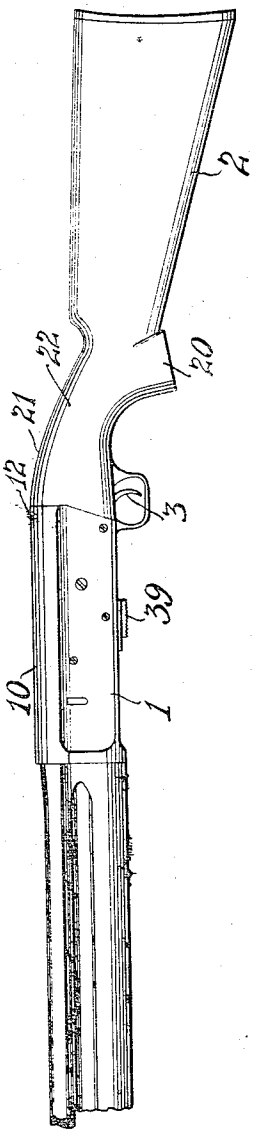
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AUTOMATIC FIREARM

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FIG. 1.



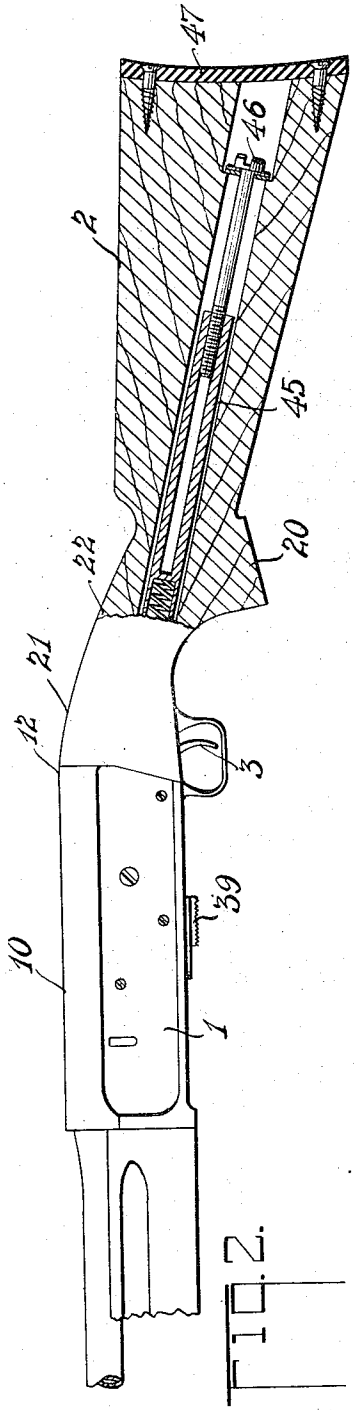
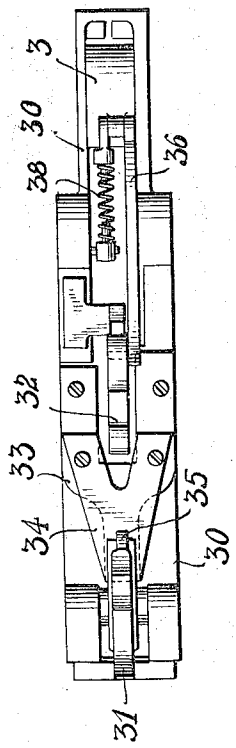




FIG. 2.

FIG. 5.




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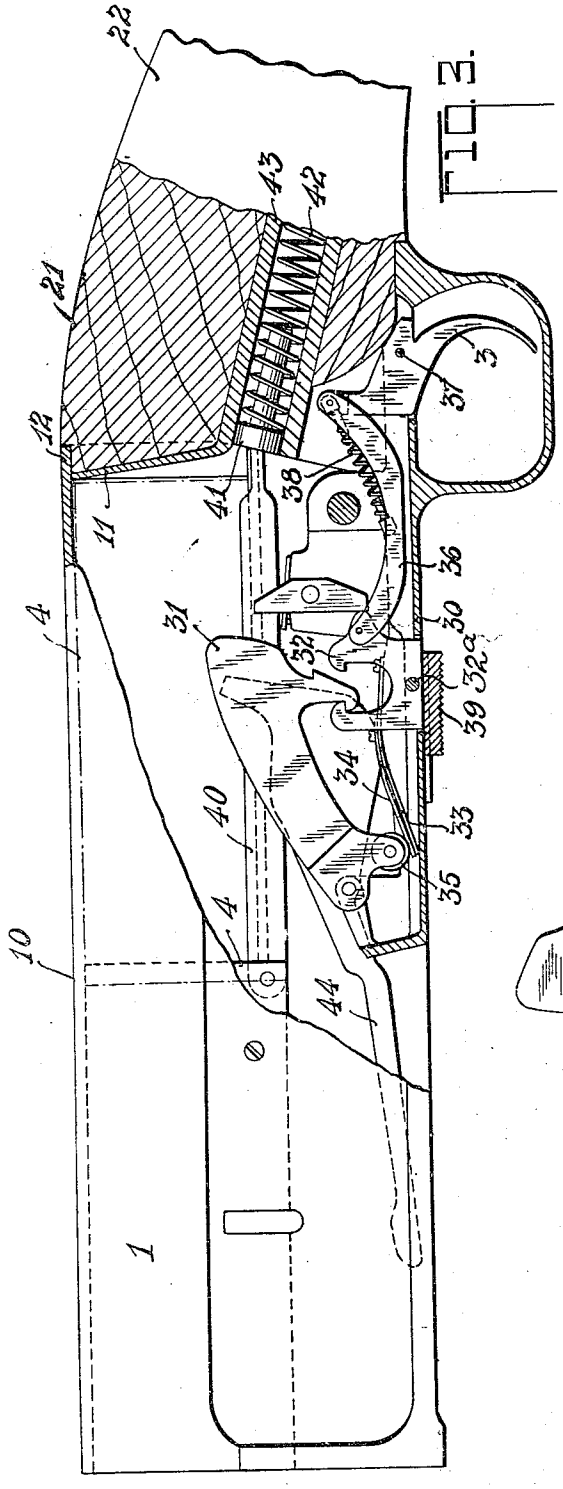



FIG. 3.

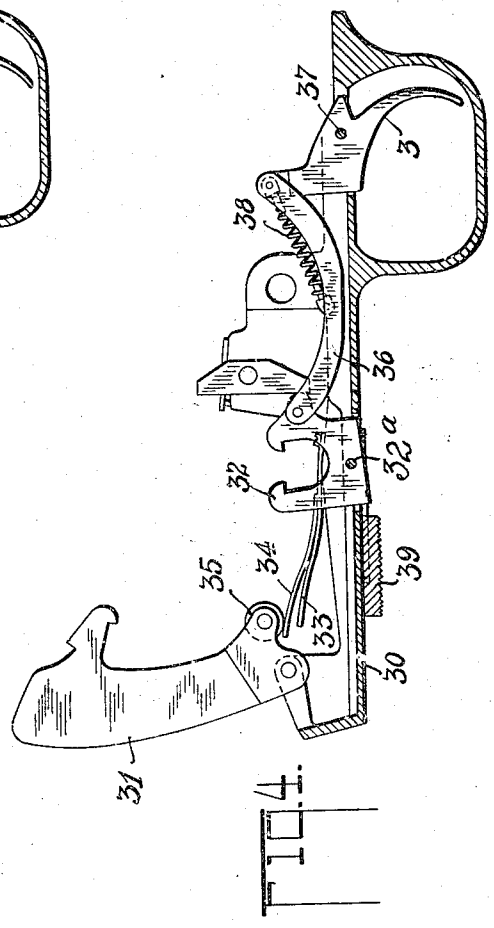



FIG. 4.

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# UNITED STATES PATENT OFFICE

2,189,202

## AUTOMATIC FIREARM

Edward E. Garland, Belleville, N. J.

Application October 5, 1938, Serial No. 233,398

11 Claims. (Cl. 42—75)

My invention relates to firearms of the automatic type, and in particular to automatic shotguns of the recoil operated type, such as that shown in Patent No. 659,507 of John M. Browning, issued October 9, 1900.

Because of the type of mechanism employed to effect automatic ejection of the empty shell, reloading, and cocking, including a cylindrical barrel extension and breech-bolt assembly, a receiver was required of substantially constant transverse contour which extended considerably rearward of the trigger. In order to enable the small of the stock to be placed sufficiently close to the receiver to be gripped when the trigger finger was engaged with the trigger disposed in this position, it was necessary to provide an abrupt drop at the rear of the receiver to the dimensions required for the small of the stock. Such offset besides presenting a clumsy appearance was detrimental to the delicate balance and "feel" of the gun which an expert requires to attain a uniformly high quality of marksmanship.

It is, therefore, a principal object of my invention to improve the lines and shape of automatic firearms of this general type both to improve the balance and handling qualities thereof and the appearance in general.

It is a further object to provide such improved lines in an automatic firearm while retaining as far as possible the conventional automatic firing mechanism, so that guns of prior construction can be readily converted into my improved firearm without requiring extensive and expensive replacement and alteration of parts of the automatic mechanism itself.

Another object is to provide a novel gun stock and one which is attached to and cooperates with the receiver in a superior manner.

It is desired also to enable the balance and size of the gun for various individual tastes to be established merely by providing a stock of the appropriate shape on a standard barrel, magazine and receiver, such assembly being practically the equivalent in each case of a completely custom-built gun.

Any such stock it is also desired to secure to the gun receiver in a more rigid manner and in one by which the recoil stress is least likely to injure the gun stock or its fastenings.

Still a further object is to dispose the trigger in a convenient place for operation by a hand grasping the small portion of the stock, and to enable the trigger to be placed in any position lengthwise of the gun within a considerable range. Preferably the trigger is placed well to the rear of the shell ejecting opening to give greater than usual protection from powder burns.

An object is also to provide trigger mechanism which will not only allow a choice as to the positioning of the trigger but which in addition will allow the trigger to release the hammer after a longer or shorter pull and by the exercise of a heavier or a lighter pressure thereon, all without defacing or mutilating any coordinating element of the automatic mechanism proper so that practically all the parts thereof may be of a standard design.

All these objects so important to the expert marksman I obtain by relatively simple structure, which will allow a maximum flexibility of individuality to such guns with fewest possible replacement of parts. It is preferable in consideration of each individual gun to replace parts rather than to make them adjustable, for once the proper relationship of the various elements has been established for a particular person he will not wish to alter such combination, for the gun should always feel the same to him.

Other more specific objects of my gun construction will be understood from the following detailed description. The drawings illustrate the novel combination of parts and the construction thereof which I now prefer, but modifications within the ability of one skilled in the art may be made without departing from the essence of my invention as defined in the appended claims. The drawings show enough of the conventional automatic recoil-operated mechanism to indicate its general nature without showing sufficient details thereof to confuse the improved features constituting my invention.

Fig. 1 is a side elevation view of the rear portion of my improved firearm.

Fig. 2 is a side elevation view of the rear portion of my firearm showing part of the stock in longitudinal section.

Fig. 3 is a side elevation view of the receiver with part of the side broken away to show the internal mechanism with the firing parts in the cocked position.

Fig. 4 is a side elevation view of the trigger plate and the mechanism carried thereby removed from the receiver, the firing parts being in "fired" position and

Fig. 5 is a plan view of the same trigger plate and mechanism shown in Fig. 4.

The automatic mechanism of my firearm, including that operative to eject the empty shell, to remove a cartridge from the magazine and

place it in the chamber, and to cock the hammer is not part of my invention. Such mechanism may be and preferably is constructed similar to the disclosure of said Patent No. 659,507 issued to John M. Browning. The details of such mechanism may be of any type suitable for coordination and cooperation with my improved hammer controlling mechanism and receiver and stock design.

In the following description mention of the front or forward portion of any mechanism will be understood to mean that toward the barrel while the rear or back end of any mechanism will be considered that toward the stock butt. The receiver **1** both inside and out rearward to its main end wall is of conventional contour and construction, its top **10** being of constant transverse section and height throughout this length, like that of the aforesaid Browning patent. The overall length of the receiver is preferably greater, however, and instead of being provided with an offset tang or extension integral with the receiver top **10** and projecting rearwardly, the top extends beyond the main rear wall **11** of the receiver substantially in continuation of the portion of the upper surface forward of such wall. As earlier described, automatic shotguns have previouly incorporated an abrupt offset or drop from the contour of the receiver to the small of the stock, resulting in a rather unwieldly and awkward shape. My receiver, however, continues in unbroken contour beyond the wall **11** to form the arched lip **12**. The forward end of the stock **2** has a recessed seat complemental to the socket formed by the rear wall **11** and lip **12** of the receiver and is engaged therein. The exterior of the front part of the stock, therefore, lies flush with the outer surface of the receiver and has substantially the same periphery. Since the front end of the stock abuts the rear end of the unconstricted receiver about its entire circumference no projecting shoulder or edge is presented in the assembled gun.

The receiver has a substantially constant and rounded contour throughout its length. The stock **2** from its front end, abutting the receiver, curves smoothly downward and tapers rearwardly at **21** to the small of the stock **22** whence it curves downward and increases somewhat in size to form the pistol grip **20**. Rearwardly of the pistol grip the stock is of the conventional shape. Since the receiver is of uniform transverse section throughout and has no exteriorly exposed receiver tang conforming to the contour of the stock the latter may be made of any size and shape which the individual owner may prefer without alteration of any metal part of the receiver. Thus the curvature **21** of the front end of the stock may be of small radius, or it may be gradual; and the small of the stock **22** may be smaller or larger, and may be placed farther forward or farther to the rear according to the size and shape of the owner's hand and the manner in which he grips the stock and engages the trigger. The pistol grip **20** may likewise be made larger or smaller, longer or shorter, and the width, thickness and length of the stock may be proportioned according to the owner's desire. Using a single gun mechanism standard, therefore, the "feel," balance, and size of the gun may be varied over, an exceptionally wide range merely by varying the size, shape and proportions of the stock, which will give nearly all the advantages of a complete custom-built gun.

One of the most important features of my novel gun mechanism is the disposition of the trigger sufficiently far to the rear to enable a stock and receiver construction of the type described to be employed without requiring the use of completely redesigned automatic shell ejecting, loading and firing mechanism. Moreover the position of the trigger lengthwise of the gun may be varied, and its position may be selected first to serve as a determining factor in the shape and proportioning of the stock, or the stock design may be established first and the position of the trigger thereafter selected to give the best operation. To enable such freedom of choice the position in which trigger **3** is pivoted upon the trigger plate **30** is not at all dependent upon the position of any other element of the automatic operating mechanism.

The described choice of disposition of the trigger lengthwise of the receiver **1** is possible because its mounting in my mechanism is divorced from the sear **32** which may be engaged with hammer **31** to retain it in cocked position. Heretofore the position of the trigger was fixed since it was considered necessary to form it as an integral part of the hammer holding sear, so that the sear pivot **32***a* served also as the trigger pivot. The hammer **31** and the upper end of the sear which cooperates therewith are of conventional construction, the hammer being provided with the usual finger having therein a cocking notch and a safety notch which may be engaged by the cocking hook and the safety hook, respectively, of sear **32**. Fig. 3 shows the cocking notch of the hammer finger engaged by the cocking hook of the sear, while Figs. 4 and 5 show it tilted into hammer released position and the hammer thrown forward into the position in which, were the trigger plate **30** secured in its operative position in the receiver, it would strike the rear end of the firing pin to fire the gun.

When sear **32** has been moved into the hammer releasing position of Figs. 4 and 5 the composite spring **33**, **34**, engaging roller **35** mounted on hammer **31** eccentrically of its pivot, forces the hammer to swing upwardly and forwardly into firing position. The spring assembly includes a lower spring leaf **33** having a bifurcated rear end straddling sear **32** and anchored to the trigger plate alongside such sear. Its free end extends forwardly beneath roller **35** but cannot contact it because of the intervention therebetween of spring leaf **34**. This latter leaf overlies spring **33**, having its rear end secured to the latter leaf intermediate its ends, and its free forward end directly engaging roller **35**. Acting as an auxiliary spring, its tension moves the hammer on up to the position shown in Fig. 4 after the tension of spring leaf **33** has largely been relieved. By the combined action of the spring leaves the requisite movement of hammer **31** may be effected although this spring mechanism is of unusually small length. Both leaves are of heavy material which affords a strong spring action and makes them very rugged.

Movement of sear **32** is accomplished by trigger **3** although the two are pivoted within the receiver **1** entirely independently of each other. Such movement is effected through the medium of a reciprocable compression bar or link **36** having pushing engagement between its forward end and sear **32** and between its rearward end and the upwardly projecting lever arm of trigger **3**. One simple and effective type of connection for this purpose may be provided by pivoting the link both to the sear and to the trigger arm,

which causes these parts to move in unison. As the trigger is pulled back its lever arm, and hence sear 32, are rocked forward, the latter into hammer releasing position. Obviously link 36 may be made of any desired length so that, despite the position of sear 32 being fixed as dictated by the construction and arrangement of hammer 31 and other parts of the automatic operating mechanism, trigger pivot 37 may be placed in any position along the gun within a wide range according to the position in which it is desired to place trigger 3.

Besides enabling the position and shape of trigger 3 to be selected at pleasure, with this mechanism the length of trigger movement to release hammer 31 and the stiffness of the trigger pull may be accurately established according to the desire of the individual, which is not easily accomplished when it is formed integral with sear 32. In the latter case the only way of altering the trigger pull is by changing the angularity of the sear cocking hook and the hammer cocking notch. Not only will such alteration give only a slight range of choice but its accuracy is not sharply defined. Especially if these angles are changed by hand filing it is difficult to shape them exactly to hold the hammer securely. With my construction sear 32 and hammer 31 may in every case be made of a standard shape to release the hammer after an unvarying forward rocking movement of the sear. To accomplish this rocking, however, the trigger lever arm may be made of any desired length within fairly wide limits. The greater the vertical distance from pivot 37 to the pivot connection with link 36 the smaller will be the movement of trigger 3 required to move the sear into hammer releasing position. Conversely the smaller the vertical distance between these pivots the greater will be the arc through which the trigger must be swung to release the hammer from sear 32.

The trigger 3 and link 36 are returned from firing position to and then retained in cocked or rearward position by engagement therewith of any suitable spring such as the compression spring 38, which serves additionally to bias sear 32 toward and to retain it in hammer restraining or cocked position. If it is desired to have a light trigger pull spring 38 will be lighter or its point of engagement with the trigger lever will be nearer pivot 37, and conversely a stronger spring or one engaging the lever farther from pivot 37 will necessitate a heavier trigger pull to fire the gun. It will not ordinarily be necessary for a single user to adjust the trigger tension or length of pull after these factors are once established to his taste. Hence it is not preferred to make any of these parts adjustable, but to make the position of pivot 37, the length of link 36, the tension of spring 38, the shape of trigger 3, and the length of the trigger lever alterable by quick and easy replacement. None of these parts cooperates directly with the automatic mechanism proper and all are of simple construction and are readily accessible. Hence each may be proportioned to cooperate with the other elements to give the desired operating balance.

Such construction is also adapted for the provision of a simple and conveniently operated safety latch. The lower surface of sear 32 lies flush with the lower surface of trigger plate 30 when in the cocked position as shown in Fig. 3. When this sear is tilted into hammer releasing position, as shown in Fig. 4, the lower front corner of sear 32 projects downward below trigger plate 30. When sliding block 39 mounted on the under surface of the trigger plate just ahead of sear 32 is slid rearwardly to the position shown in Fig. 3 it covers the aperture through which the sear projects in tilting forward, and hence interdicts hammer releasing movement thereof. When slid forward to the "off" position of Fig. 4 the gun may be fired. It is also to be noted that the safety latch cannot be moved into locking position when sear 32 is tilted forward either into hammer releasing position or into the position wherein its safety hook is engaged with the safety notch of the hammer finger, so that the parts will always be locked in cocked position.

The automatic recoil operated mechanism for ejecting the empty shell, reloading the gun and cocking the hammer is conventional as previously stated and is not part of my invention. It includes the barrel extension and breech-bolt assembly 4 which, with link 40 and spring pin 41, are reciprocated by the gun's recoil from the solid line position into the broken line position shown. Usually this barrel extension and breech-bolt assembly is of substantially constant section throughout its length and hence requires a receiver 1 having an upper portion 10 of constant contour over the length of travel fore and aft of such assembly. During the rearward movement of the assembly 4 spring 42, received in tube 43 extending generally axially through stock 2, is compressed by spring pin 41. This spring serves to return the breech-bolt to its forward position, during which movement cartridge carrier 44 is raised to lift a fresh cartridge from the magazine into alignment with the chamber, to be forced thereinto by the breech-bolt.

To the rear end of tube 43, which is integral with flange or plate 11 and the receiver 1, is secured an integrally threaded tube 45 as shown in Fig. 2. Into this latter tube is screwed a bolt 46 having its head countersunk in the butt of stock 2. The socket for the head is covered by butt plate 47. This construction provides a very rigid fastening between the receiver 1 and stock 2 which is subjected almost exclusively to direct axial stresses by the recoil of the gun. Moreover no exposed surface plates integral with and extending rearwardly from receiver 1 are required where this construction is employed. Hence the wood stock may throughout be fashioned according to the individual taste of the owner. To enable such custom stock design to be even more flexible the trigger position may be shifted lengthwise as previously explained. The trigger position will, however, always be such that its pivot 37 will be to the rear of the barrel extension and breech-bolt assembly 4 in every position thereof, as shown in Fig. 3. This is true even when the assembly 4 is in its farthest rearward position indicated by broken lines. The trigger will therefore always be within convenient reach of a hand grasping the small of the stock 22 which is rearwardly of the portion 21 of the stock curved downward without any abrupt break from the longitudinally straight upper surface 10 of receiver 1.

The operation of the gun is substantially the same as that of the Browning patent mentioned, the functioning of my auxiliary mechanism being apparent from the foregoing description. When a cartridge is fired the recoil forces the barrel extension and breech-bolt assembly 4 to the rear into the broken line position shown in Fig. 3, spring 42 being compressed and hammer 31 cocked by such movement. The barrel extension

then returns forward, during which movement the empty shell is ejected. As thereafter spring **42** forces the breech-bolt forward the front end of carrier **4** is elevated to bring a fresh shell into registry with the chamber and breech-bolt. Further forward movement of the latter slides the shell into the chamber and forces carrier **44** back down so that the parts assume the position shown in Fig. 3, spring **38**, through link **36**, holding sear **32** in cocked, hammer retaining position. As the trigger is pulled rearward into the position of Fig. 4 sear **32** releases the hammer to fire the shell, the concussion of which produces the recoil requisite to initiate again the described operating cycle.

As my invention I claim:

1. In automatic firearm mechanism, a receiver, a hammer pivotally mounted therein, a hammer holding sear pivoted in said receiver and engageable with said hammer to hold it in cocked position, a trigger pivotally mounted independently of said sear, means interengaged between said trigger and sear and operable to move the sear out of holding engagement with said hammer, a leaf spring having a bifurcated fixed end straddling said hammer holding sear and having its free end extending forward toward said hammer, and a second leaf spring overlying said first leaf spring, having one end anchored upon such first leaf spring intermediate the ends thereof, and having its other end free and disposed above the free end of said first leaf spring and engaging said hammer to swing the latter upwardly and forwardly when said hammer holding sear is moved out of engagement therewith.

2. In firearm mechanism, a trigger plate, a hammer pivoted upon said trigger plate, a hammer holding sear received in an aperture in said plate and pivoted therein to swing from cocked position, wherein it engages said hammer to hold it in cocked position and its lower surface is flush with the lower surface of said trigger plate, into firing positon, wherein the hammer is released and the sear's lower surface is tilted to project be'ow the lower surface of said plate, and a safety catch slidable along the lower surface of said plate over its aperture to interdict tilting of said hammer holding sear into firing position.

3. In automatic firearm mechanism, a receiver having a cavity therein, a stock having its front end fitted to the rearward end of said receiver with its upper surface curving from substantially the top of said receiver smoothly and gradually downwardly to the small of the stock, a hammer mounted within said receiver and movable between cocked position and firing position, a sear located within said receiver forwardly of said stock's front end for holding said hammer in cocked position, a trigger located rearwardly of the stock's front end, means interengaged between said trigger and sear for transmitting movement of the rearwardly located trigger to the forwardly located sear to release said hammer from restraint by said sear, and a single spring operating both to bias said sear toward hammer restraining position and to return said trigger and said means interengaged between it and said sear from firing position to cocked position.

4. In automatic firearm mechanism, a receiver formed with a passage therein, a barrel extension and breech block mounted for rectilinear reciprocation in said passage, a stock having its front end fitted to the rearward end of said receiver in line with said passage, a hammer mounted within said receiver adapted to be moved into cocked position by rearward movement of said reciprocating parts, a sear located within said receiver, operable in one extreme position to hold said hammer in its cocked, retracted position and in the opposite extreme position to hold said hammer in a farther retracted position, and operable to release said hammer from its cocked position by movement from its first extreme position toward such opposite extreme position, a trigger mounted upon a pivot located rearwardly of the stock's front end, means interengaged between said trigger and sear for transmitting movement of the rearwardly located trigger to the forwardly located sear to move it into hammer releasing position, and a single spring for biasing said trigger, sear to urge the sear, and means interengaged therebetween toward such opposite extreme position.

5. In automatic firearm mechanism, a receiver, a hammer therein, a pivot pin in said receiver extending through the base of said hammer and guiding it for swinging between cocked and firing positions, a hammer holding sear mounted in said receiver and engageable with said hammer to hold it in cocked position, a leaf hammer spring engaging the base of said hammer eccentrically of said pivot pin and urging the hammer toward firing position, and a spring underlying said hammer spring and pressing thereagainst in a direction to supplement the force of said hammer spring for moving said hammer from cocked position into firing position upon release of said sear from its holding engagement with the hammer.

6. In automatic firearm mechanism, a receiver having a cavity therein, a stock having its front end abutting and completely overlying the upper portion of the receiver's rearward end with its upper surface curving from substantially the top of said receiver smoothly and gradually downward to the small of the stock, a hammer mounted in the receiver cavity and movable between cocked position and firing position, a sear mounted in the receiver cavity forward of said stock's front end and engageable with said hammer to retain it in cocked position, a trigger pivoted rearwardly of said stock's front end and having an integral lever arm extending upwardly therefrom, and a bar pivoted by its rearward end to said trigger lever and extending forward therefrom to engage said sear, and reciprocated lengthwise through a predetermined distance to move said sear into hammer releasing position by pivotal movement of said trigger commensurate with the effective length of its integral lever arm.

7. In automatic firearm mechanism, a receiver having a cavity therein, a stock having its front end abutting and completely overlying the upper portion of the receiver's rearward end with its upper surface curving from substantially the top of said receiver smoothly and gradually downward to the small of the stock, a hammer mounted in the receiver cavity and movable between cocked position and firing position, a sear pivoted in the receiver cavity forward of said stock's front end and engageable with said hammer to retain it in cocked position, a trigger pivot independent of the sear pivot and disposed rearwardly of said stock's front end, a trigger pivoted on said trigger pivot and having an integral lever arm extending upwardly therefrom, and a bar pivoted by its rearward end to said trigger lever and by its forward end to said sear; and reciprocated lengthwise through a predetermined distance, in unison with said sear executing a corresponding predetermined pivotal movement between hammer re-

taining and hammer releasing positions, by pivotal movement of said trigger commensurate with the effective length of its integral lever arm.

8. In automatic firearm mechanism, a receiver having a cavity therein, a stock having its front end fitted to the rearward end of said receiver with its upper surface curving from substantially the top of said receiver smoothly and gradually downwardly to the small of the stock, a hammer mounted within said receiver and movable between cocked position and firing position, a sear located within said receiver, forward of said stock's front end, operable in one extreme position to hold said hammer in its cocked position and in the opposite extreme position to hold said hammer in a farther retracted position, and operable to release said hammer from its cocked position by movement from its first extreme position, a trigger located rearwardly of the stock's front end, and means interengaged between said trigger and sear for transmitting movement of the rearwardly located trigger to the forwardly located sear to release said hammer from restraint in its cocked position by said sear.

9. In automatic firearm mechanism, a receiver having a cavity therein, a stock having its front end fitted to the rearward end of said receiver with its upper surface curving from substantially the top of said receiver smoothly and gradually downwardly to the small of the stock, a hammer mounted within said receiver and movable between cocked position and firing position, a sear within said receiver pivoted forward of said stock's front end, operable in rearward tilted position to hold said hammer in its cocked position and in forward tilted position to hold said hammer in a farther retracted position, and operable to release said hammer from its cocked position by forward tilting from such rearward tilted position, a trigger pivoted rearwardly of the stock's front end, and means interengaged between said trigger and sear for tilting said forwardly located sear forward by rearward swinging of said rearwardly located trigger to release said hammer from restraint in its cocked position by said sear.

10. In automatic firearm mechanism, a receiver having a cavity therein, a stock having its front end fitted to the rearward end of said receiver with its upper surface curving from substantially the top of said receiver smoothly and gradually downwardly to the small of the stock, a hammer mounted within said receiver and movable between cocked position and firing position, a sear within said receiver pivoted forward of said stock's front end, operable in rearward tilted position to hold said hammer in its cocked position and in forward tilted position to hold said hammer in a farther retracted position, and operable to release said hammer from its cocked position by forward tilting from such rearward tilted position, a trigger pivoted rearwardly of said stock's front end and having an integral lever arm extending upwardly therefrom, and a bar pivoted by its rearward end to said trigger lever and extending forward therefrom to engage said sear, and reciprocated lengthwise through a predetermined distance to move said sear into hammer releasing position by pivotal movement of said trigger commensurate with the effective length of its integral lever arm.

11. In automatic firearm mechanism, a receiver having a cavity therein, a stock having its front end fitted to the rearward end of said receiver with its upper surface curving from substantially the top of said receiver smoothly and gradually downwardly to the small of the stock, a hammer mounted within said receiver and movable between cocked position and firing position, a U-shaped sear within said receiver pivoted by its base forward of said stock's front end, and including a front cocking hook and a rear safety hook, engageable alternatively with said hammer to hold it in cocked position and in a farther retracted position, respectively, a trigger pivoted rearwardly of said stock's front end and having an integral lever arm extending upwardly therefrom, and a bar pivoted by its forward end to said sear and by its rearward end to said trigger lever, and reciprocated lengthwise through a predetermined distance to move said sear by pivotal movement of said trigger commensurate with the effective length of its integral lever arm, thereby to release said hammer from engagement by said safety hook and to engage it by said cocking hook, and thereafter to release it from engagement by said cocking hook.

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