

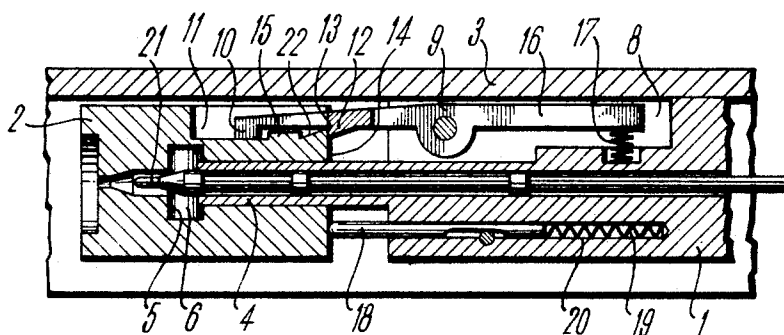
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[33] **Germany**
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[54] **AUTOMATIC FIREARM BIPARTITE SEMIRIGID BOLT**
11 Claims, 5 Drawing Figs.

[52] U.S. Cl. **89/187,**
42/16
[51] Int. Cl. **F41d 1/00,**
F41d 3/00
[50] Field of Search **42/16-**
—16.5; 89/173, 187, 194, 196, 179—183

ABSTRACT: An automatic firearm, in particular a hand firearm or small arm, with a semirigid bolt having a bolt head carrier provided with a camming piece and a bolt head disposed on the camming piece so as to be movable within certain limits in the longitudinal direction of the bolt. At two diametrically opposed points of the bolt, recesses are provided for accommodating locking members in the form of locking rollers which can be pushed outward by the camming piece to a point where they are free to leave the recesses of the bolt head in an outward direction and to enter into corresponding recesses in the barrel extension of the firearm.



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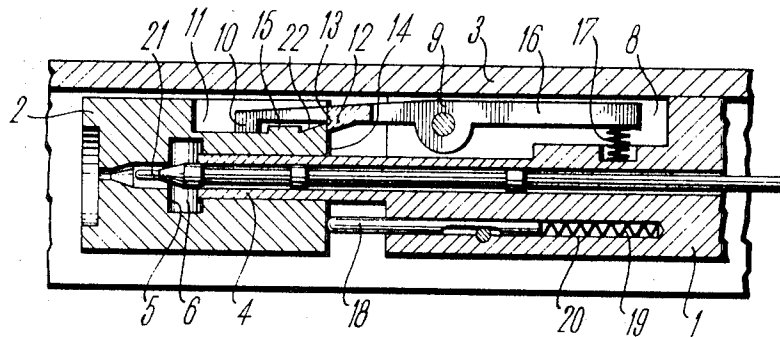


Fig. 1

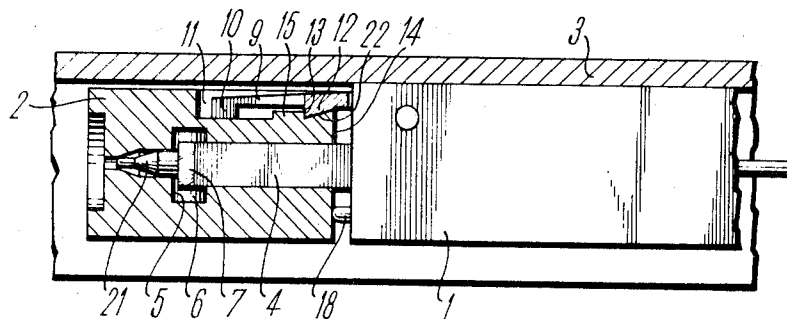


Fig. 2

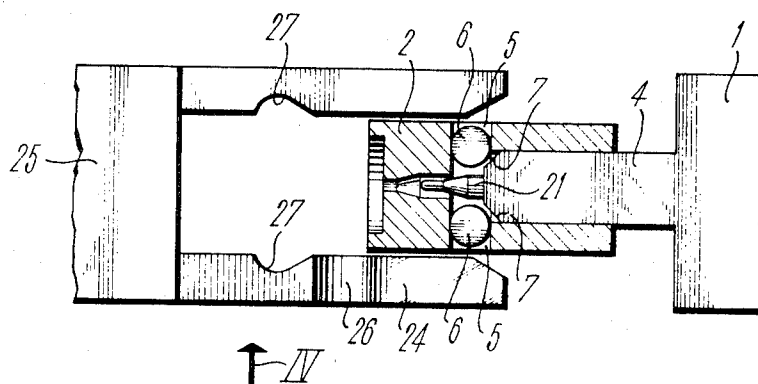


Fig. 3

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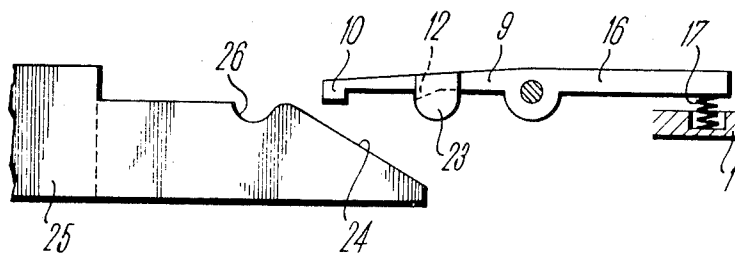


Fig. 4

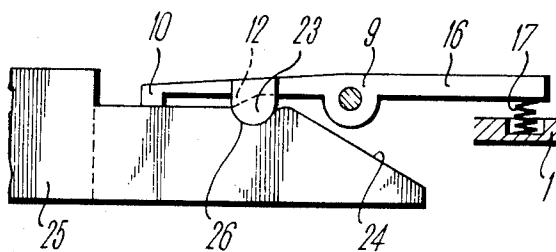


Fig. 5

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AUTOMATIC FIREARM BIPARTITE SEMIRIGID BOLT

The present invention relates to an automatic firearm, in particular a hand firearm or small arm, with a semirigid bolt consisting of a bolt head carrier provided with a wedge or camming piece and a bolt head which is so disposed on said camming piece as to be movable, within certain limits, in the longitudinal direction of the bolt and which at two diametrically opposed points is provided with recesses accommodating locking members, in particular locking rollers, which can be pushed outward by the camming piece to a point where they are free to leave the recesses of the bolt head in an outward direction and to enter into corresponding recesses in the barrel extension of the firearm.

In firearm with such bolts, the locking members, and in particular the locking rollers, are subject to forces exerted by the camming piece of the bolt head carrier which tend to push said members in an outward direction even during the counterrecoil of the bolt while the bolt head carrier is propelled by the recoil spring and advances the bolt head. The slide must, therefore, be provided with runways for said members which prevent the locking members from leaving the bolt head. These runways, apart from increasing the manufacturing costs of the firearm, are subject to heavy wear, which adversely affects the life of the firearm. A particularly grave disadvantage lies in the fact that in the extreme rear position of the bolt, when the bolt is stopped and flung back in the forward direction, and when the bolt head hits a cartridge to be inserted into the barrel, the camming piece, the locking members, and their guideways are subject to heavy impact loads. Said members must be of a very robust construction to withstand such impacts for a sufficiently long period of time. This is an essential disadvantage of the known automatic firearms of the type described.

It is the object of this invention to avoid these disadvantages. According to the invention, this objective is accomplished by pivotally mounting in one of the two parts composing the bolt a catch lever extending in the longitudinal direction of the bolt, a nose on said catch lever engaging the rear end of a shoulder on the other component part of the bolt when the latter is in the unlocked position, thus keeping the two component parts of the bolt spaced apart, and by providing a control cam which is permanently connected to the slide and which disengages the catch lever from the shoulder when the bolt moves into the locking position.

The invention ensures that the two component parts of the bolt are being kept apart during both the recoil and the counterrecoil of the bolt so that the camming piece cannot exert upon the locking members any forces acting in an outward direction. Consequently, there is no need of providing the firearm with any special runways for the locking members. It suffices to design the barrel extension in such manner that in case any locking members should have left the bolt head such locking members will be returned into said bolt head before said head moves into its locking position. The above explanations show that the application of the catch lever according to the present invention simplifies the firearm and increases its life. When the bolt moves into the locking position, an ordinary control cam disengages the catch lever from the shoulder so that the bolt head carrier can move against the bolt head when the latter has arrived at the rear end of the barrel and, with the aid of the camming piece, force the locking members, in a known manner, into corresponding recesses of the barrel extension of the firearm, thus achieving the desired semirigid locking feature.

In a preferred embodiment of the invention, the control cam, which is permanently connected to the slide, is provided with an indentation which engages a projection of the catch lever when the bolt is in its locked position. The antirebound feature of the catch lever according to the present invention obviates the need for supplementary masses or similar measures intended to prevent a rebound of the bolt, simultaneously ensuring extreme functional safety of the firearm.

Furthermore, the catch lever according to the invention may have a projection at one end, said projection engaging a recess in the other component part of the bolt and bottoming against one end of the recess when the bolt is in its unlocked position, such that in this embodiment of the invention the catch lever simultaneously serves as the connecting link which causes the bolt head to follow the recoil of the bolt head carrier and prevents the bolt head from sliding off the camming piece of the bolt head carrier. This obviates the need of locking studs or similar members previously used to prevent a separation of the bolt head from the bolt head carrier with the bolt in its mounted position, while permitting the bolt head to be displaced a certain amount with respect to the camming piece. The bolt according to the invention is thus further simplified by designing the catch lever so as to form such a connecting link.

In a preferred embodiment of the invention, the catch lever is mounted in the bolt head carrier. Generally, the bolt head carrier affords more space for accommodating the catch lever than does the bolt head. In the vicinity of its front end, the catch lever is provided with a sawtooth-shaped nose, the steep flank of which engages the rear end face of the bolt head with the bolt in the unlocked position and drops into a corresponding recess of the bolt head when the bolt is locked.

In order to disengage the nose from the rear end face of the bolt head, this embodiment of the invention provides for a cam to be disposed near the front end of the catch lever, laterally of the nose and extending in the same direction, said cam cooperating with a ramp disposed in the barrel extension of the firearm. The ramp is followed by an indentation into which the cam drops when the bolt is in the locking position, thus providing an antirebound feature.

In a further embodiment of the invention, a spring-loaded pin which tends to force the two components of the bolt apart may be mounted in one of the two bolt components, especially in the bolt head carrier, in a manner permitting said pin to be displaced in the longitudinal direction. Irrespective of manufacturing tolerances, this pin ensures that under any operating conditions the bolt head and the bolt head carrier will be kept apart far enough to enable the nose of the catch lever to engage the rear end of the corresponding shoulder of the other bolt component and to definitely keep the bolt components apart until the bolt again moves into the locking position.

The design of the firearm according to the present invention is particularly suitable for pistols. When applied to pistols, the bolt head carrier may be rigidly fastened in the slide in a manner known per se.

Further details and embodiments of the invention will become apparent from the following specification, in which the invention will be described and explained in greater detail, reference being made to an embodiment shown by way of example in the accompanying drawing. In other embodiments of the invention, the features apparent from the specification and the drawing may be applied separately or in any desired combination. In the accompanying drawing:

FIG. 1 is a vertical longitudinal section of a pistol bolt according to the invention in the counterrecoil position, drawn on a larger scale,

FIG. 2 shows the arrangement according to FIG. 1 in the locking position,

FIG. 3 is a top view of the barrel extension at the rear end of the barrel with a horizontal section through the head of the entering bolt and an exterior view of the forward portion of the bolt head carrier,

FIG. 4 is a side elevation of the barrel extension according to FIG. 3 in the direction of the arrow IV together with the catch lever prior to moving into the locking position, and

FIG. 5 is a side elevation similar to FIG. 4 but with the catch lever in a position corresponding to the locking position of the bolt.

As is apparent from FIG. 1, the bolt shown in the drawing consists of a bolt head carrier 1 and a bolt head 2 disposed so as to be movable with respect to said bolt head carrier. The bolt head carrier 1 is formed by a metal block secured, in a

manner known per se, in a slide 3 of U-shaped cross section, said slide being supported so as to be movable in the longitudinal direction of the pistol, as usual. The bolt head carrier 1 is provided with a rectangular forward projection 4 of reduced cross section on which the bolt head 2 is disposed so as to be

The projection 4 forms a wedge or camming piece for the control of two locking rollers 6 disposed in recesses 5 of the bolt head (FIG. 3). The end face of the camming piece 4 is provided with bevels 7 which cooperate with said locking rollers 6.

A catch lever 9 is pivotally supported in a recess 8 of the bolt head carrier 1, said catch lever extending in the longitudinal direction of said bolt head carrier and projecting from it with its front end in the forward direction. The front end of the catch lever is provided with a projection 10 which engages a corresponding recess 11 of the bolt head. Aft of said projection, and with spaced relation to it, the catch lever is provided with a sawtooth-shaped nose 12, the steep flank 13 of which faces forward. With the bolt unlocked, said steep flank 13 of said nose 12 is positioned behind the rear end face 14 of the bolt head 2, thus keeping the bolt head carrier and the bolt head separated by a predetermined fixed distance. At the same time, the projection 10 locks behind a projection 15 disposed in the recess 11 of the bolt head 2, thus preventing the bolt head 2 from sliding off the camming piece 4 of the bolt head carrier 1. In order to keep the projection 10 and the nose 12 of the catch lever 9 engaged with the bolt head, a helical compression spring 17 is disposed between the rear end 16 of the catch lever 9 and the bolt head carrier 1.

Furthermore, a pin 18, whose end projecting from the front end face of the bolt head carrier bottoms against the rear end face 14 of the bolt head 2, is slidably mounted in the bolt head carrier 1 in parallel relation to the catch lever 9. The pin 18 is loaded by a helical compression spring 19 which is located in the bore 20 accommodating the pin 18 and acts upon the rear end face of said pin 18.

Furthermore, the bolt head carrier 1 and the bolt head 2 are penetrated, in a known manner, by a firing pin 21. In addition, the bolt head is provided with a triangular recess 22 adjacent to the rear end face 14, the shape of said recess matching that of the sawtooth-shaped nose 12 of the catch lever 9.

As is apparent from FIGS. 4 and 5, the underside of the catch lever 9 is provided with a semicircular cam 23 adjacent to the nose 12. When the bolt moves into the locking position, this cam cooperates with a ramp 24 disposed on one side of the barrel extension 25 located, in a known manner, at the rear end of the barrel of the firearm. The ramp 24 serves as a control cam for the catch lever 9 and is so designed that under the action of the cam 23 it will pivot the catch lever 9 to a point where the front flank 13 of the nose 12 slides off the rear end face 14 of the bolt head 2. Adjacent to the ramp 24, the barrel extension 25 is provided with an indentation 26, into which the cam 23 can drop.

As will be noted from FIGS. 1 and 3, the catch lever 9, with the front end face 13 of the nose 12, keeps the bolt head 2 at such a distance from the bolt head carrier 1 that the locking rollers 6 in the recesses 5 of the bolt head have no contact with the control surfaces 7 at the front end of the camming piece 4. Consequently, the locking rollers 6 are completely relieved from all loads during the movement of the bolt and are not forced out of the recesses 5 in an outward direction. Simultaneously, the projection 10 at the front end of the catch lever 9 prevents the bolt head 2 from sliding off the camming piece 4 of the bolt head carrier. The bolt thus moves within the firearm as an essentially rigid unit without exerting any forces on the slide 3 or other parts of the firearm.

When the bolt moves forward into the locking position, the cam 23 on the catch lever 9 is brought into contact with the ramp 24 of the barrel extension 25 by the counterrecoil of the bolt and then raised as the bolt advances. As a result, the catch lever 9 will be pivoted to a point where the nose 12 slides off the rear end face 14 of the bolt head 2 and the bolt head carrier

er can approach the bolt head, which has meanwhile reached the locking position. The approach of the bolt head carrier causes the locking rollers 6 in the bolt head to be forced out of the recesses 5 of the bolt head in an outward direction and into corresponding recesses 27 of the barrel extension 25 by means of the bevels 7 at the front end of the camming piece 4. This describes the method of accomplishing the known semirigid locking feature of the bolt. In addition, however, the cam 23 on the catch lever 9 drops into the recess 26 of the barrel extension during the counterrecoil of the bolt head carrier 1, as shown in FIG. 5.

Simultaneously, the nose 12 drops into the recess 22 of the bolt head, as shown in FIG. 2. In this manner, rebound of the bolt head carrier 1 is positively prevented.

After the shot has been fired, the bolt head and the bolt head carrier recoil under the action of the gun powder gases and the bolt head and the bolt head carrier move apart again. The separating motion is assisted by the spring-loaded pin 18 which pushes the bolt head 2 away from the bolt head carrier 1 and ensures that the nose 12 of the catch lever 9, under the force of the spring 17, can again engage the rear and face 14 of the bolt head 1.

It will be apparent that the present invention provides a very simple bolt which is secured against rebound and ensures that the rear end of the barrel is properly locked at the moment the shot is fired and the locking members of which are subjected to loads at the moment of firing the shot only while no loads of any kind are acting on them for the rest of the time. This results in substantial simplifications and considerably increases the life of such a firearm. In particular, the present invention, for the first time, enables such a bolt to be also applied to pistols.

We claim:

1. An automatic firearm with a semirigid bolt consisting of a bolt head carrier provided with a camming piece and a bolt head which is so disposed as to be movable, within certain limits, with respect to said camming piece in the longitudinal direction of the bolt and which, at two diametrically opposed points, is provided with recessed, locking members being accommodated in said recesses, which locking members can be forced outward by the camming piece to a point where they can leave the recesses of the bolt head in an outward direction and enter into corresponding recesses in a barrel extension of the firearm, characterized in that a catch lever extending in the longitudinal direction of the bolt is pivotally supported in one of two component parts of the bolt consisting of a bolt head and bolt head carrier, a nose of said catch lever engaging the rear end of a shoulder on the other component part of the bolt with the bolt in the unlocked position, thus keeping the two component parts of the bolt apart, and a control cam is provided which is permanently connected to a slide and disengages said catch lever from said shoulder when the bolt moves into the locking position.

2. A firearm according to claim 1, characterized in that said control cam which is permanently connected to the slide is provided with an indentation engaged by a projection of said catch lever when the bolt is in the locked position.

3. A firearm according to claim 1, characterized in that one end of said catch lever is provided with a projection which is engaged by a recess of the other component part of the bolt and which bottoms against one end of said recess when the bolt is in the unlocked position.

4. A firearm according to claim 1, characterized in that said catch lever is loaded by a spring which tends to keep said nose and a projection provided on said catch lever in engagement with said other component part of the bolt.

5. A firearm according to claim 1, characterized in that said catch lever is supported in said bolt head carrier.

6. A firearm according to claim 5, characterized in that said catch lever, near its forward end, is provided with a sawtooth-shaped nose, the steep flank of which engages the rear end face of said bolt head with the bolt in the unlocked position and drops into a corresponding recess of said bolt head when the bolt is locked.

7. A firearm according to claim 5, characterized in that said catch lever, near its forward end and laterally of said nose, is provided with a cam extending in the same direction, said cam cooperating with a ramp disposed in the barrel extension of the firearm, said ramp being followed by an indentation into which said cam drops in the locking position of the bolt.

8. A firearm according to claim 1, characterized in that a spring-loaded pin, which tends to push the two component parts of the bolt apart, is supported in one of the two com-

ponent parts so that it can move in the longitudinal direction of the bolt.

9. A firearm according to claim 8, characterized in that said pin is supported in the bolt head carrier.

10. A firearm according to claim 1, characterized in that said bolt head carrier is secured in the slide of a pistol.

11. A firearm according to claim 1, wherein said locking members are in the form of locking rollers.

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