

Cartridge ejection arrangement

The invention relates to a cartridge ejection arrangement with at least two cartridge extractor hooks spring-mounted to a movable breech or bolt head, said extractor hooks which preferably face one another (generic part of Claim 1).

Positional terms such as "up" or "vertical" which are used here refer to the weapon in normal position, to which the named arrangement belongs. The direction of fire is horizontal to the "front".

A small arm, in particular a semi-automatic weapon with a barrel and a breech, which when opening moves approximately along the axis of the bore (central axis of the barrel) from the rear end of the barrel to the rear, in all cases exhibits a cartridge ejection arrangement with an extractor hook and an ejector. The extractor hook encompasses the rim or half-rim of the cartridge or engages in its bottom peripheral groove. The ejector is seated, with reference to the axis of the bore, somewhat opposite the hook, so that the rim of the cartridge bottom runs up against it. In this case the ejector is described as being stationary. What this means is that it is either firmly mounted to the weapon or its casing or that it is flexibly mounted in the breech or bolt head and at the end of its barrel recoil runs against a weapon-proof resistance.

The cartridge or cartridge case is ejected at a right angle to the axis of the bore. In the process, with reference to the axis of the bore, the extractor hook is seated at the side toward which the cartridge or cartridge case is ejected. The ejector is seated on the opposite side.

In the case of cartridges with e.g. a rim groove, which, turned toward the breech block (front surface of the breech), forms a flat surface, the extractor hook is seated snugly in the groove with a complementary supporting surface when it is extracted. The cartridge or its case can therefore only be released from this hook when it is tilted. In this way a reliable extraction of the cartridge case is guaranteed. In the case of a cartridge rim with a round contour, for example with small arms cartridges and shotgun cartridges, this extraction is in essence only guaranteed by frictional connection. A correspondingly powerful spring then loads the extractor hook in order to make possible a reliable extraction.

Insofar as can be gathered from the figures of US-3 906 651, such a cartridge with a round rim contour is shown there. This cartridge is seated on the breech block of a breech which exhibits two extractor hooks facing one another. The invention proceeds from this state of the art.

It is not possible to infer from this publication the reason this extractor arrangement has been chosen, nor can it be inferred how the ejector should be arranged and constructed. The contour of the two extractor hooks is also unusual and facilitates slipping from the cartridge rim. Such a slipping has to be possible with one of the hooks, if it is not intended to be uncommonly flexibly spring-mounted.

However, a longitudinal groove in the breech can be recognized in Figure 2 of this publication, which is located near one of the hooks and could hold the ejector.

The extraction of shotgun cartridges of about 12 or 10 caliber is often a problem particularly in the case of very long cartridge cases and in semi-automatic weapons, because the rapidly opening breech carries the extractor hooks along with it, which

for their part can then slip from the cartridge rim with round contour. Here the double extractor hook, which is known from the named publication, could perhaps offer a remedy. The double extractor hook could also be advantageous in the case of extremely large cartridges which can have a relatively small rim (flare, tear gas or shotgun cartridges of the caliber 4 (26.5 mm), grenade cartridges (4 cm) or the like).

Earlier in the case of small arms, in particular with ordnance weapons, one assumed that the shooter was right-handed. Left-handed shooters were trained to use the weapon with their right hand. Today they are making an effort to do justice to the characteristics of the shooter and are also setting up weapons for use by left-handed persons. Particularly in the case of semiautomatic weapons of the Bullpup design (the magazine is located behind the butt) this requires the cartridge ejector to be away from the face of the shooter, since the ejector is located at the height of the cheekbone.

However, also in the case of other weapons, for example aircraft machine guns of helicopters, the direction of ejection cannot be selected and at best should be adapted to the installation conditions. In the process the cartridge ejection can take place anywhere except toward the reloading device. For example if a cartridge gripper seated above the weapon is used, then the ejection can take place to the left or to the right, or even in a downward direction, depending on where a spent ammunition bag or chute can be mounted.

It is the object of the invention to create an improved cartridge ejection arrangement. In particular at least one of the above outlined disadvantages should be at least partially remedied and preferably an arrangement of the initially named type should be created, whose ejection direction can be altered.

To solve this task it is proposed that the initially named arrangement be further developed by making it possible to have at least one stationary ejector assigned to one or more cartridge extractor hooks in such a way that when the breech or bolt head returns the cartridge or cartridge case is pulled out of a cartridge chamber jointly by all cartridge extractor hooks and, when released from the cartridge chamber, swivels around the cartridge extractor hook and in the process is ejected to the side which does not have an ejector assigned to it (Claim 1).

We proceed from the fact that each of the extractor hooks has only a limited ability to keep the cartridge or cartridge case in the chamber in which it is ejected from. The use of several extractor hooks moreover definitely has advantages, particularly in the case of the aforementioned cartridges. If now all extractor hooks with the exception of the one on whose side the ejection is to take place have an ejector assigned, then the ejection can take place in any direction with an extractor assigned to it.

Of course the number of extractor hooks is limited, and three or more hooks will only be practical in the case of cartridges with very great diameter. In one embodiment of the invention it is therefore proposed that only two cartridge extractor hooks facing one another and one ejector be provided (Claim 2). This is however necessary and also sufficient in the case of a Bullpup weapon.

If now in addition the ejector exhibits two ejector projections which are both arranged at one of the two cartridge ejector hooks and which run in longitudinal grooves of the breech or bolt head, which discharge into the breech block on both sides of the cartridge extractor hook (Claim 3), then an arrangement is created which

- perfectly extracts even difficult cartridges and cartridge cases and
- can be retrofitted with the simplest means from right to left ejection and vice versa.

To be precise, only the ejector must moved be for the purpose of retrofitting. The location of the breech and the extractor hooks remains unchanged.

Conventional cartridge extractor hooks exhibit a hook-like end with a surface facing the breech block, which encompasses a cartridge rim. In accordance with a further embodiment of the invention it is proposed that when the hook-like ends encompass a cartridge rim, their surfaces form an acute angle to a plane parallel to the breech block, so that they move away from the center of the breech block to the front (Claim 4).

Preferably this acute angle lies between 0° and 15° (Claim 5).

In contrast to the initially named US publication, in which the extractor hooks are constructed complementary to the contour of the cartridge rim, in the case of the invention preferably a flat surface is used, which is seated on the rim. Thus cartridges of all different kinds of design can be used, including those whose rim forms a surface turned away from the breech block that is parallel to it. Such a rim can be present in the case of cartridge cases for special cartridges, for example flare cartridges. Such cartridge cases are manufactured for example by means of turning on a lathe or by means of indirect extrusion.

The arrangement of the invention can be used for small arms of all types. It is particularly advantageous for large caliber cartridges. Thus it is particularly preferable that the arrangement be e.g. assigned to a shotgun

(Claim 6), in particular being assigned to a repeating or a semiautomatic shotgun. Here the structural diversity and mutual deviation of cartridges for one and the same caliber is particularly great, on the other hand the need for retrofitting a weapon for right-handed shooters to left-handed shooters is particularly great. Such a weapon is namely not a personal weapon such as an automatic rifle, which can accompany a soldier practically throughout his entire period of service, but rather is only issued for special operations. Weapons with a caliber of more than 15 mm are basically not included in this category.

An embodiment of the arrangement of the invention is explained in greater detail with the help of the following drawing. The figures show the following:

- Figure 1 shows an oblique aerial view of a breech of a semiautomatic shotgun that is equipped with the arrangement of the invention,
- Figure 2 shows the top view of the breech with ejector,
- Figure 3 shows the view of an extractor hook and
- Figure 4 shows the partial view of an ejector viewed from the front or the rear.

Figure 1 shows a bolt head 1 which is moveable along two guide bars 3. This breech exhibits a breech block 5, to which one extractor hook 7 each is assigned on both sides.

The extractor hook 7 is shown enlarged in Figure 3. It is for example stamped out of sheet metal and exhibits on the whole a somewhat t-shaped contour, whose middle shaft exhibits a bore hole 9 on the end. A rear flange 11 and a front flange 13 extend at a right angle from the center shaft on its other end. The rear flange 11 bears

an angular connecting piece 15 on its free end, which is intended for engagement in a spiral compression spring (not shown in the figure). The front flange 13 bears the actual hook 17 on its free end, said hook exhibiting a surface 19 turned toward the middle shaft, which runs at an acute angle to the extension of the middle shaft, and hence also at an acute angle to the breech block 5 (Figure 2). The two extractor hooks 7 are each pivotable around an axis, somewhat in the form of a holding pin 21, which penetrates the bore hole 9.

The breech 1 exhibits a longitudinal crosspiece 25 on both sides, to whose exterior side the corresponding extractor hook 7 is mounted. The two hooks 7 are seated on both sides of a cartridge. An ejector 27 is seated behind the breech 1 in the region of its barrel recoil. This ejector is shown in break and from above. Viewed from the front or the back, the ejector 27 exhibits a u-shaped cross-section. When the breech 1 recoils, one of the longitudinal crosspieces 25 runs through the ejector 27. The two u-flanges of this ejector 27 engage the corresponding longitudinal crosspiece 25 from above and below and extend with their ends to the breech block 5. The ends of these flanges are marked 29 in Figure 4.

Since the cartridge or cartridge case 23 is held on the breech 1 by means of the extractor hooks 7 and is carried along with the breech, it returns with the breech 1. The ejector 27, on the other hand, remains stationary during this movement of the breech. Thus the longitudinal crosspiece 25 moves through the two flanges of the ejector 27 to the rear. When the breech block 5 reaches the ejector 27, then the bottom of the cartridge 23 runs up to its ends 29 and is pressed against the

(right) extractor hook 7. Due to the interaction of the round contour of the cartridge rim with the beveled edge 19 (Figure 3) the extractor hook 7 is pushed back, and the ejector 27 imparts a powerful thrust to the right part of the cartridge rim, so that the cartridge 23 swivels around the left extractor 7 and is ejected.

Moving the ejector 27 to the other (left) side of the breech similarly brings about an ejection to the right.

The ejector 27 can be inserted into a longitudinal groove or transverse groove in the weapon casing. A component of the weapon or a pin can hold the ejector in this position.

Patent Claims

1. Cartridge ejection arrangement with at least two cartridge extractor hooks (7) spring-mounted to a movable breech or bolt head (1), said extractor hooks (7) which preferably face one another, characterized by the fact that at least one stationary ejector (27) assigned to one or more cartridge extractor hooks (7) in such a way that when the breech or bolt head (1) returns the cartridge or cartridge case (23) is pulled out of a cartridge chamber jointly by all cartridge extractor hooks (7) and swivels around the cartridge extractor hook (7) and in the process is ejected to the side which does not have an ejector (27) assigned to it.
2. Arrangement in accordance with Claim 1, characterized by the fact that two cartridge extractor hooks (7) facing one another and one movable ejector (27) are provided.
3. Arrangement in accordance with Claim 2, characterized by the fact that the ejector (27) exhibits two ejector projections (29) which are both arranged at one of the two cartridge ejector hooks (7) and which run in longitudinal grooves or along a crosspiece (25) of the breech or bolt head (1), which discharge into the breech block (5) on both sides of the cartridge extractor hook (7).
4. Arrangement in accordance with one of Claims 1 through 3, characterized by the fact that the cartridge extractor hooks (7) exhibit a hook-like end (17) with a surface (19) facing the breech block, which when the hook-like ends (17) encompass a cartridge rim, form an acute angle to a plane parallel to the breech block, so that these surfaces

(19) move away from the center of the breech block (5) to the front.

5. Arrangement in accordance with Claim 4, characterized by the fact that the acute angle lies between 0° and 15° .

6. Arrangement in accordance with one of Claims 1 through 5, characterized by the fact that it is assigned to a shotgun or to a weapon with a caliber of more than 15 mm.