, Conn., a corporation of Delaware

Application March 28, 1940, Serial No. 326,308

10 Claims. (Cl. 42—69)

The present invention relates to improvements in trigger-mechanisms for firearms and more particularly to improvements in trigger-mechanisms primarily adapted for use in conjunction with firearms of the type wherein the hammer or other firing-member is very rapidly moved into cooking position simultaneously with a rapid rearward movement of the breech-bolt or equivalent element under the urge, for instance, of the power developed by a just-fired cartridge.

The present invention contemplates the provision of a firing-mechanism wherein a relatively-deep engagement is effected between the sear and the firing-member and wherein the movement of the sear relative to the firing-member for releasing the latter is effected at a relatively-slow rate during its initial phase and subsequently at a relatively-rapid rate.

One of the objects of the present invention is to provide a firearm having a superior construction and arrangement of parts whereby the trigger is automatically uncoupled from the sear immediately upon the breech-bolt being unlocked and wherein the means for uncoupling and coupling the said trigger and sear acts to provide an initially-soft and easy trigger-pull followed by a relatively-hard and crisp trigger-pull.

Another object of the present invention is to provide a superior trigger-mechanism including retirable coupling-means normally operatively-interposed between the trigger and the sear and so constructed and arranged with respect thereto as to transmit the initial movement of the trigger to the said sear at a relatively-slow rate followed by transmission at a relatively-more rapid rate.

A further object of the present invention is to provide a superior trigger-mechanism wherein the functions of providing a two-stage trigger pull are devolved upon means which also discharge the function of a coupler between a trigger and sear.

With the above and other objects in view, as will appear to those skilled in the art from the present disclosure, this invention includes all features in the said disclosure which are novel over the prior art and which are not claimed in any separate application.

In the accompanying drawings, in which certain modes of carrying out the present invention are shown for illustrative purposes:

Fig. 1 is a broken view mainly in side elevation and partly in vertical central-longitudinal section of the intermediate portion of a firearm embodying the present invention, the breech-bolt being shown in its breech-closing position;

Fig. 2 is an enlarged view partly in vertical central-longitudinal section and partly in side elevation of the portion of the firearm at and adjacent the trigger-mechanism, the hammer being shown in its cocked position and the trigger in its normal non-firing position preparatory to the discharge of the firearm;

Fig. 3 is a similar but less comprehensive view showing the parts in the positions which they assume when the trigger is at the completion of its first-stage or "soft" pull movement;

Fig. 4 is a view corresponding to Fig. 3 but showing the parts in the positions which they assume when the trigger has completed its second-stage or "hard" pull movement into its firing position to effect the discharge of the firearm;

Fig. 5 is a view corresponding to Figs. 3 and 4 but showing the parts in the positions which they assume immediately following the initiation of the rearward movement of the action-slide and with the trigger held in its firing position;

Fig. 6 is a view corresponding to Figs. 3, 4 and 5, but showing the parts in the positions which they assume when the breech-bolt and action-slide have been moved rearwardly sufficiently to fully retire the hammer and thus permit the sear to be moved upwardly into its cocking position, and with the trigger held in its firing position;

Fig. 7 is a broken horizontal sectional view taken on the line 7—7 of Fig. 2;

Fig. 8 is a fragmentary transverse sectional view taken on the line 8—8 of Fig. 2;

Fig. 9 is a fragmentary transverse sectional view taken on the line 9—9 of Fig. 2;

Fig. 10 is a similar view taken on the line 10—10 of Fig. 2;

Fig. 11 is a fragmentary transverse sectional view taken on the line 11—11 of Fig. 2;

Fig. 12 is a perspective view of the trigger, detached;

Fig. 13 is a perspective view of the sear, detached;

Fig. 14 is a perspective view of the unit comprising the bell-crank-like shifter and the transmitting-member carried thereby;

Fig. 15 is a perspective view of the transmitting-member, detached;

Fig. 16 is a broken perspective view of the rear portion of the action-slide looking mainly at the underside thereof; and

Fig. 17 is a perspective view of the hammer.

The firearm herein chosen for illustrating the present invention includes a receiver 20, a barrel 21, a tubular receiver-extension 22, a trigger-plate

23 and a stock 24. The barrel 21 is secured in the usual manner of firearms to the said receiver 20 and extends forwardly therefrom, and the tubular receiver-extension 22 is rigidly secured to and extends rearwardly from the said receiver and serves to couple the latter firmly to the stock 24.

The receiver 20 is provided in its interior with a mechanism-receiving chamber 25 in which a breech-bolt 26 is adapted to be tilted and reciprocated by an action-slide 27. The action-slide 27 reciprocates longitudinally of the firearm, and may be moved rearwardly in any suitable manner such, for instance, as by a gas-operated piston, as is shown in my co-pending application, Serial No. 313,650, filed January 13, 1940.

The reciprocating breech-bolt 26 just above referred to has pivotally coupled to its rear end by means of a pivot-pin 28, the upper end of an operating-link 29, which latter is also pivotally secured at its lower end by a pivot-pin 30 to a cross-head 31 forming a feature of the action-slide 27 before referred to. Brazed, welded or otherwise secured to the respective opposite sides of the cross-head 31 of the action-slide 27, are the rear ends of two parallel spaced-apart side-bars 32—32 constituting part of the said action-slide. The side-bars 32—32 of the action-slide 27 are held in laterally-spaced-apart relationship by the cross-head 31 and extend forwardly therefrom with capacity for longitudinal reciprocating movement therewith.

Extending rigidly rearwardly from the cross-head 31 of the action-slide 27 is a stem 33 bearing at its rear end against the forward end of a spring-plunger 34 (Fig. 1). The said spring-plunger is mounted with capacity for reciprocating movement in the receiver-extension 22 before referred to and is constantly urged forwardly by a helical bolt-return spring 35 (Fig. 1).

The trigger-plate 23 has side walls 36—36 which are laterally-spaced-apart to provide an upwardly-opening longitudinal clearance-groove 37 in the said trigger-plate, which latter may be secured to the underside of the receiver 20 in any suitable manner. Upwardly projecting from the upper edges of the respective side walls 36—36 just referred to, are ears 38—38 (Fig. 9) serving to support the respective opposite ends of a pivot-pin 39 mounting a hammer 40 for pivotal movement between the said ears 38—38.

The hammer 40 is formed in its rear face with a longitudinal clearance-groove 41 designed to receive the forward end of a hammer-actuating plunger 42 pivotally secured by a pivot-pin 43 to the said hammer 40. The hammer-actuating plunger 42 includes a rearwardly-extending spring-guiding stem 44 mounted at its rear for sliding movement in a transversely-extending abutment-member 45 located in the clearance-groove 37 of the trigger-plate 23 and pivotally supported at its respective opposite ends in the side walls 36—36 of the said trigger-plate. The spring-guiding stem 44 has its forward portion encircled by a helical hammer-spring 46, which latter is interposed between the forward face of the abutment-member 45 and a rearwardly-facing shoulder 47 formed on the plunger 42. The opposite ends of the said hammer-spring 46 respectively thrust against the forward face of the abutment-member 45 and the shoulder 47 of the plunger 42, to constantly urge the hammer 40 forwardly to strike a firing-plunger 48 carried by the breech-bolt 26 to effect the discharge of a cartridge.

To enable the hammer 40 and the forward portion of the hammer-actuating plunger 42 to swing through their desired arcs, the action-slide 27 is provided with a longitudinal clearance-slot 49. The said clearance-slot is formed partly in the stem 33 and partly in the cross-head 31 of the action-slide 27, and is of sufficient length to accommodate the hammer 40 when the same is in its cocked position.

The trigger-plate 23 is formed with a usual integral loop-like trigger-guard 50 which encloses the finger-piece 51 of a trigger 52 carried by the said trigger-plate. The major portion of the trigger 52 is located in the clearance-groove 37 of the said trigger-plate 23 and is mounted for pivotal movement upon a pivot-pin 53 extending transversely of the said trigger-plate with its respective opposite ends supported in the side walls 36—36 thereof, as is shown in Fig. 8. The finger-piece 51 of the trigger 52 extends downwardly through a vertical clearance-slot 54 formed in the said trigger-plate 23 and leading downwardly from the clearance-groove 37 therein to the underside of the said trigger-plate.

The trigger 52 is formed with two laterally-spaced-apart parallel arms 55—55 united adjacent their forwardly-projecting ends by an integral bridge 56, for the purpose as will later appear. The said arms 55—55 also extend upwardly so as to provide the central portion of the trigger 52 with a longitudinal clearance-groove 57 across which the pivot-pin 53 of the trigger 52 extends. Located in the clearance-groove 57 of the trigger 52 is the rear end of a sear 58 mounted upon the pivot-pin 53 just referred to, for independent pivotal movement with respect to the said trigger 52.

The sear 58 extends forwardly between the arms 55—55 of the trigger 52 with its forward portion passing beneath the bridge 56 of the said trigger, as is clearly shown in Figs. 2 to 6 inclusive. Formed on the upper edge of the sear 58 about midway of its length is a forwardly-facing cocking-shoulder 59 adapted to engage a relatively-deep rearwardly-facing cocking-abutment 60 forming one face of a cocking-notch 61 provided in the hammer 40. The sear 58 by the engagement of its cocking-shoulder 59 with the cocking-abutment 60 of the hammer 40 serves to releasably maintain the said hammer in its cocked position against the tension of the hammer-spring 46 until such time as the cocking-shoulder 59 is moved downwardly out of engagement with the cocking-abutment 60 of the hammer 40 by the actuation of the trigger 52, all as will more clearly hereinafter appear.

Immediately to the rear of its cocking-shoulder 59, the sear 58 is formed on its upper edge with a concave arcuate abutment 62 adapted to be engaged with the convex arcuate outer face of a lug 63 forming that portion of the hammer 40 immediately forwardly of the cocking-notch 61. The arcuate outer face of the lug 63 is concentric with the center of the pivot-pin 39 of the hammer 40 and serves, when engaged by the arcuate abutment 62 of the sear 58, to retain the said sear in its depressed or hammer-releasing position, for the purpose and in a manner as will hereinafter appear.

The sear 58 is provided intermediate the pivot-pin 53 and the cocking-shoulder 59 thereof with a downwardly-opening spring-pocket 64 in which is located the upper portion of a helical sear-spring 65 having its lower end seated against the adjacent portion of the bottom of the

clearance-groove 37 in the trigger-plate 23. The sear-spring 65 exerts a constant but yielding effort to swing the sear 58 upwardly into position to interpose its cocking-shoulder 59 in the path of movement of the cocking-abutment 60 of the hammer 40. At its forward end the sear 58 is formed with a downwardly-and-forwardly-extending finger 66 which normally is positioned over and in registration with a notch 67 provided in a cylindrically-contoured safety-slide 68.

The safety-slide 68 is mounted for axial shifting movement in a passage 69 extending transversely of the trigger-plate 23 in the portion thereof adjacent the forward portion of the space enclosed by the trigger-guard 50 of the said trigger-plate, as is clearly shown in the drawings. The safety-slide 68 is adapted to be axially shifted in the passage 69 into either its "safe" position or "firing" position as is usual with safety devices. It will be understood that by axially shifting the safety-slide 68 into its "safe" position (indicated by broken lines in Fig. 11), the notch 67 therein will be moved out of registration with the finger 66 of the sear 58 to thus bring a peripheral portion 70 of the said safety-slide beneath the finger 66 of the said sear 58 to thus prevent the said sear from being moved downwardly for the release of the hammer 40. By shifting the said safety-slide into its "firing" position, the notch 67 therein will be in the position shown by full lines in the drawings, and the sear 58 may be moved downwardly in a manner as will hereinafter appear, thus entering the finger 66 thereof into the notch 67 of the said safety-slide without interference thereby when the trigger 52 is actuated to effect the discharge of the firearm.

Intermediate the cocking-shoulder 59 and the finger 66 of the sear 58, the said sear is formed with a longitudinal clearance-slot 71 which substantially underlies the bridge 56 of the trigger 52, as is clearly shown in Figs. 2 to 6 inclusive.

Forwardly of the hammer 40 the trigger-plate 23 pivotally carries a shifter 72 of bell-crank-like form. The shifter 72 is mounted for pivotal movement on a pivot-pin 73 extending transversely of the said trigger-plate 23 across the upper forward portion of the clearance-groove 37 therein and is supported at its respective opposite ends in the respective side walls 36—36 of the said trigger-plate, as is clearly shown in Fig. 11. The shifter 72 has a depending-arm 74 which is formed in its lower end with a longitudinal clearance-notch 75 resulting in the formation of laterally-spaced-apart ears 76—76.

The clearance-notch 75 just above referred to receives the forward or inner end of a horizontally-arranged pivotal transmitting-member 77 which is mounted for free rocking movement relative to the shifter 72 upon a pivot-pin 78, the respective opposite ends of which latter are supported in the ears 76—76 of the arm 74 of the said shifter. The transmitting-member 77 extends rearwardly substantially horizontally and has a relatively-narrow rear portion 79 normally located over the clearance-slot 71 in the sear 58 and beneath the under face of the bridge 56 of the trigger 52, as is clearly shown in Fig. 2.

The outer or rear end of the rear portion 79 of the transmitting-member 77 is formed with an upwardly-extending first-stage actuating-nose 80 normally in engagement with the under face of the bridge 56 of the trigger 52, as clearly shown in Fig. 2. The said bridge may be said to constitute the "first stage" actuating-abutment of the trigger 52. Intermediate its actuating-nose 80 and its pivot-pin 78, the said transmitting-member 77 is formed on its under face with a downwardly-extending sear-actuating lug 81 which normally is in engagement with an upwardly-facing actuating-surface 82 provided adjacent the forward or free end of the sear 58.

It may here be noted that the arms 55—55 of the trigger 52 are formed at their forward ends adjacent the respective upper edges thereof and forwardly of the bridge 56 with two laterally-spaced-apart second-stage actuating-abutments 83—83. The actuating-abutments 83—83 of the trigger 52 project inwardly toward each other from the inner faces of the respective arms 55—55 of the said trigger and normally overlie the relatively-broad portion 84 of the upper face of the transmitting-member 77 immediately forwardly of the relatively-narrow rear portion 79 thereof. The said portion 84 is engageable by the second-stage actuating-abutments 83—83 and may, therefore, be properly termed the "second-stage" abutment of the transmitting-member 77.

Returning to the shifter 72, it will be noted that the same is provided immediately forwardly of the pivot-pin 73 with two laterally-spaced-apart upwardly-and-forwardly-inclined spring-pockets 85—85 in which are located the lower portions of two helical springs 86—86 (Fig. 7) which thrust against the adjacent portion of the trigger-plate 23. The shifter 72 also includes a horizontal arm 87 which carries at its rear end a relatively-long cam-pin 88 extending transversely through the said arm 87 with each of its respective opposite ends normally disposed in the adjacent one of two clearance-notches 89—89 respectively formed in the under edge of the adjacent rear portions of the side bars 32—32 of the action-slide 27, when the latter is in its forward position.

The springs 86—86 above referred to constantly urge the shifter 72 to turn in a clockwise direction as viewed in the drawings, to yieldingly maintain the rear or outer portion of the transmitting-member 77 interposed between the bridge 56 of the trigger 52 and the sear 58, as is shown in Figs. 2, 3 and 4. The springs 86—86 also serve to urge the opposite ends of the cam-pin 88 respectively upwardly into the clearance-notches 89—89 of the action-slide 27 for engagement by forwardly-and-downwardly-inclined uncoupling-cams 90—90, respectively forming the forward wall of each of the two clearance-notches 89—89.

To hold the trigger 52 in its normal non-firing position, the said trigger is formed adjacent its finger-piece 51 with an upwardly-and-rearwardly-inclined spring-pocket 91 opening through the rear upper edge thereof and receiving a spring-plunger 92 having a guide-stem 93 encircled by a helical trigger-spring 94. One end of the trigger-spring 94 thrusts against the end-wall of the spring-pocket 91 while the opposite end thrusts against the adjacent face of the spring-plunger 92 to thus hold the said spring-plunger in seated engagement with the adjacent portion of the trigger-plate 23 and thus hold the trigger 52 in its normal or non-firing position.

As will be apparent from the accompanying drawings and the present description the cocking-shoulder 59 of the sear 58 has a relatively-long or deep engagement with the cocking-abutment 60 of the hammer 40 just prior to the trigger being pulled. This depth of engagement may, for example, be .05 inch. The cocking-shoulder 59

of the sear 58 is disengaged from the cocking-abutment 60 of the hammer 40 in two stages, namely, a first stage and a second stage. During the first-stage movement the trigger-pull may be characterized as "soft" or "light" during which the depth of the engagement of the cocking-shoulder 59 with the cocking-abutment 60 is reduced about .03 inch, thus leaving approximately .02 inch remaining for the second-stage movement. During this first-stage movement, as just referred to, the finger-piece of the trigger must be moved a relatively-great distance to effect a relatively-small degree of movement of the sear 58. The second-stage movement of the sear 58 is accompanied by what may be termed a "hard" or "heavy" pull of the trigger, sometimes referred to as a "crisp" pull. This second-stage movement of the sear effects the complete disengagement of its cocking-shoulder 59 from the cocking-abutment 60 of the hammer 40 and causes the said sear to move more rapidly relative to the trigger-movement than was the case during the first-stage movement referred to.

For the purpose of description let it be assumed that the firearm is loaded and that the hammer 40 is cocked and the associated parts are in their respective positions in readiness for the discharge of the firearm, as shown particularly well in Figs. 1 and 2. Under these conditions the breach-bolt 26 is fully in its breech-closing position and the action-slide 27 is in its full forward position. The safety-slide 68 will, when the firearm is in readiness for firing, be in its "firing" position, i. e., in such position that its notch 67 is in full registration with the finger 66 of the sear 58.

If rearward draft is now applied to the finger-piece 51 of the trigger 52 to rock the said trigger clockwise about its pivot-pin 53 against the tension of the trigger-spring 94, the said trigger will be first swung through a first-stage movement from the position in which it is shown in Fig. 2 to that in which it is shown in Fig. 3. The rocking of the trigger 52 through its first-stage movement will occur under conditions wherein the advantages of leverage are in favor of the trigger to provide a relatively-long light or soft trigger-pull, as will now more fully appear.

The clockwise rocking movement of the trigger 52 as just above referred to, will swing its forward end downwardly to cause the bridge 56 thereof to correspondingly move the first-stage actuating-nose 80 of the transmitting-member 77 downwardly and hence similarly swing the said transmitting-member. The downward swinging movement of the transmitting-member 77 as just described will move the rear portion 79 thereof downwardly and will cause the actuating-lug 81 of the transmitting-member 77 to press against the actuating-surface 82 of the sear 58 to concurrently move the outer or forward end of the said sear downwardly against the tension of the sear-spring 65. This movement of the sear will withdraw the cocking-shoulder 59 thereof slightly more than halfway toward its complete disengagement from the cocking-abutment 60 of the hammer 40. The parts will now have reached the positions in which they are shown in Fig. 3.

It will be noted that during the first-stage movement the movements of the bridge 56 of the trigger 52 and the first-stage actuating-nose 80 of the transmitting-member 77 are greater than the movement of the actuating-lug 81 of the said transmitting-member since the said actuating-lug is located intermediate the said bridge and actuating-nose and the pivot-pin 78.

The relative positions of the bridge 56 and actuating-nose 80 with respect to the pivot-pin 78 of the transmitting-member 77 results in a leverage requiring a relatively-light or soft trigger-pull to swing the sear 58 downwardly through its first-stage movement, as above described. It will also be understood that due to the leverage just above described a relatively-long trigger-pull is required to effect a relatively-short swinging movement of the sear 58.

The parts will now occupy the positions in which they are shown in Fig. 3 with the bridge 56 and the second-stage actuating-abutments 83—83 of the trigger 52 respectively in engagement with the first-stage actuating-nose 80 and the second-stage abutment-portion 84 of the transmitting member 77.

When the trigger 52 has been moved through to the completion of its first-stage movement of relatively-light or soft pull as just above described, there will be an apparent "tightening-up," so to speak, of the trigger-pull. In this manner, the user of the firearm may accurately gauge the point at which the hammer 40 will be fully released by the sear 58.

After the parts have assumed the positions shown in Fig. 3, additional swinging movement of the trigger 52 will cause the second-stage actuating-abutments 83—83 of the said trigger to press downwardly upon the second-stage abutment-portion 84 of the transmitting-member 77 and thus further rock the said transmitting-member downwardly to cause the rear portion 79 thereof to enter into the clearance-slot 71 of the sear 58. This rocking movement of the transmitting-member 77 will cause the sear-actuating lug 81 thereof to further depress the sear 58 against the tension of the sear-spring 65 to move the cocking-shoulder 59 thereof downwardly to completely disengage the said cocking-shoulder from the cocking-abutment 60 of the hammer 40, thus releasing the said hammer to the action of its hammer-spring 46 and thus discharge the firearm.

The sear, trigger and transmitting-member will now have assumed the positions in which they are shown in Fig. 4. In this figure the hammer is shown as moved part way up into position to discharge the firearm.

It will be apparent that the engagement of the second-stage actuating-abutments 83—83 of the trigger 52 with the second-stage abutment-portion 84 of the transmitting-member 77 is closer to the pivot-pin 78 of the latter than the previous engagement of the bridge 56 of the trigger 52 with the first-stage actuating-nose 80 of the transmitting-member 77. This shifting of the point of contact between the trigger 52 and the transmitting-member 77 results in a relative increase of movement of the transmitting-member 77 relative to the said trigger and hence imposes additional load thereon. The relative increase of movement of the transmitting-member as just described, compels a lesser movement of the trigger 52 to now effect the movement of the sear 58 through its second stage and hence requires greater pressure to be exerted upon the finger-piece 51.

As will be apparent from the foregoing, the force required to be exerted upon the finger-piece 51 of the trigger 52 to depress the sear 58 during its first-stage movement, is less than is required to effect the second-stage movement. When the

trigger 52 has completed its first-stage movement, the point of contact between the said trigger and the transmitting-member 77 is moved forwardly closer to the pivot-pin of the said transmitting-member and, therefore, requires the exertion of greater pressure upon the finger-piece 51 of the said trigger in order to effect the full release of the hammer 40 by the sear 58. This increase in pressure will be readily apparent to the user of the firearm, thus giving indication that the trigger has been moved to a point where a slight further rearward draft on the said trigger will cause the complete release of the hammer.

After the completion of the first-stage trigger-pull, if the user should relax the pressure upon the trigger the angular relationship of the cocking-shoulder 59 and the cocking-abutment 60 is such that the sear 58 will reassume its initial position shown in Fig. 2, to thus insure a safe sear-engagement when the firearm is carried in a cocked and loaded condition.

The withdrawal of the cocking-shoulder 59 of the sear 58 as above described will enable the hammer 40 to be rapidly swung in a clockwise direction into the position indicated by broken lines in Fig. 4, under the urge of the hammer-spring 46. The hammer 40 near the completion of its clockwise turning movement under the urge of the hammer-spring 46 will sharply strike the rear exposed end of the firing-plunger 48 to snap the latter forwardly to discharge the cartridge contained in the cartridge-chamber of the firearm, in a manner well understood in the art.

When the trigger 52 is actuated as above described, to effect the downward movement of the sear 58 for the release of the hammer 40, the finger 66 of the said sear is entered into the notch 67 of the safety-slide 68 when the said safety-slide is in its firing position, as shown by full lines in Fig. 11. In this manner the safety-slide 68 is prevented from being axially shifted into its so-called "safe" position until such time as the sear 58 is again in its upper position.

When the sear is in its depressed or hammer-releasing position, and the hammer 40 swings in a clockwise direction to effect the discharge of the firearm, the lug 63 of the said hammer will override the arcuate abutment 62 of the said sear 58. With the lug 63 of the hammer 40 actuated over the arcuate abutment 62 of the sear 58 as shown in Figs. 4 and 5, the sear 58 will be prevented from swinging upwardly under the urge of the sear-spring 65 until such time as the hammer 40 is again substantially-fully retired.

It will be apparent from the foregoing that the sear 58 is held in its depressed position by the hammer 40 during the major portion of the latter's swinging movement in both clockwise and counterclockwise directions. The said sear is released for upward movement only when the said hammer is in its retired position as shown in Figs. 2, 3 and 6.

Following the discharge of the firearm, the rearward movement of the action-slide 27 will effect the unlocking and rearward travel of the tilting and reciprocating breech-bolt 26 to cause the ejection of the just-fired cartridge. Immediately at the start of the rearward movement or travel of the action-slide 27, the uncoupling-cams 90—90 of the said action-slide will respectively engage the respective opposite ends of the cam-pin 88, now located in their respective clearance-notches 89—89. The uncoupling-cams 90—90 will force the cam-pin 88 downwardly to thus swing the shifter 72 in a counterclockwise direction against the tension of the springs 86—86 from the positions in which it is shown in Figs. 2, 3 and 4 into the positions in which it is shown in Figs. 5 and 6.

The counterclockwise movement of the shifter 72 as above described, will swing the lower end of the depending-arm 74 of the shifter 72 forwardly to thus correspondingly shift the transmitting-member 77 to remove the first-stage actuating-nose 80 thereof from beneath the bridge 56 of the trigger 52. The described shifting movement of the transmitting-member 77 will also move the abutment-portion 84 thereof forwardly out from beneath the second-stage actuating-abutments 83—83 of the trigger 52, thus enabling the narrow rear portion 79 of the said transmitting-member to be moved upwardly between the said actuating-abutments. The forward shifting of the transmitting-member 77 as just described, will uncouple the trigger 52 and the sear 58 and will permit the sear-spring 65 to assert itself at the appropriate time to swing the sear 58 upwardly into position to enable its cocking-shoulder 59 to be re-engaged by the cocking-abument 60 of the hammer 40 when the said hammer is swung into its cocked position by the rearward movement of the action-slide 27.

The hammer 40 is swung into its cocked position when the action-slide 27 moves rearwardly, by a portion 95 of its cross-head 31 which engages the forward face of the hammer 40 to swing the said hammer in a counterclockwise direction against the tension of the hammer-spring 46.

During all but the initial rearward travel of the action-slide 27, the respective opposite ends of the cam-pin 88 are in engagement with the respective lower edges of the side-bars 32—32 of the action-slide 27. This engagement temporarily prevents the shifter 72 from again assuming the position in which it is shown in Figs. 2, 3 and 4, and thus serves to hold the transmitting-member 77 out from between the trigger 52 and the sear 58, as shown in Figs. 5 and 6, until such time as the clearance-notches 89—89 of the action-slide 27 are again respectively brought into registration with the opposite ends of the cam-pin 88 by the full return movement of the action-slide 27.

By preventing the transmitting-member 77 from entering the space between the trigger 52 and the sear 58 until such time as the action-slide 27 is fully returned to its forward position, the sear 58 is rendered immune during this time interval against being held down or again being forced downwardly by any movement of the trigger 52. It will be understood that with the transmitting-member 77 withdrawn from between the trigger 52 and the sear 58 as shown in Figs. 5 and 6, said sear 58 is free to move upwardly under the urge of the sear-spring 65 immediately following the complete actuation of the trigger 52.

With the parts in the positions shown in Fig. 6, the rear end of the transmitting-member 77 is prevented from overriding the bridge 56 when the action-slide 27 moves forwardly into position to release the shifter 72. This is accomplished by the engagement of the rear face of the said transmitting-member 77 with the forward face of the bridge 56 of the trigger 52, until such time as the said trigger is released, whereupon the bridge 56 will slide upwardly with respect to the said transmitting-member to a degree sufficient to permit the latter member to snap under the said bridge. The rear end of the transmit-

ting-member is prevented from rising with the said bridge by the limiting effect of the upper wall of the notch 75 in which the forward end of the said transmitting-member is mounted.

From the foregoing, it will be apparent that substantially immediately following the initiation of the rearward movement of the action-slide 27, the shifter 72 is so moved as to render the transmitting-member 77 inoperative until such time as not only has the said action-slide been returned to its full forward position but rearward draft upon the trigger 52 has been relaxed. In this manner, the sear 58 is freed for upward movement immediately upon the initiation of the rearward movement of the action-slide 27 following the discharge of the firearm so that the hammer 40 will be cocked regardless of what position the trigger may be in. Furthermore, the next succeeding discharge of the firearm is also prevented until such time as the operator of the firearm has relaxed rearward draft upon the trigger 52.

It will be apparent from the foregoing that the arrangement of parts is such as to prevent the action-slide in the event of damage to or the jamming of the trigger mechanism from disengaging the sear from the hammer upon the rearward movement of the said action-slide. It will be noted that as the action-slide moves rearwardly, it institutes a forward movement of the transmitting-member 77 which is substantially parallel with the surfaces between which it is interposed rather than a perpendicular movement in withdrawing the said transmitting-member from its position between the trigger 52 and the sear 58.

The safety-slide by means of the construction herein shown and described, is rendered inoperable save only at such time as the hammer is in its retired position, thereby guarding against the shifting of the said safety-slide when the hammer is in its firing position.

By a construction and arrangement of parts such as is herein shown and described, a compact, durable and reliable trigger-mechanism is provided. By devolving the function of providing a multiple stage trigger-pull upon a member such as the transmitting-member 77 which also discharges the function of operatively coupling and uncoupling the sear and trigger, a maximum degree of simplicity and reliability is effected.

The invention may be carried out in other specific ways than those herein set forth without departing from the spirit and essential characteristics of the invention, and the present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive, and all changes coming within the meaning and equivalency range of the appended claims are intended to be embraced therein.

I claim:

1. A firearm of the multiple-stage trigger-pull type, including in combination: a movable breech-bolt; a firing-member; a pivotal trigger-member; a pivotal sear-member; one of the said pivotal members being provided with a first-stage actuating-abutment and a second-stage actuating-abutment respectively located at different distances from the pivot-point of such pivotal member; means for transmitting the movement of the said pivotal trigger-member to the said pivotal sear-member at two speed-ratios and including a transmitting-member mounted in the firearm-structure and movable into and out of positions wherein the said transmitting-member alternately operatively-couples and -uncouples the said sear-member and the said trigger-member, the said transmitting-member being constructed and arranged to be sequentially engaged with the first-stage actuating-abutment and the second-stage actuating-abutment upon the aforesaid pivotal member so provided; and means movable in conjunction with the said breech-bolt for shifting the said transmitting-member.

2. A firearm of the multiple-stage trigger-pull type, including in combination: a movable breech-bolt; a firing-member; a pivotal sear-member releasably holding the said firing-member in its cocked position; a pivotal trigger-member for shifting the said sear-member into position to release the said firing-member; one of the said pivotal members being provided with a first-stage actuating-abutment and a second-stage actuating-abutment respectively located at different distances from the pivot-point of such pivotal member; means for transmitting the movement of the said trigger-member to the said sear-member at two speed-ratios and including a pivotal transmitting-member mounted in the firearm-structure also with capacity for bodily movement into and out of positions wherein the said transmitting-member alternately operatively-couples and -uncouples the said sear-member and the said trigger-member, the said transmitting-member being constructed and arranged to engage with both actuating-abutments of the pivotal member so provided; and means movable in conjunction with the said breech-bolt for bodily moving the said transmitting-member into one of its two positions referred to.

3. A firearm of the multiple-stage trigger-pull type, including in combination: a movable breech-bolt; a firing-member; a pivotal trigger-member; a pivotal sear-member; one of the said pivotal members being provided with a first-stage actuating-abutment and a second-stage actuating-abutment respectively located at different distances from the pivot-point of such pivotal member; means for transmitting the movement of the said pivotal trigger-member to the said pivotal sear-member at two speed-ratios and including a transmitting-member mounted in the firearm-structure and movable into and out of positions wherein the said transmitting-member alternately operatively-couples and -uncouples the said sear-member and the said trigger-member, the said transmitting-member being constructed and arranged to be sequentially engaged with the first-stage actuating-abutment and the second-stage actuating-abutment upon the aforesaid pivotal member so provided; a shifting-member operatively connected to the transmitting-member of the aforesaid means for shifting the same into and out of position to operatively couple the said trigger-member and the said sear-member; and means movable in conjunction with the said breech-bolt for actuating the said shifting-member to move the said transmitting-member out of position to operatively-couple the said trigger-member to the said sear-member.

4. A firearm of the multiple-stage trigger-pull type, including in combination: a movable breech-bolt; a firing-member; a pivotal sear-member releasably holding the said firing-member in its cocked position; a pivotal trigger-member for shifting the said sear-member into position to release the said firing-member; one of the said pivotal members being provided with a first-stage actuating-abutment and a second-

stage actuating-abutment respectively located at different distances from the pivot-point of such pivotal member; means for transmitting the movement of the said trigger-member to the said sear-member at two speed-ratios and including a pivotal transmitting-member mounted in the firearm-structure also with capacity for bodily movement into and out of positions wherein the said transmitting-member alternately operatively-couples and -uncouples the said sear-member and the said trigger-member, the said transmitting-member being constructed and arranged to engage with both actuating-abutments of the pivotal member so provided; a shifting-member operatively connected to the pivotal transmitting-member of the aforesaid means for bodily shifting the same into and out of position to operatively-couple the said sear-member and the said trigger-member; and means movable in conjunction with the said breech-bolt for actuating the said shifting-member to bodily move the said transmitting-member out of position to operatively-couple the said pivotal trigger-member and the said pivotal sear-member.

5. A firearm of the multiple-stage trigger-pull type including in combination: a movable breech-bolt; a firing-member; a sear releasably holding the said firing-member in its cocked position; a pivotal trigger for shifting the said sear into position to release the said firing-member and provided with a first-stage actuating-abutment and a second-stage actuating-abutment located a greater distance from the pivot-point of the trigger than is the said first-stage actuating-abutment; a transmitting-member constructed and arranged to be sequentially engaged first by the first-stage actuating-abutment and then by the second-stage actuating-abutment of the said pivotal-trigger, the said transmitting-member being constructed and arranged to be moved into and out of positions for alternately operatively-coupling and -uncoupling the said sear and trigger; and means movable in conjunction with the said breech-bolt for shifting the said transmitting-member into one of its two aforesaid positions.

6. A firearm of the multiple-stage trigger-pull type, including in combination: a movable breech-bolt; a firing-member; a sear releasably holding the said firing-member in its cocked position; a pivotal trigger for shifting the said sear into position to release the said firing-member and provided with a first-stage actuating-abutment and a second-stage actuating-abutment located a greater distance from the pivot-point of the trigger than is the said first-stage actuating-abutment; a transmitting-member constructed and arranged to be sequentially engaged first by the first-stage actuating-abutment and then by the second-stage actuating-abutment of the said pivotal-trigger, the said transmitting-member being constructed and arranged to be moved into and out of position for alternately operatively-coupling and -uncoupling the said sear and trigger; a shifting-member operatively connected to the said transmitting-member for shifting the same into and out of positions to operatively-couple the said sear and the said pivotal-trigger; and means movable in conjunction with the said breech-bolt for moving the said shifting-member to cause the same to move the said transmitting-member out of position to operatively couple the said pivotal-trigger and the said sear.

7. A firearm of the multiple-stage trigger-pull type, including in combination: a movable breech-bolt; a firing-member; a pivotal sear-member releasably holding the said firing-member in its cocked position; a pivotal trigger-member for shifting the said sear-member into position to release the said firing-member and provided with a first-stage actuating-abutment and also a second-stage actuating-abutment located more remote with respect to the pivot-point of the said pivotal-trigger than is the said first-stage actuating-abutment thereof; means for transmitting the movement of the said trigger-member to the said sear-member at two speed-ratios and including a transmitting-member mounted in the firearm-structure with capacity for both pivotal movement and bodily movement, the said transmitting-member being bodily movable into and out of positions wherein the same alternately operatively-couples and -uncouples the said sear-member and the said trigger-member, the said transmitting-member being constructed and arranged to be successively engaged by the first-stage and the second-stage actuating-abutments of the said trigger-member; and means movable in conjunction with the said breech-bolt for bodily shifting the said transmitting-member.

8. A firearm of the multiple-stage trigger-pull type, including in combination: a movable breech-bolt; a firing-member; a pivotal sear-member releasably holding the said firing-member in its cocked position; a pivotal trigger-member for shifting the said sear-member into position to release the said firing-member and provided with a first-stage actuating-abutment and also a second-stage actuating-abutment located more remote with respect to the pivot-point of the said pivotal-trigger than is the said first-stage actuating-abutment thereof; means for transmitting the movement of the said trigger-member to the said sear-member at two speed-ratios and including a transmitting-member mounted in the firearm-structure with capacity for both pivotal movement and bodily movement, the said transmitting-member being bodily movable into and out of positions wherein the same alternately operatively-couples and -uncouples the said sear-member and the said trigger-member, the said transmitting-member being constructed and arranged to be successively engaged by the first-stage and the second-stage actuating-abutments of the said trigger-member; a pivotal shifting-member operatively connected to the said transmitting-member; and means movable in conjunction with the said breech-bolt for turning the said pivotal shifting-member to bodily shift the said transmitting-member out of position wherein the said transmitting-member operatively-couples the said trigger-member and the said sear-member.

9. A firearm of the multiple-stage trigger-pull type, including in combination: a movable breech-bolt; a firing-member; a sear releasably holding the said firing-member in its cocked position and formed with an actuating-abutment and with a clearance-opening adjacent thereto; a trigger for shifting the said sear into position to release the said firing-member; means for transmitting the movement of the said trigger to the said sear at two speed-ratios and including a pivotal transmitting-member engageable with the actuating-abutment of the said sear and constructed and arranged to be tilted into the clearance-opening thereof, the said transmitting-member being constructed and arranged

for movements into and out of position to operatively-couple and -uncouple the said sear and trigger; and means movable in conjunction with the said breech-bolt for shifting the said transmitting-member.

10. A firearm of the multiple-stage trigger-pull type, including in combination: a movable breech-bolt; a firing-member; a sear releasably holding the said firing-member in its cocked position and formed with an actuating-abutment and with a clearance-opening adjacent thereto; a trigger for shifting the said sear into position to release the said firing-member; means for transmitting the movement of the said trigger to the said sear at two speed-ratios and including a pivotal transmitting-member engageable with the actuating-abutment of the said sear and constructed and arranged to be tilted into the clearance-opening thereof, the said transmitting-member being constructed and arranged for movements into and out of position to operatively-couple and -uncouple the said sear and trigger; a pivotal shifting-member operatively connected to the said transmitting-member for moving the same; and means movable in conjunction with the said breech-bolt for turning the said pivotal shifting member to cause the same to retire the said transmitting-member out of position wherein the same operatively-couples the said sear and the said trigger.

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