BOLT LOCKING MECHANISM FOR RECIPROCATING GUN

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ABSTRACT

A bolt locking mechanism for an automatic weapon having a bolt housing and an accelerator slidably mounted therein. A firing pin is attached to the accelerator and the bolt housing has a pair of linear grooves extending outwardly to the sides of the bolt. A roller lock is provided in each linear groove and these roller locks are engageable with cams which lock the accelerator with the bolt during a portion of the bolt travel. A barrel extension has a pair of locking grooves which are engageable by the roller locks to lock the bolt housing with the barrel extension during firing of the automatic weapon.

1 Claim, 7 Drawing Figures
BOLT LOCKING MECHANISM FOR RECIPROCATING GUN

BACKGROUND OF THE INVENTION

The present invention relates to a breech locking mechanism for automatic weapons. In automatic weapons, such as machine guns, a breech head or block is provided in a housing and is locked thereto during the igniting of a cartridge. After firing, the breech block is automatically unlocked from the housing and then reciprocated by either recoil or by gas pressure in order to extract a spent cartridge and to load a live cartridge into the gun chamber. Many modern day weapons may fire five or six hundred rounds per minute, the design of breech block locking mechanisms is highly critical as wear and fatigue on the contacting elements will cause the weapon to jam and malfunction.

Various devices have been used to lock a breech to a housing during firing. For example, in U. S. Pat. No. 3,348,453, which issued Oct. 24, 1967, to Ernnt Muhlemann, a pair of bolt locks are pivotally connected to a bolt mechanism and these locks are engageable with slots in the breech housing. The bolt mechanism is unlocked by a control member which moves rearwardly and permits the bolt locks to retract.

SUMMARY OF THE INVENTION

The present invention relates to an improved breech locking device for an automatic weapon. A bolt housing has an accelerating slidable mounted therein and a firing pin is attached to the forward end of the accelerator. A pair of roller locks are mounted in linear grooves in the bolt housing and cams are provided to hold the roller locks in engagement with the accelerator to prevent forward movement. The cants permit the roller locks to move outwardly as the bolt moves forward and unlocks the accelerator from the bolt housing. The roller locks are engageable with grooves in a barrel extension and can lock the bolt housing to the barrel extension during firing. The roller lock is of a two-piece construction having a cylindrical ring which is mounted or supported on a shaft having flats thereon which engage in the linear groove.

FIG. 1 is a perspective view of a machine gun using the bolt mechanism of the present invention;
FIG. 2 is a partial sectional view showing a bolt mechanism prior to entering a barrel extension;
FIG. 3 is a partial sectional view showing a cartridge chambered and a bolt mechanism unlocked;
FIG. 4 is a partial sectional view showing a bolt mechanism partially locked to a barrel extension;
FIG. 5 is a partial sectional view showing a bolt mechanism locked to a barrel extension and a cartridge being fired;
FIG. 6 is a partial sectional view showing a bolt mechanism unlocked and in a retracting condition; and
FIG. 7 is a side view of a bolt mechanism.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring first to FIG. 1 of the drawing, there is shown a machine gun 11 having a recoil barrel 12 attached to gun housing 13. By way of example, gun 11 might be an air-cooled weapon that fires from 350 to 600 rounds of ammunition per minute, with the ammunition being fed into the gun by a mechanical feeder while the rounds are presented in a continuous link belt.

Referring now to FIGS. 2 through 7 of the drawings, barrel 12 is attached, as by threading, to barrel extension 14 which is part of housing 13. Barrel extension 14 is provided with a bore 15 for receiving a cartridge 16 and is also provided with a chamber 17 for receiving a bolt 18 which chambers cartridge 17 prior to firing and extracts the spent cartridge after firing. An accelerator 19 is slidably mounted in bolt 18 and carries a firing pin 21. Bolt 18 is provided with a pair of linear grooves 22 and 23 which are opposed one another and extend to the sides of bolt 18. Roller lock assemblies 24 and 25 are positioned in grooves 22 and 23, respectively, and are used to retain accelerator 19 until cartridge 16 is fully chambered. A pair of cams 26 and 27 are provided on the sides of housing 13 and are used to facilitate locking and unlocking of roller lock assemblies 24 and 25.

As best shown in FIG. 7 of the drawings, each roller lock assembly is comprised of a shaft 28, which has flat sides engageable with the sides in the groove in which it operates, and a roller 29 is provided on shaft 28 and is engageable with one of the cams. Barrel extension 14 is provided with a pair of cam grooves 31 and 32, and these grooves are engageable by the roller lock assemblies 24 and 25, respectively.

OPERATION

Firing action of the weapon shown in FIG. 1 of the drawings begin when bolt 18 is released from a sear in a manner well-known in the art. A round 16 on the lower face of the bolt is chambered, while a round in the feeder is being picked up on the upper face of the bolt. A more complete description of this loading operation can be found in U. S. Pat. No. 3,563,132, which issued FEB. 16, 1971, to Cashen et al.

Bolt 18 is driven forward by a drive spring (not shown) and, as bolt 18 moves into battery position, roller lock assemblies 24 and 25 move outwardly into grooves 31 and 32, as best shown in FIG. 4 of the drawings. As shown in FIG. 5 of the drawings, as the roller lock assemblies move completely into grooves 31 and 32, accelerator 19 is free to move forward, and inertia bar 33 drives accelerator 19 forward thereby forcing firing pin 21 into the primer of round 16. As round 16 fires, the recoil components of weapon 11 begin their rearward movement, with bolt 18 still being locked to barrel extension 14. When roller lock assemblies 24 and 25 engage cams 26 and 27, these roller lock assemblies are cammed inwardly and bolt 18 is unlocked from barrel extension 14. Roller lock assemblies 24 and 25 then move accelerator 19 rearwardly with respect to bolt 19 and then again lock accelerator 19 with bolt 18.

By way of example, with weapon 11 being chambered to fire 20mm ammunition, when bolt 18 begins its rearward movement, bolt 18 pulls barrel extension assembly about 1% inches before roller lock assemblies are cammed inwardly to free the bolt 18 from barrel extension 14. A barrel recoil spring then forces barrel extension 14 back into a firing position.

It can be seen that roller lock assemblies 24 and 25 are retained in linear grooves 22 and 23, respectively, and that shaft 28 has flats so that there is area contact.
between shaft 28 and the groove in which it operates. These features greatly reduce the stress levels on rollers 29 and thus prevent wear and malfunction.

It can thus be seen that the present invention provides an improved bolt locking mechanism for an automatic weapon. Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood, that within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.

I claim:

1. In an automatic firearm, a bolt locking mechanism comprising,
   a breech housing,
   a barrel extension connected to said breech housing having means for attaching a barrel on one end thereof and having locking grooves therein,
   a bolt slidably mounted in said breech housing, said bolt having opposed linear slots with parallel surfaces in each side thereof,
   an accelerator slidably mounted in said bolt, said accelerator having a firing pin attached thereto,

first and second roller lock assemblies each said roller lock assembly having a shaft with at least one pair of flat parallel surfaces on each end thereof and a roller positioned midway between said shafts ends with said flat parallel surfaces extending outwardly from each side of said roller, said parallel surfaces on each end of said shaft being slidable engageable with the parallel surfaces of said linear slots in said bolt and each said roller being engageable with said accelerator, said roller lock assemblies releasably locking said accelerator with said bolt, and

cam means attached to said breech housing engageable with said roller lock assemblies for locking said accelerator with said bolt until a round carried by said bolt reaches a battery position and said roller lock assemblies unlock said accelerator from said bolt and lock said bolt to said barrel extension and upon recoil of said bolt said cam means actuates said roller lock assemblies to unlock said bolt from said barrel extension and to lock said accelerator with said bolt.

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