Dec. 20, 1938. W. L. SWARTZ 2,140,946

FIREARM

Filed April 13, 1937 2 Sheets-Sheet 1

Fig. 1

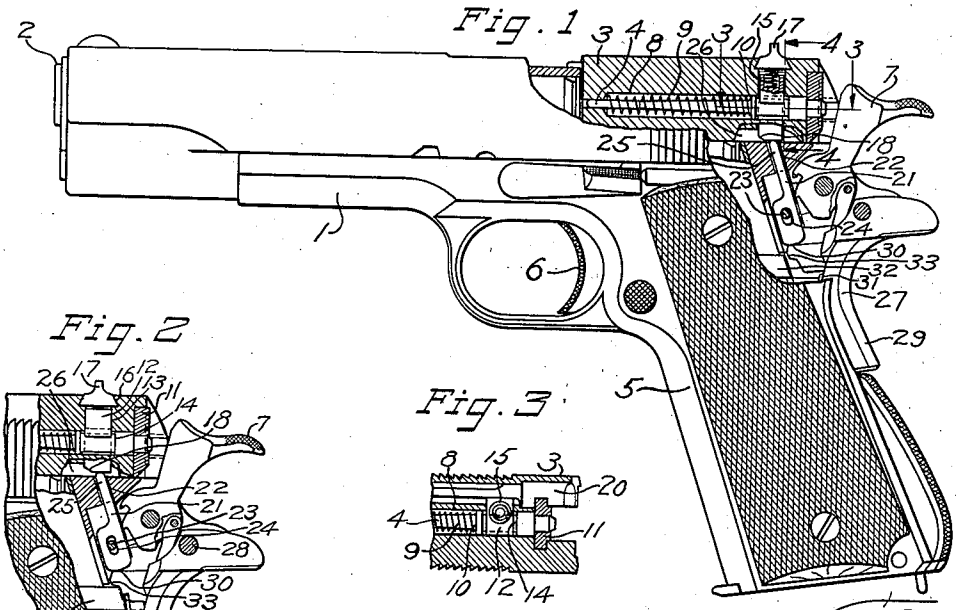


Fig. 2

Fig. 3

Fig. 4

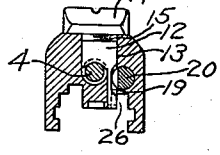


Fig. 7

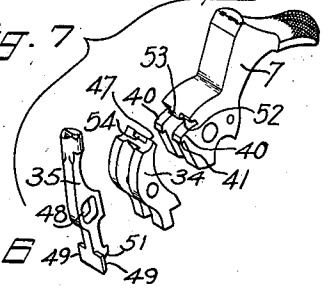


Fig. 5

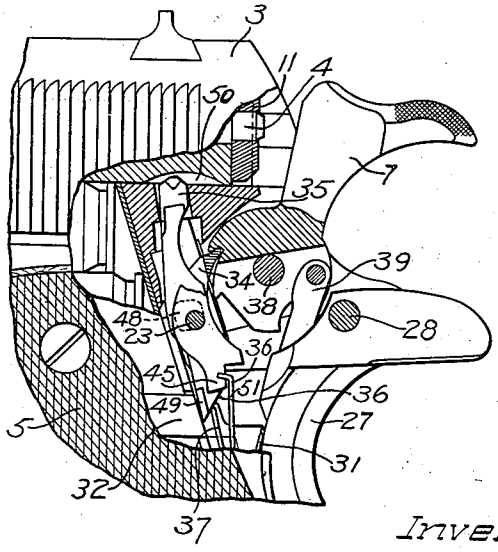
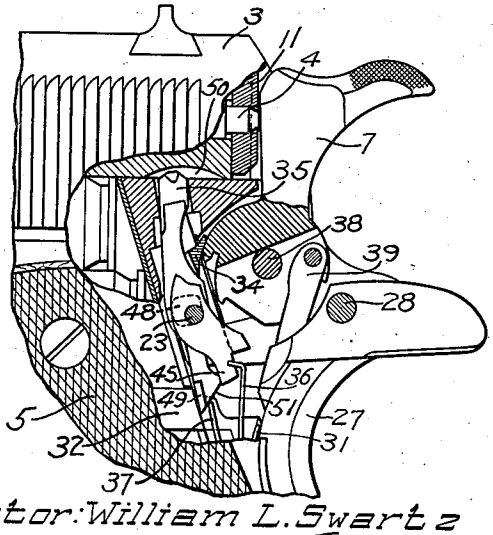


Fig. 6



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Fig. 8

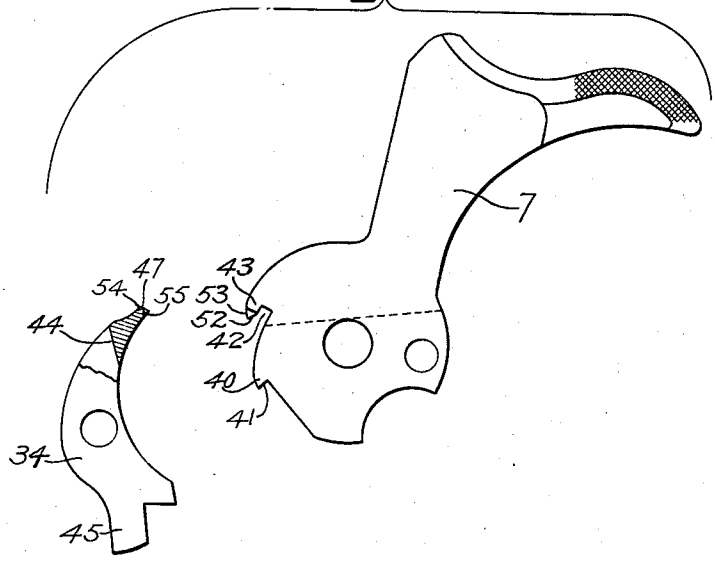
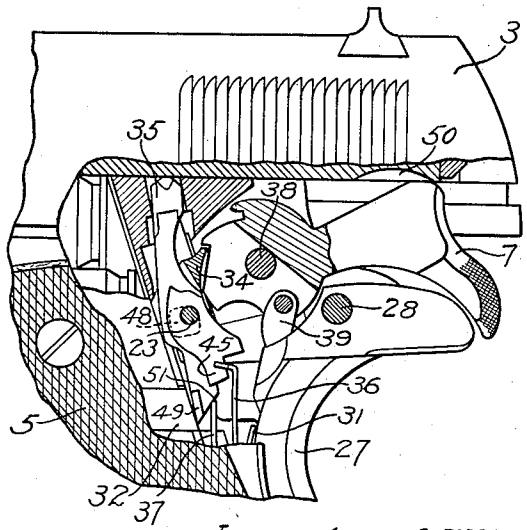


Fig. 9



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Patented Dec. 20, 1938 2,140,946

UNITED STATES PATENT OFFICE

2,140,946

FIREARM

William L. Swartz, Wethersfield, Conn., assignor to Colt's Patent Fire Arms Manufacturing Company, Hartford, Conn., a corporation of Connecticut

Application April 13, 1937, Serial No. 136,630

9 Claims. (Cl. 42—69)

The primary object of the invention is to provide firing and sear members for a firearm, one of said members having an end face of substantial area, which are so constructed as to prevent the improper engagement of the members.

From this specification further objects and advantages of the invention will be apparent to those skilled in the art.

In the accompanying drawings I have shown the embodiment which I now deem preferable, but it will be understood that the drawings are intended for illustrative purposes only and are not to be relied upon as limiting or defining the scope of the invention, the claims forming a part of this specification being relied upon for that purpose.

In the drawings:

Fig. 1 is a side elevation view of a firearm embodying the invention, certain parts being broken away to more fully disclose the invention and other parts being further broken away to show other details.

Fig. 2 is a side elevation view of the breech portion of the firearm of Fig. 1 showing the parts in another position.

Fig. 3 is a horizontal sectional view taken on the line 3—3 of Fig. 1.

Fig. 4 is a vertical sectional view taken on the line 4—4 of Fig. 1.

Fig. 5 is an enlarged side elevation view of the breech portion of the firearm of Fig. 1, certain parts being broken away to show another phase of the invention.

Fig. 6 is a view similar to that of Fig. 5 showing the parts in another position.

Fig. 7 is an exploded view of certain parts of the invention as shown in Figs. 5 and 6.

Fig. 8 is an enlarged exploded view of the sear and hammer shown in Fig. 7, a portion of the sear being broken away.

Fig. 9 is a view similar to that of Fig. 5 showing the parts in still another position.

In firearms it is common practice to provide a firing pin which may be forcibly moved into contact with the primer of a cartridge to fire the same. I consider it desirable to provide means for locking such a firing pin against movement to firing position except when the arm is being properly gripped by the user preparatory to firing in order to avoid the possibility of the firearm being unintentionally discharged.

For locking the firing pin a member may be provided which is adapted to move to and from a position in which it prevents movement of the firing pin into contact with the cartridge. The invention relates to such a locking construction and in accordance therewith I preferably mount a movable member on that portion of the arm which must be gripped by the user preparatory to firing and provide an actuator for transmitting movement from this movable grip member to the lock. The actuator may move the lock either into or out of locking relationship with the firing pin, although for reasons which will be apparent hereinafter I now prefer to have the actuator slidable to move the lock out of engagement with the firing pin.

The invention is susceptible of application to most types of firearms having a firing pin but for the purpose of this specification I have illustrated it in connection with an automatic pistol of the type shown in U. S. Patents Nos. 984,519 and 1,070,582. As shown in the drawings forming a part of this specification, the pistol comprises a frame or receiver 1, a barrel 2, a reciprocatable slide or breech bolt 3, a firing pin 4, a grip 5, a trigger 6, and a hammer 7. In the pistol illustrated the grip is adapted to hold a magazine containing a plurality of cartridges which may be successively fed into the chamber of the barrel, fired, and ejected by repeated retraction of the trigger and automatic reciprocation of the bolt, all in a known manner.

The firing pin 4 is slidably mounted in a hole 8 in the bolt and is urged to retracted position by a spring 9 abutting at one end against a shoulder 10 on the firing pin and at the other end against a portion of the bolt. Rearward movement of the firing pin is limited by a stop 11. It is apparent from the drawings that the firing pin is of such length that when the hammer is in its uncocked position, see Fig. 6, it may rest against the stop 11 without moving the firing pin sufficiently to cause its forward end to project beyond the front face of the bolt 3. It should, however, be understood that the hammer delivers a sudden blow to the rear end of the firing pin when the gun is intentionally discharged and the momentum of the firing pin causes it to be projected beyond the front face of the bolt to fire the cartridge primer.

In accordance with the invention a firing pin lock 12 is provided which is movable into and out of locking engagement with the firing pin and which may be mounted on any part of the firearm and have any desired type of movement. When used on a firearm of the type illustrated I at present prefer to slidably mount the lock in the bolt which may be transversely apertured as at 13 to receive the lock. Although other forms of locking engagement may be used, I have shown the firing pin as being provided with the shoulder 14 in front of which the firing pin safety lock 12 may project to effectively prevent movement of the firing pin beyond the front face of the bolt. While not strictly essential, I prefer to provide means for biasing the lock and such means is found in the spring 15. In the illustrated construction the lock receiving aperture 13 intersects the rear sight groove 16 in the bolt and the rear

sight 17, in conjunction with the firing pin, serves to hold the lock and spring in place, although any desired construction for the purpose may be adopted. The shape of the lock is not critical, the same being only dependent upon the other details of construction used, and in the construction shown it is generally L-shaped with the leg of the L projecting downward, the forward lower corner of which is provided with the cam surface 18. The leg is notched as shown at 19 in Fig. 4 so that the extractor 20 may be removed from the bolt without necessitating the removal of the lock 12.

The means for moving the lock may be of different forms depending upon whether the lock is mounted on the bolt or on the frame, and also depending upon whether the lock is biased, either to or from firing pin engaging position, or not. With the construction illustrated I now prefer to slidably mount a firing pin safety lock actuator 21 in a cavity 22 in the frame, it being held therein by a pin 23 which passes through an elongated slot 24 in the actuator. The actuator includes a portion 25 which, when the parts are in the position shown in Fig. 1, projects upward so that the end thereof is substantially flush with the top of the frame but which, when the parts are in the position shown in Fig. 2, projects above the top of the frame to move the lock 12 out of engagement with the firing pin. The bolt 3 has a groove 26 formed therein for receiving the projecting end of the actuator when it is in its raised position.

In accordance with the invention movable means for operating the actuator is provided on some portion of the firearm which must be gripped, it of course being apparent that the type of movable means provided and its form of connection with the actuator will be dependent upon the specific type of safety lock and actuator adopted for effecting the purposes of the invention. When the construction takes the form illustrated, a grip safety such as shown at 27 is now preferred. The safety 27 is pivotally mounted in the frame by a pin 28 and it includes a downward extending portion 29 which generally conforms with the shape of the grip. This safety is further provided with a portion 30 which extends beneath the actuator. A spring 31 serves to bias the grip safety to the position shown in Fig. 1.

The grip safety may, if desired, further function to lock the trigger in non-firing position except when the pistol is properly gripped preparatory to firing. In the construction illustrated the trigger 6 includes a trigger bar portion 32 which is adapted to actuate a sear to release the hammer from cocked position. The portion 33 of the grip safety is so shaped and positioned that when the grip safety is in the position of Fig. 1, the trigger is blocked against retraction, but when the parts are in the position of Fig. 2 the trigger may be moved to firing position.

The operation of the construction described so far is as follows:

If the firearm is not being properly gripped preparatory to firing, the parts thereof occupy the positions shown in Fig. 1, that is, the firing pin safety lock is engaged with the firing pin to prevent movement of the latter to firing position should such movement tend to take place due to any cause, and the portion 33 of the grip safety is in a position to prevent movement of the trigger to firing position. If the pistol be properly gripped for firing, the grip safety 27 will be swung inward and consequently the portion 30 thereof will be moved upwardly. This upward movement will slide the actuator 21 upward which in turn will move the firing pin safety lock out of locking engagement with the firing pin, the pin now being free to be moved to firing position. As the portion 33 of the grip safety is moved upward it also frees the trigger 6 for retraction. Assuming that the pistol is loaded and the hammer cocked, the trigger may now be retracted to release the hammer. When the pistol has been fired by contact of the firing pin with a cartridge, the bolt will be caused to slide rearward in a known manner. After the bolt has moved rearward to some extent the safety lock 12 will move out of engagement with the actuator 21 and will be biased by the spring into engagement with the firing pin. Further rearward movement of the bolt will serve to extract and eject the empty cartridge and cock the hammer, all in the usual manner. The bolt will then be moved forward to breeched position but in so moving the lock 12 will come into engagement with the actuator 21 and by reason of the cam surface 18 will again be moved out of locking engagement with the firing pin and the pistol may be again fired as before, assuming that during the forward movement of the bolt a cartridge was fed into the chamber.

If the user's grip on the pistol should now be released the parts would be returned to the positions of Fig. 1 due to the combined action of the springs 15 and 31. It should be noted that the spring 15 not only serves to insure proper movement of the safety lock 12 to locking position but also aids the spring 31 in performing its function, therefore if the spring 31 should for any reason fail to move the grip safety to its safety position the spring 15 would tend to cause such movement.

The phase of the invention so far described is disclosed and claimed in my co-pending divisional application Serial No. 155,609, filed July 26, 1937.

In accordance with another phase of the invention means are provided for preventing the improper engagement of the sear and firing members of a firearm when it is desired to place them in a safety or locked condition. Firearms are often so constructed that the firing member may be locked in a so called "half cocked" or safety position when desired, and the usual method for so locking the firing member is to provide a recess in one of the members into which a portion of the other member may project, but from which the said portion may not be withdrawn by mere actuation of the trigger. In providing for this type of locking I construct the sear and firing members so that these two must be fully and properly engaged with each other in the safety position or else fully disengaged from said position, or in other words, these parts are incapable of being improperly engaged so as to mislead the user into believing that the parts are in a safety position when in fact they are not.

In order to maintain constant the pull on the trigger necessary to fire the arm it has been found desirable to provide the sear and firing members with engageable surfaces of substantial area for holding the latter in cocked position. The provision of such a surface of substantial area on one member gives rise to the possibility that this surface may engage with a lip on the other member forming one of the side walls of the safety recess in said other member and thus lead the user to believe that the firing member

is in a safety position when in fact it is not. This phase of the invention contemplates the provision of cooperating means on the sear and firing members for moving the two toward each other when they would otherwise tend to improperly engage as above pointed out. One mode, and at present the preferred one, of effecting this movement is to provide cam surfaces on these two elements.

Also in accordance with this aspect of the invention cooperating means, preferably cam surfaces, may be provided on the firing and sear members for moving them away from each other unless they are in such relative positions that a portion of the one member will properly move into a safety recess in the other member.

I have shown this phase of the invention as it may be applied to a firearm such as shown in Fig. 1, although it will be readily apparent that it is not so limited.

In Figs. 5 to 9 I have illustrated a firing mechanism of the type shown in the above noted patents as modified in accordance with this phase of the invention. This firing mechanism includes the firing member or hammer 7, a sear member 34, a disconnector 35, a sear spring 36, the trigger bar 32, the trigger 6, and a trigger bar and disconnector spring 37.

In this assembly the hammer is pivotally mounted in the frame by a hammer pin 38 and is, through the link 39, biased in a counterclockwise direction by a main spring (not shown). The body of the hammer has formed thereon the two projections 40 which together form a shoulder 41 of substantial area with which the sear may engage to hold the hammer cocked. In the periphery of the body of the hammer and angularly spaced from the shoulder 41 is a safety recess 42, one wall of which is formed by a lip 43. The sear member 34 is bifurcated and includes a body portion from which project the arms 44 and 45. The sear is pivotally mounted in the frame 1 by the pin 23. A sear spring 36 presses against the arms 45 to bias the sear in a clockwise direction and thus tends to move the arm 44 into engagement with the body of the hammer. The arm 44 terminates in an end surface 47 of substantial area which is adapted to engage the shoulder 41 of the hammer to hold the latter in cocked position and, as above pointed out, these two engageable surfaces are of substantial area to assure a uniform "trigger pull".

The disconnector 35 is mounted between the legs of the bifurcated sear on the pin 23 which passes through an aperture 48 in the disconnector. As the aperture 48 is larger than the pin 23, the disconnector may pivotally and slidably move relative to the frame and sear. The lower end of the disconnector is provided with wings 49 which are adapted to engage with the arms 45 of the sear when the parts are in certain positions. The top of the disconnector projects above the top of the frame into a recess 50 in the bolt when the latter is in its breeched position. The spring 37 presses against the cam surface 51 to urge the disconnector upward and in a clockwise direction, and as the disconnector presses against the trigger bar 32, the latter is urged to non-firing position.

The operation of this trigger, disconnector, and sear mechanism is well known and may be clearly understood from Figs. 5 and 9. Assuming that the pistol is cocked with the end of the sear engaging the shoulder 41 on the hammer, retraction of the trigger 6 and consequent rearward movement of the trigger bar 32 will rotate the disconnector in a counterclockwise direction and in so rotating it the wings 49 thereon will engage with the arms 45 of the sear to effect a similar rotation of the sear which will release the hammer. After the cartridge has been fired the slide 3 will automatically move rearward and in so doing the disconnector will be moved downward as indicated in Fig. 9 and the wings 49 will be moved out of engagement with the arms 45; this action will take place even though the trigger is held in retracted position. At this stage of the operation the sear will be free from any control by the trigger and will be biased by the spring 36 to hold the hammer cocked. Before the pistol can be again fired, the pull on the trigger must be released to permit the disconnector to rotate in a clockwise direction to a position in which it may be moved upward by the spring 37 to again position the wings 49 in front of the arms 45. This mechanism serves to prevent "doubling," that is, the firing of more than a single shot upon a single retraction of the trigger.

In Figs. 5 to 9 I have shown how the construction just set forth may be modified to include the principles of this phase of the invention. A portion of the lip 43 is shaped to form a cam surface 52, see Fig. 8, and the opposite surface of this portion is shaped to form another cam surface 53. I provide means on the arm 44 of the sear to cooperate with the cam surfaces 52 and 53, and as shown, such means may take the form of cam surfaces 54 and 55.

It should be understood that while I now consider it preferable to provide two pairs of cooperating cam surfaces on the sear and firing members, either pair may be omitted within the scope of this phase of the invention.

I have shown the cam surfaces 52, 53 and 54, 55 as being located medially of the lip 43 and arm 44, respectively, but such location is merely preferred in order to promote balanced operation of the sear and firing members and is not critical to the invention. It should be further understood that the application of this phase of the invention is not limited to firearms having firing members of the hammer type or to a construction in which the arm is on the sear and the safety recess is in the firing member.

The operation of this phase of the invention is as follows:

Assume that the user is holding the firearm with the firing mechanism in the condition shown in Fig. 6 and desires to move the hammer 7 to the safety or "half cocked" position shown in Fig. 5. The hammer may be rotated in a clockwise direction against the action of the hammer main spring (not shown). When the hammer has been rotated slightly beyond the position shown in Fig. 5, the arm 44 on the sear will tend to snap into a position against the periphery of the body of the hammer. If such action takes place, the arm 44, upon release of the hammer to permit rotation of the same in a counterclockwise direction. will move into the safety recess 42 to effectively hold the hammer in a safety position. If, however, the arm 44 should for any reason fail to fully snap up against the body of the hammer, the end face 47 thereof will engage the end face of the lip 43 and, in the absence of the cam surfaces 52, 54 and 53, 55 provided in accordance with this phase of the invention, the hammer would be held in a position such as to lead the user to believe that the firearm was in

a safety condition when in fact a pull on the trigger would result in an unintended discharge of the weapon. However, when the cam surfaces 52 and 54 are provided, the possibility of such action is reduced, for if the arm 44 does not snap all of the way in, these cam surfaces will engage each other to cam the arm toward the hammer body and thus cause its proper movement into the safety recess when the hammer is released and moved in a counterclockwise direction by the main spring. If the cam surfaces 53 and 55 of the invention be provided, the arm and hammer will be cammed away from each other unless the same are in a position in which the arm 44 will move into the safety recess 42 upon movement of the hammer in a counterclockwise direction.

Alternative forms of the invention set forth in this specification will be apparent to those skilled in the art, and I do not mean to limit myself to any particular embodiment except as defined in the claims.

What I claim is:

1. In combination in a firearm, a sear member, a firing member, one of said members including an arm having an end face of substantial area, the other said member having a safety recess therein for reception of said arm and a shoulder thereon of substantial area with which said end face is engageable to hold the firing member in cocked position, and cooperating means on the said members for moving the arm and the recessed member relatively toward each other for insuring movement of the arm into said recess.

2. In combination in a firearm, a sear member, a firing member, one of said members including an arm having an end face of substantial area, the other said member having a safety recess therein for reception of said arm and a shoulder thereon of substantial area with which said end face is engageable to hold the firing member in cocked position, and cooperating cam surfaces on the said members for camming the arm and the recessed member relatively toward each other for insuring movement of the arm into said recess.

3. In combination in a firearm, a sear member, a firing member, one of said members including an arm one portion of which has a cam surface thereon and another portion of which terminates in an end face of substantial area, the other member having a safety recess therein for reception of said arm and a shoulder thereon of substantial area with which said end face is engageable to hold the firing member in cocked position, and a cam surface on the said other member adjacent said recess engageable by the cam surface on the arm for camming the said arm and the recessed member relatively toward each other for insuring movement of the arm into said recess.

4. In combination in a firearm, a sear member, a firing member, one of said members including an arm having an end face of substantial area, the other said member having a safety recess therein for reception of said arm and a shoulder thereon of substantial area with which said end face is engageable to hold the firing member in cocked position, and cooperating means on the said members for moving the arm and the recessed member relatively away from each other unless the arm is in a position to move into said recess.

5. In combination in a firearm, a sear member, a firing member, one of said members including an arm having an end face of substantial area, the other said member having a safety recess therein for reception of said arm and a shoulder thereon of substantial area with which said end face is engageable to hold the firing member in cocked position, and cooperating cam surfaces on the said members for camming the arm and the recessed member relatively away from each other unless the arm is in a position to move into said recess.

6. In combination in a firearm, a sear member, a firing member, one of said members including an arm one portion of which has a cam surface thereon and another portion of which terminates in an end face of substantial area, the other member having a safety recess therein for reception of said arm and a shoulder thereon of substantial area with which said end face is engageable to hold the firing member in cocked position, and a cam surface on the said other member adjacent said recess engageable by the cam surface on the arm for camming the said arm and the recessed member relatively away from each other unless the arm is in a position to move into said recess.

7. In combination in a firearm, a sear member, a firing member, one of said members including an arm having an end face of substantial area, the other said member having a safety recess therein for reception of said arm and a shoulder thereon of substantial area with which said end face is engageable to hold the firing member in cocked position, and cooperating means on the said members for moving the arm and the recessed member relatively toward each other for insuring movement of said arm into said recess or for moving them relatively away from each other unless said arm is in a position to move into said recess.

8. In combination in a firearm, a sear member, a firing member, one of said members including an arm having an end face of substantial area, the other said member having a safety recess therein for reception of said arm and a shoulder thereon of substantial area with which said end face is engageable to hold the firing member in cocked position, and cooperating cam surfaces on the said members for camming the arm and the recessed member relatively toward each other for insuring movement of said arm into said recess or for camming them relatively away from each other unless the arm is in a position to move into said recess.

9. In combination in a firearm, a sear member, a firing member, one of said members including an arm one portion of which has cam surfaces thereon and another portion of which terminates in an end face of substantial area, the other said member having a safety recess therein for reception of said arm and a shoulder thereon of substantial area with which said end face is engageable to hold the firing member in cocked position, and cam surfaces on the said other member adjacent said recess engageable by the cam surfaces on the arm for camming the said arm and the recessed member relatively toward each other or for camming them relatively away from each other unless the arm is in a position to move into said safety recess.

WILLIAM L. SWARTZ.