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AUTOMATIC FIREARM WITH MEANS FOR MAINTAINING SLOW RATE OF FIRING

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The present invention relates to automatic hand firearms, and the principal objects of the invention are to provide such a firearm with a relatively slow rate of firing, a steady position even at sustained fire, and to design and mount the barrel of the latter so as to be of a considerable length despite the comparatively short length of the entire weapon, to permit the barrel to be drawn without cutting, not to be seriously affected in its function if it should become distended, and to be easily exchanged without tools even though it might be distended. These features are desirable especially in automatic pistols and similar weapons with a locking mechanism operated by inertia but of a low weight, but they are of importance also in automatic hand firearms of other types, for example, those with a locked breech.

In automatic hand firearms, for example, automatic pistols with an inertia lock, it is desirable to be able to maintain a relatively slow rate of firing. This may be attained by different means. Thus, for example, it is known to reduce the acceleration by making the bolt of a considerable weight. This has, however, the disadvantage that the total weight of the weapon also becomes very heavy. Another known possibility of attaining this consists in allowing the bolt to run for a considerable distance. This, however, requires a long breech housing which either renders the entire weapon very long and unwieldy or necessitates that it be provided with a short barrel.

Thus, for example, there are known hand firearms of the locked type in which the bolt consists of two parts and is disposed within its housing substantially coaxially with the barrel. When the head portion of such a bolt is in the forward, inactive position, it is locked to the breech housing or to the barrel, while when a shot is fired, it will under the resulting gas pressure yield at first only for a short distance toward the rear and, by then being locked, it will throw back the other or inner part for a greater distance, whereupon the locking engagement will be released and both parts will travel together at least for the distance which is necessary for ejecting the spent cartridge and inserting a fresh cartridge, while finally both parts will also be returned together by spring pressure to the inactive position. Consequently, except for the slight delay caused by the release of the locking device, the rate of firing of such a weapon depends solely upon the weight of the entire bolt and the distance which it has to travel. A slow rate of firing thus requires the bolt to be either very heavy or to have a long traveling distance. The weapon can therefore either not have the light total weight or the short total length as desired.

Hand firearms of the locked type have also been provided with leverlike locking members. When a shot is fired with one of these weapons, a small kinetic impulse upon the head portion of the bolt is transmitted by these locking levers to the inner part of the bolt so as to throw back the latter against the action of a spring. The inner bolt member when reaching its end position will then release the lever which locks the head portion and at the same time act upon other levers to throw back the head portion and move the same toward the rear until both parts of the bolt will arrive together in the end position, whereupon both parts will also be returned by the locking spring to the original position. The head portion of

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the bolt of these firearms is locked to the breech housing or to the barrel only when in the inactive position. When a shot is fired, the gas pressure in the barrel will be opposed only by the weight of the head portion as such of the bolt which then carries out a small movement which is transmitted by the locking levers to the inner part of the bolt. Consequently, these locking levers have to bear the full gas pressure and will be worn out and ruined relatively soon. There are no known hand firearms with bolts of the unlocked inertia type which consist of two parts which are movable independently of each other.

The present invention is applicable to automatic hand firearms either with a locked bolt or with an unlocked bolt consisting of several parts, and it achieves in either case the object to attain a slow rate of firing and to exert the pressure produced by the shot directly upon the total mass of the bolt which, in the event that locking means are provided, will take up at least a part of the pressure in the form of kinetic energy and thereby relieve the force acting upon the locking means.

The present invention provides a bolt for automatic hand firearms which consists of two parts, namely, an outer head member and an inner member which are movable relative to each other in the axial direction and are provided intermediate the breech housing and the outer head member with a locking member which is adapted to lock these two parts together when the outer head member reaches its rear end position, while the inner member continues to move alone toward the rear and then again forwardly. The locking member will therefore be shifted automatically into the locking position and then again into the released position. This manner of locking results in a considerable reduction in the rate of firing since at first the entire bolt, that is, the total mass thereof, will run back to the rear end position of the outer head member, whereupon the outer head member will be locked to the breech housing and will then stop until the inner member which alone continues to travel toward the rear has again returned to its original position with respect to the outer head member. The length of time required by the bolt to move from its inactive position to its rear end position and again back into the inactive position is therefore nearly doubled so that the rate of firing will be considerably decreased without requiring any increase in the total weight of the bolt or in the distance of travel of the outer head member.

In one preferred embodiment of the invention, the locking member is designed so as alternately to lock the outer head member of the bolt to the housing or to the inner member. This is done in such a manner that in the inactive position and during the first part of the movement which both bolt members travel together after the shot has been fired the outer head member will be locked to the inner member, that during the second part of the movement the outer head member will be locked to the housing while the inner member continues to travel alone until, under the action of its own return spring, it has returned to the position in which it is again locked to the outer head member, whereupon during the final return of both members to the inactive forward position they are again locked to each other. Consequently, during the common forward and backward travel of both bolt members between the inactive position and the rear end position of the outer head member, the inner member cannot move independently of and relative to the outer head member.

According to a preferred modification of the locking device, a locking indentation in the breech housing for arresting the outer head member of the bolt in its rear end position is made of an elongated shape so as to insure that the locking member will engage therein and disengage from the inner bolt member even though the outer head member travels at a considerable speed.

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The present invention consists further in providing the outer head member with a downwardly projecting extension which contains the firing pin, and in mounting the barrel within the breech housing underneath the guiding means of the bolt. If the bolt is operated by inertia, the weight of the bolt may thus be made very considerable and in accordance with the charge of the cartridges to be shot from this weapon, and the housing may be made of a length in accordance with the distance of travel of the bolt. If the breech design is of the locked type, the necessary locking elements may thus also be provided within the upper front part of the weapon and be easily locked to the barrel, and especially it is thus possible to make the weapon of a very short length which is especially important in automatic pistols and similar weapons. The invention produces the further advantage that, because of the low position of the barrel its axis will be in alignment with the stock, thus giving the weapon a steady position in firing.

The present invention is by no means limited to automatic pistols, but may also be applied to firearms of other types. The locking member for locking the head member of the bolt either to the breech housing or to the inner bolt member may be of different designs and consist, for example, of one or more balls, rollers, or levers, and it is independent of the locking device for locking the bolt in the closed position in the known manner either to the barrel or to the breech housing. The new locking device may therefore be applied independently of this known locking device.

These and other objects, features, and advantages of the present invention will become further apparent from the following detailed description thereof, particularly when the same is read with reference to the accompanying drawings, in which—

FIGURE 1 shows a longitudinal section of the bolt and a part of the breech housing and the barrel of an automatic pistol according to the invention;

FIGURE 2 shows a cross section taken along line II—II of FIGURE 1;

FIGURE 3 shows a cross section of a modification of the locking recess in the breech housing.

Referring to the drawings, the breech housing 1 which is disposed above the barrel 16 of the pistol serves as the main support of the bolt which is slidable within this housing in the axial direction thereof and consists of two parts, namely, an outer tubular head member 2 and an inner member 3. This inner bolt member 3 is slidable within the head member 2 in the axial direction against the action of a spring 4, while head member 2 is acted upon by a spring 5, the rear end of which rests on the rear wall of housing 1. Spring 4 is mounted on a long pin 7 which is secured at its rear end to a head in the form of a plate 8 and urges a shoulder 9 on the inner member 3 against a corresponding shoulder 9' in head member 2, these two shoulders thus forming a stop and a counterstop. Near its rear end the inner bolt member 3 is provided with an annular recess 10 which has a tapered camlike front surface 110 and into which a suitable locking member, preferably in the form of a ball 11, is adapted to engage which rests loosely within a bore hole 12 in head member 2. When in this position, as shown in FIGURE 1, ball 11 locks head member 2 and the inner member 3 to each other. The rear part of breech housing 1 is provided with an inner indentation 13 into which the locking ball 11 is adapted to engage. Instead of providing indentation 13 in the shape of a ball cup, as shown in FIGURE 1, the same may more preferably be made of an elongated shape 13', as shown in FIGURE 3, so as to insure that locking ball 11 will have sufficient time to enter properly into the indentation if the recoil velocity of head member 2 is relatively high. The front surface 130 of indentation 13 or 13' is tapered so as to exert a cam action upon ball 11 in the downward direction. Head member 2 of the bolt has a downwardly projecting

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extension 14 which contains the firing pin 15 and is disposed behind the barrel 16 which is connected by front and rear supports 17 and 18 to breech housing 1 and is enclosed by a jacket, not shown.

The operation of this pistol is as follows:

When a shot is fired, head member 2, 14 of the bolt is driven backwardly by the pressure of the powder gases within the barrel and thereby takes along the inner bolt member 3 to which it is coupled by locking ball 11. At the end of its movement, head member 2 will be in a position in which locking ball 11 in bore hole 12 coincides with indentation 13. Due to its own inertia the inner bolt member 3 will continue to move toward the rear against the action of its own spring 4 whereby ball 11 will roll upwardly along the camlike surface 110 of recess 10 and enter into recess 13 in breech housing 1, thereby locking head member 2 to housing 1 and disengaging it from member 3 which can then continue to travel for a certain distance toward the rear against the action of its spring 4. At the subsequent return movement of the inner bolt member 3, ball 11 will again enter into recess 10 of member 3 whereby head member 2 will be unlocked from housing 1 and locked to the inner member 3 so that, under the action of spring 5, head member 2 and inner member 3 can together return to their normal or inactive position.

Head member 2 may also be additionally locked automatically either to breech housing 1 or to barrel 16 by suitable means, not shown.

The two barrel supports 17 and 18 are connected to barrel 16 at the outside of the cartridge chamber 19 and at the wider, bored-out and enlarged end 20 of the barrel where the latter is secured to support 17 by means of a locking ring 21 and a cap nut or bayonet lock 22.

Although my invention has been illustrated and described with reference to the preferred embodiments thereof, I wish to have it understood that it is in no way limited to the details of such embodiments, but is capable of numerous modifications within the scope of the appended claims.

Having thus fully disclosed my invention, what I claim is:

1. In an automatic firearm having a housing defining a bore, bolt means mounted for reciprocal movement in the bore comprising an outer tubular member slidably engaged in the bore, an inner member having a wall slidably engaged in the outer member, a locking member for alternately locking the inner member to the outer member on one hand and the outer member to the housing on the other, a bore hole in the outer member for receiving the locking member and a corresponding recess in the outer surface of said wall of the inner member, an indentation on the inside of the housing, said indentation being located in the central part of the length of the housing, a stop on the inner member and a counterstop on the outer member, said counterstop being located in front of the stop, the front parts of the walls of said recess and said indentation forming tapered cam surfaces for controlling the locking member, a spring which acts from behind on the outer member, a second spring which acts from behind on the inner member, whereby when the inner and outer members are locked together by the locking member said tapered cam surface on the wall of said recess is located substantially in front of the indentation in the wall of the housing, so that when first the locked inner and outer members move back together from their locked positions the locking member reaches a position underneath the indentation in the housing and thus locks the outer member with the housing while the inner member is freed from the outer member thus allowing the inner member to move back in the housing against the opposition of the second spring until its kinetic energy is expended and it is returned thereby placing the recess in receiving relationship with the locking member, whereupon both the inner and outer mem-

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bers are again locked together and moved forward to their original position.

2. An automatic firearm according to claim 1 wherein the locking member is a ball movably engaged in the bore hole.

3. An automatic firearm according to claim 2 wherein the recess in the wall of the inner member extends circumferentially about the rearward end thereof.

4. An automatic firearm according to claim 1 wherein the inner member is tubular in form and further comprising bolt return means including an elongated member slidably engaged in the forward end portion of the inner member and having a head on its rearward end portion adapted to abut the rearward end of the outer member, said second spring engaged between said forward end portion of the inner member and said head on the elongated member, and said first spring engaged between said head and the rearward end portion of the bore.

5. An automatic firearm according to claim 1 wherein said housing further defines a barrel for the firearm extending below the forward portion of said bore and parallel therewith, and said outer member has a portion de-

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pending therefrom and positioned to abut the rearward end portion of the barrel, the forward end of said depending portion of the outer member having a firing pin mounted thereon.

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