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2,900,877

RECOIL-ACTION MACHINE GUN

Filed June 8, 1956

2 Sheets-Sheet 1

FIG. 1a

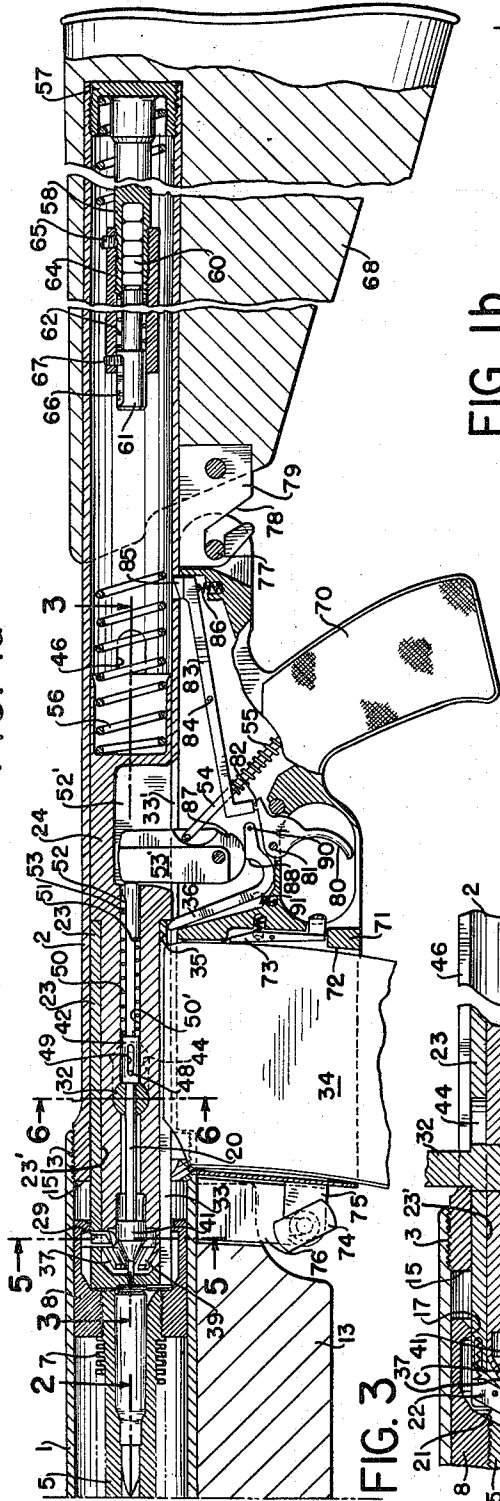


FIG. 1b

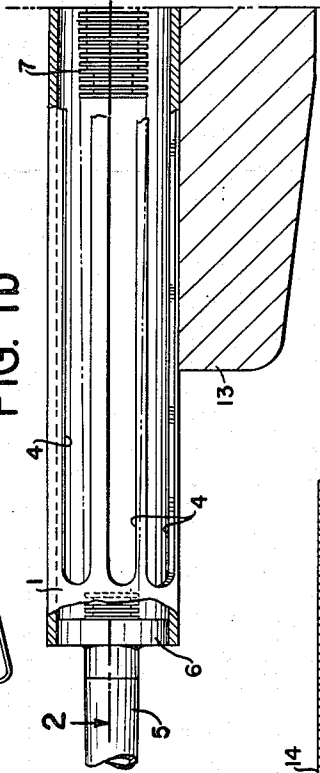


FIG. 2

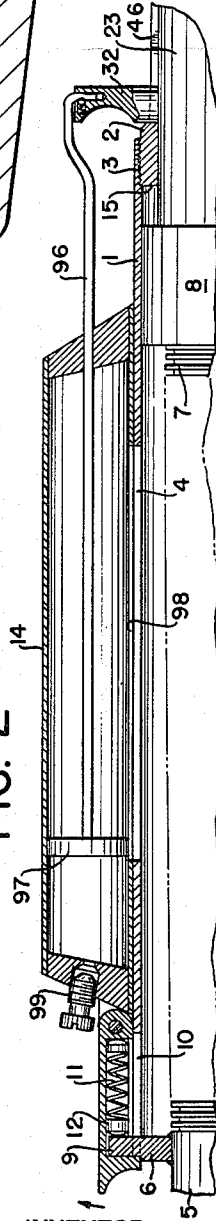
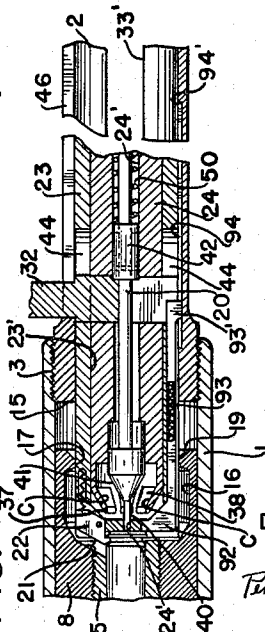


FIG. 3



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FIG. 4

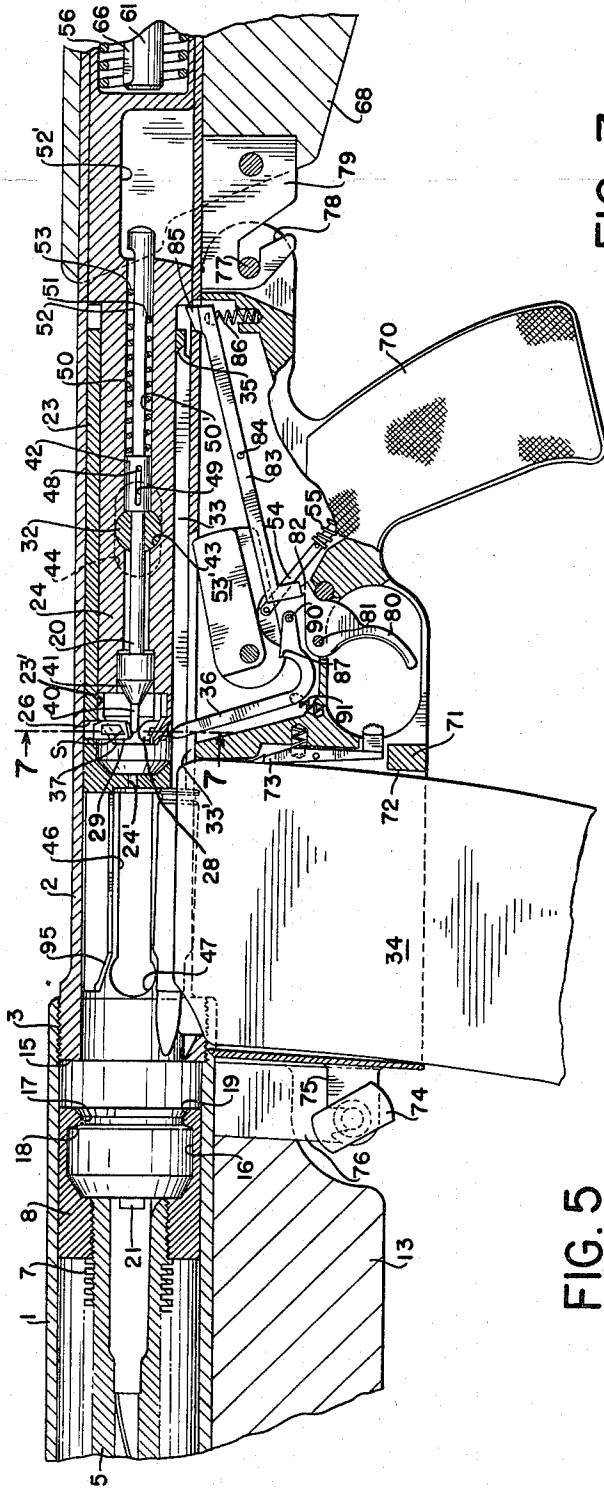


FIG. 7

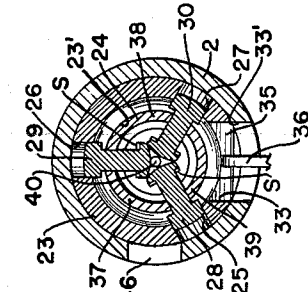


FIG. 6

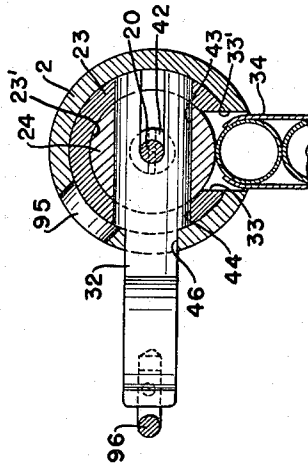
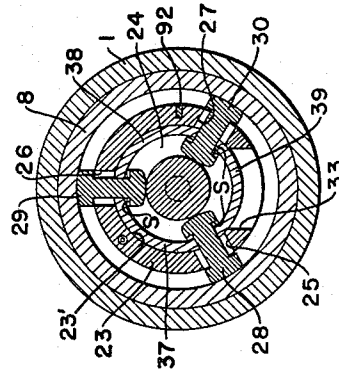


FIG. 5



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**RECOIL-ACTION MACHINE GUN**

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5 Claims. (Cl. 89—173)

This invention relates to machine guns of the type having a short recoil action and has for its object the provision of an improved breech block operating mechanism for such guns. The invention is concerned with machine guns having a barrel which is locked to the breech block at the time of firing, and means for unlocking the breech block as the barrel and breech block travel rearward during recoil.

The improved breech block operating mechanism of my invention comprises a barrel having an integrally connected locking collar, both slidable in a guide frame, and a stop secured to the frame for limiting the sliding motion of both the barrel and the collar. A plurality of locking lugs are mounted in radially disposed holes in the breech block which are movable into and out of locking engagement with the collar. The breech block houses an interior slide which can travel rearward with the initial movement of the barrel and breech block and, when the locking collar engages the stop, the slide continues to travel rearward under sufficient momentum to pull the locking lugs out of locking engagement with the collar and carry the breech block rearward along with the slide. The breech block and slide are returned by a return spring. The slide has a plurality of radially disposed and inclined fingers which move the locking lugs radially to their unlocked position. The fingers have inclined cam surfaces that engage inclined surfaces on the locking lugs to pull them inwardly as the slide travels rearward.

The slide has an interior longitudinal opening in which is mounted a longitudinally slidable firing pin which has means for engaging the locking lugs to set them in a locked position as the firing pin travels forward to strike the cartridge. When the breech block and slide are in their forward but unlocked position, the lugs are freely movable outwardly. The firing pin has a conically shaped head near the pin end and just before the firing pin reaches the cartridge primer, the conical head engages the locking lugs and pushes them outwardly into locking engagement with the locking collar on the barrel. After the firing pin ignites the cartridge, the recoil of the interconnected barrel, collar and breech block drives them rearward as a unit, along with the contained slide and firing pin, until the collar strikes the stop. The momentum imparted to the slide and firing pin continues them rearward. A rebound spring for the firing pin pushes it rearward in the slide and the conical head of the firing pin is thus retracted out of engagement with the locking lugs, and when the inclined surfaces of the fingers of the slide engage the inclined surfaces of the locking lugs, the lugs are pulled inwardly and the breech block is unlocked from the collar. The breech block, slide and firing pin then travel rearward as a unit until the end of the slide engages a resilient buffer and the slide, breech block and firing pin are stopped. Meanwhile, the slide is compressing its return spring which returns the unit to the locked position ready for a repetition of the cycle of firing.

The barrel, collar and breech block unit are advantage-

ously mounted in a tubular frame in which they are reciprocable during recoil and return. Ordinary standard tubing stock may be used for the frame. On one side of the gun a cylinder is mounted having a piston connected to and operated by the slide. The tubular frame has a plurality of slots, and air pumped by the operation of the piston passes over the barrel and through the slots cooling the barrel during the rearward and forward travel of the slide.

I prefer to provide the barrel with a combination return spring and barrel latch, the spring serving to return the barrel to its forward position after recoil, and the latch serving as a means for the rapid detachment of the barrel.

These and other novel aspects of the invention will be better understood after considering the following discussion taken in conjunction with the accompanying drawings, in which:

Fig. 1a is a longitudinal elevation, with parts in section, of a machine gun of my invention;

Fig. 1b is a longitudinal elevation, with parts in section of the forward part of the gun of Fig. 1a;

Fig. 2 is a sectional view at 2—2 of Figs. 1a and 1b;

Fig. 3 is a sectional view at 3—3 of Fig. 1a;

Fig. 4 is an enlarged sectional view of Fig. 1a, with the breech block in its rearward position;

Fig. 5 is a sectional view at 5—5 of Fig. 1a;

Fig. 6 is a sectional view at 6—6 of Fig. 1a; and

Fig. 7 is a sectional view at 7—7 of Fig. 4.

The machine gun of my invention illustrated in the drawings comprises a barrel frame 1 of tubular cross-sectional shape, preferably formed of stock steel or aluminum tubing to which a tubular receiver 2 is connected by the thread 3. The barrel frame has a plurality of ventilating slots 4, and the barrel 5 has an attached bushing 6 which provides a bearing for the slidable connection with the frame. While any standard type of barrel may be used, I prefer to use a barrel having cooling fins 7. The rear end of the barrel is threaded into a locking collar 8 which makes a close sliding fit inside the tubular frame 1. The bushing 6 on the barrel has a projecting lug 9 (Fig. 2) which travels in a slot 10 in the frame 1 as the barrel reciprocates. The lug is engaged by a spring 11 which urges the barrel to its forward firing position and which opposes the recoil. Advantageously, this spring is mounted in a latch 12 which the spring secures in its locked position as shown in Fig. 2. By lifting the left end of this latch, the barrel and collar 8 can be pulled out of the frame. The frame has an attached forearm 13 and a cylinder 14 mounted on the right side, the function of which will be described later.

The receiver 2 has a shoulder 15 which serves as a stop for the rearward travel of the barrel and collar 8. The collar has an annular recess 16 and an annular locking rib 17, the inner face 18 of which is slightly sloped and the outer face 19 is beveled to facilitate entrance of the cartridges. The barrel chamber has a recess 21 for entry of the extractor 22.

The receiver is cylindrical inside in cross-section, and the breech block 23 and slide 24, both exteriorly cylindrical, are slidably mounted inside the receiver.

The breech block has a cylindrical interior 23' in which the forward part of the slide is mounted and slidable a short distance from the position shown in Fig. 1a to the position shown in Fig. 4. The breech block has a hole 24' for the firing pin 20 and has the extractor 22 (Fig. 3) of conventional construction attached to its face. As shown in Figs. 1a and 5 the breech block has three radial holes 25, 26 and 27, in which the locking lugs 28, 29 and 30 respectively, are mounted. As best shown in Figs. 4, 5, 6 and 7, the underportion of the breech block has a longitudinal cut 33 overlying a larger opening 33' in the receiver for clearing the magazine 34 and

uppermost cartridge which extends through to the rear leaving a depending lug 35 which engages the sear depressor arm 36, the function of which will be described more fully hereinafter. The slide 24 has a plurality of fingers 37, 38 and 39 at its forward end which engage the central portions of the locking lugs 28, 29 and 30 as best shown in Figs. 4, 5 and 7. As shown in Figs. 1a and 4 these fingers are at an angle of about 30° with respect to the longitudinal axis providing cam surfaces C (Fig. 3), and as the slide moves rearward the fingers engage cam surfaces S on the lugs (Figs. 5 and 7) and pull the locking lugs inward out of contact with the locking rib 17 on the collar 8.

The slide is bored out centrally to receive the firing pin 20 which has a pin 40, a conical cam portion 41 which engages the lugs and pushes them outward to their locked position, and a sleeve 42 which bears against the handle 32. The handle 32 is in transverse slidable connection with the firing pin, projects through a hole 43 in the slide and a coincident slot 44 in the breech block 23 and a slot 46 in the receiver. The slot 46 extends rearward as shown in Fig. 1a and has an enlargement 47 through which the handle 32 may be removed as will be explained hereinafter.

It will be noted that the rebound spring 50 mounted in the bore hole 50' bears at one end on the sleeve 42 and at the other end on the shoulder 51 of the firing pin. The firing pin is flattened at 52 to slide under the cross pin 53 which limits the forward movement of the firing pin. When the breech block is operated manually by pulling the handle 32 rearward, the sleeve 42 is first pushed rearward from the position shown in Fig. 1a to the position shown in Fig. 4. In other words, the sleeve 42 slides over the pin 48, compressing the rebound spring, until the firing pin reaches the position of Fig. 4. The conical head 41 is removed from engagement with the locking lugs and the handle being secured to the slide pulls the slide rearward and the locking lugs out of engagement with the breech block. The handle makes engagement with the rearward surface of the hole 44 and the breech block is pulled rearward with the slide.

The slide is cut out at 52' for the clearance of the hammer 53' which is operated by the strut bar 54 and spring 55. The rear end of the slide is hollowed out to receive one end of the return spring 56, the opposite end of which bears on the plug 57 which is screwed into the receiver. The plug carries a projecting hollow member 58 in which is mounted rubber buffers 60 and a buffer bar 61 which bears against a coil spring 62 and, when fully compressed, also against the rubber buffers. A sleeve 64 is secured in threaded connection to the member 58 and is held in position by the Allen screw 65. The buffer bar 61 has a groove 66 in which the Allen screw 67 is inserted to permit sliding movement of the bar and also to prevent the bar from being pushed out of the extension 58 by the spring 62. The rear end of the gun has a shoulder stock 68 of any suitable construction.

The grip member 70 and magazine housing 71 are preferably unitary, being pressed out of sheet metal. The housing has a recess 72 into which a box magazine 34 is inserted from below. The magazine is held in position by the magazine catch 73.

The grip member 70 and housing 71 are removable from the receiver 2 as a unit. By loosening the locking bolt 74, the lug 75 can be pushed downward out of engagement with bracket 76 on the frame 1. The entire unit 70 and 71 can then be swung downward to pivot on the cross pin 77 in the rearward extension of the grip member which is inserted in the slot 78 in the depending bracket 79 attached to the receiver 2. By turning the grip member on the pin 77 and then moving it rearward and downward, the grip member can be removed from the receiver.

The grip member comprises a trigger 80 pivoted on pin 81 and has a head 82 for engaging the bar 83 which is pivotally mounted on the grip member by the pin 84. This bar has a sear catch 85 for engaging the slide as shown in Fig. 4 and is held in an upward position by the spring 86. The hammer has a sear notch 87 which engages a sear catch 88 on the depressor arm 36. This depressor arm is pivotally mounted on pin 90 and is pressed upwardly by the spring 91. The ejector 92 is mounted in a slot in the breech block (Figs. 3 and 5) and is normally held in a forward position by the spring 93. The depending end 93' is slidable in the slot 94 in the receiver. On the rearward travel of the breech block the depending end 93' of the ejector slides in the slot 94 until it strikes the shoulder 94' and the empty case is thrown through the port 95.

In the embodiment of the invention illustrated, the handle 32 is connected to a rod 96 carrying a piston 97 which reciprocates in cylinder 14 during movement of the slide. The cylinder has a slot 98 overlying a slot 4 in the frame 1 and the piston pumps air over the fins 7 of the barrel which is surged back and forth through the slots 4 in the frame to cool the barrel. The piston 97 may be cushioned near the end of its stroke by regulating the discharge of air from the enclosed forward part of the cylinder by adjusting a vent opening with the screw 99.

The machine gun of the invention is operated as follows:

Fig. 1a shows the arrangement of elements at the instant the firing pin strikes the primer of the cartridge, for example a 30 caliber military cartridge. The recoil of the explosion drives the barrel, collar 8 and assembly of breech block 23, slide 24 and firing pin 20 rearward. When the collar strikes the stop 15, the slide and firing pin continue under their momentum. The firing pin is drawn to its rearward position as shown in Fig. 4 and the conical head 41 is moved out of contact with the locking lugs 28, 29 and 30. As the slide continues rearward, the fingers 37, 38 and 39 pull the lugs inwardly from the positions shown in Fig. 5 to the position shown in Fig. 7 and the lugs are removed from locking engagement with the rib 17. The lugs are preferably beveled to correspond with the beveled face 18 of the rib and this facilitates unlocking. The breech block is now disconnected from the barrel and since the spring 11 is compressed, the barrel and collar 8 are returned to the firing position of Figs. 1a, 2 and 3. On the initial rearward movement of the breech block, the extractor 22 draws the empty cartridge case out of the barrel chamber and the base of the cartridge is in contact with the breech block and ejector 92. The depending lug 93' strikes the shoulder 94' and the ejector strikes the cartridge with a sharp blow throwing the empty case through the port 95.

Due to the momentum imparted to the slide 24 and the engagement of the handle 32 with the breech block, the breech block is carried rearward with the slide. As the slide travels rearward it cocks the hammer 53 and compresses the return spring 56. At the rearward end of its travel the slide strikes the buffer bar 61 and the rearward travel is stopped. Ordinarily the member 61 is not compressed enough to strike the rubber buffers 60 which are primarily intended as emergency stops. It will be noted with reference to Fig. 4 that the sear catch 85 has engaged a notch on the slide and the entire assembly of breech block, slide and firing pin are held in the rearward position. When the trigger 80 is pressed the arm 83 is turned and the sear catch releases the slide which immediately starts forward. In the position of Fig. 4, the depressor arm 36 is raised by the spring 91 since the upper end is free in this position to enter the longitudinal slot 33 in the breech block. The sear 88 engages the notch 87 on the hammer and holds it in its cocked position as shown in Fig. 4. As the breech block continues forward, it engages the base of a cartridge in

the magazine 34 and pushes it into the chamber of the barrel. Near the end of the return stroke, the depending lug 35 on the breech block strikes the end of the depressor arm 36 and breaks the sear connection with the hammer. The hammer falls and strikes the firing pin which is in the rearward position shown in Fig. 4.

The conical head 41 is driven between the locking lugs 28, 29 and 30 which are in the position of Fig. 7 and forces them radially to the locked position of Figs. 1a and 5, the lugs being in engagement with the annular rib 17. An instant thereafter the firing pin strikes the cartridge primer and the firing cycle is repeated. So long as the trigger is held, the sear 85 cannot engage the notch in the slide and stop the slide as in Fig. 4 and the gun fires in full automatic action, the hammer being released each time the shoulder or depending lug 35 strikes the depressor arm 36.

To disassemble the gun, the handle 32 is pulled to its rearward position and the rod 96 is pulled out of the hole in the handle. Then the breech block is returned to its forward position. When the handle is coincident with the enlarged hole 47 of the slot 46, the handle may be pulled out. By removing the bolt 74, the grip member 70 and housing 71 can be removed as previously described. When the latch 12 is raised, the barrel can be pulled forward out of the frame 1. Then the entire assembly of breech block, slide and firing pin can be slid out of the receiver 2 and frame 1.

I claim:

1. The improvement in machine guns which comprises a receiver, a frame for the barrel, a barrel slidably mounted in the frame, a locking member connected to and movable with the barrel, means on the receiver forming a stop for the rearward travel of the barrel and locking member, a unit comprising a breech block, a slide within the breech block, a firing pin within the slide, a plurality of slots in the forward end of the breech block, a locking lug in each slot movable outwardly to engage the locking member and inwardly to an unlocked position, inclined surfaces on the slide, inclined surfaces on the lugs which coact with the inclined surfaces of the slide, and an inclined surface on the forward end of the firing pin which also coacts with said inclined surfaces on the lugs, whereby, on firing, the barrel and locking member with the unit travel rearward until the locking member strikes the stop, the slide continues to move

rearward under its own momentum and the inclined surfaces thereof pull the locking lugs out of locking engagement with the locking member and the breech block is unlocked and carried rearward along with the slide and firing pin, means for returning the barrel to its firing position immediately after unlocking, means for returning the unit of breech block, slide and firing pin to the locked position, and a hammer which drives the firing pin and forces the inclined surface thereof into engagement with the locking lugs, locking the breech block to the locking member.

2. An improved machine gun as defined in claim 1 which comprises a tubular frame connected to the receiver in which the barrel and locking member make bearing contact, and the stop is on the forward end of the receiver.

3. An improved machine gun as defined in claim 1 which comprises a firing pin having a conical head which engages the locking lugs as the firing pin moves forward to push the lugs into engagement with the locking member.

4. An improved machine gun according to claim 1 which comprises a tubular receiver having a cylindrical interior, a cylindrical breech block slidable in the interior of the receiver, said breech block having a cylindrical hole and a cylindrical slide in the cylindrical hole of the breech block.

5. An improved machine gun according to claim 1 which comprises an annular locking rib on the locking member.

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