~~Ejector for a Firearm, as well as a Receiver and Firearm~~

Having an Ejector

The invention relates to an ejector for a firearm comprising an ejector main body having an ejector element disposed thereon, such that the ejector element, after the ejector has been mounted on the receiver of the firearm, extends into the movement path of a backward and forward running breechblock guided in the receiver such that it can move longitudinally, forms a counter bearing for the casing base of a cartridge casing extracted from the cartridge chamber by a returning breechblock and, after interacting with the casing base, ejects and/or discards the cartridge casing from the receiver

The invention also relates to a receiver as well as a firearm, each of which are equipped with an ejector of this type.

In these documents, positional terms such as "up," "down," "front," "back," etc. are always from the perspective of a shooter holding the weapon in the normal shooting stance, with the bore axis running horizontally.

Prior Art

Ejectors are known in various embodiments and have the duty of ejecting or discarding a cartridge casing from a firearm, which has been removed from the cartridge chamber of the firearm immediately prior to this by an extractor disposed on a breechblock.

The operating sequence when shooting a cartridge and the subsequent ejection of the empty cartridge casing is known *per se* and can be depicted in a simplified manner in brief as follows: For firing, first a breechblock, in particular a bolt head, guides a cartridge from the cartridge supply device into the cartridge chamber of a firearm. The actuation of a trigger mechanism releases a firing pin, which then strikes the cartridge base and there ignites a charge, such that a projectile is shot out of the cartridge casing through a barrel.

The forces, or gases, respectively, released during the firing process are used to displace the bolt in a return movement. With a gas-operated reloading, for example, the discharged firing gases drive the breechblock at a high speed toward the back, in the direction of the stock via a piston rod. At least one cartridge extractor is provided thereby on the breechblock, on the bolt head, specifically. This extractor encompasses the spent cartridge casings, at their edge on the casing base, and removes them from the cartridge chamber during the return movement of the breechblock. An ejector then forces the cartridge casing out of the receiver.

The generic ejector specified in the introduction is known from DE 10 2010 009 488 B3, and is used, for example, in the machinegun HK121 of the applicant. A longitudinal groove is provided in the breechblock, on its upper surface, in which the ejector tappet of the stationary ejector extends during the return of the bolt. After firing, the cartridge casing retained by the extractor on the bolt head moves at high speed toward the ejector tappet, which ejects the cartridge casing and in doing so rotates it. This leads to a heavy load to the extractor, which functions as a counter bearing when the cartridge casing strikes the ejector tappet. The cartridge casing rotating out of the extractor then strikes the piston rod in a defined manner, where it is deflected and exits the machinegun receiver downward, through a cartridge ejector window, at high speed.

This ejector leads to heavy loads to the individual elements, in particular the ejector and the extractor, such that there is more wear to these components, and the service life thereof is reduced.

Furthermore, ejectors are known from the prior art, in which a thrust bolt is spring mounted in the bolt head. The thrust bolt is pretensioned thereby, via a spring, against a cartridge base of a cartridge casing located in the cartridge chamber, and is retained in the bolt head. During the return of the bolt, and during the extraction of the cartridge casing from the cartridge chamber, the spring relaxes and forces the thrust bolt outward. The thrust bolt acts on the cartridge base thereby, and pushes the cartridge casing out. Such thrust bolts are known, for example, from the firearms by the applicant, G36, HK416, HK417 and from the GPMG. US 2011/0168009 A1 also discloses a semiautomatic firearm having such a thrust bolt.

The disadvantage of thrust bolts of this type is that only relatively weak spring forces can act on this thrust bolt because otherwise the recoil springs of these bolts can no longer securely return these bolts against the force of the thrust bolt spring. Furthermore, there is relatively little space in these bolts for a markedly strong thrust bolt spring. This applies in particular to rotating bolts, such as those known from DE 10 2010 009 427 B4 by the applicant.

The above solution is also not suitable for a high cadence range and long firing sequences in sustained fire because there is little time for the ejection process, and the relatively weak thrust bolt springs cannot move the casings quickly enough. With high cadences and long firing sequences in sustained fire, an ejection system of this type leads to malfunctioning of the firearm and in particular to ejection failures due to cartridge casings not being ejected.

Furthermore, the semiautomatic rifles HK-SL6 and HK-SL7 by the applicant are known. These semiautomatic rifles comprise a rolling block. A two-armed rocker lever is provided with these firearms as an ejector, which is disposed on the side of the receiver and extends in the longitudinal direction of the semiautomatic rifle. A bolt head returning after firing

extracts a cartridge from the cartridge chamber with an extractor. It runs thereby to the rocker lever with a lateral guide recess. Because the rocker lever has ends that curve upward at both ends thereof, the returning bolt forces the back end of the rocker lever downward and the front end upward. The front end engages in the bolt head and forces the cartridge casing out of the bolt head from below. The rocker lever is spring mounted via a spring assembly, such that it can be displaced toward the back.

This construction, having a rocker lever, also requires a relatively weak ejector spring, because the kinematically unstable rocker lever does not allow for a strong return pressure spring, but rather, only a relatively weak, purely buffering spring.

The embodiment of the ejector as a rocker lever having a casing advance buffer is prone to wear and is not suitable for higher cadences and continuous firing loads in sustained fire.

Lastly, DE 1 015 724 shows an ejector for automatic firearms. A spring mounted ejector slider is provided in the bolt head. During the bolt return, the ejector slider strikes a spring mounted, pivotable mass, which drives the ejector slider forward, out of the bolt, and strikes the cartridge base thereby.

This design has a complex structure and comprises numerous components, which are prone to wear and soiling. In particular, a construction of this type, having a relatively light stopping mass subjected to spring pressure, results in this stopping mass being deflected, as desired, after being struck by the ejector slider, and then, however, it releases its entire acquired kinematic energy on the receiver part, without buffering, which would destroy both the stopping mass as well as the receiver part in a very short time.

On the whole, known ejectors are prone to wear, structurally complex, and not suited for continuous sustained fire and long component downtimes, as is required of modern machineguns.

~~Object and Solution Therefor of the Invention~~

With this background, the object of the present invention is to provide an improved ejector as well as a receiver and a firearm having such an ejector, in order to overcome the disadvantages specified above, or to at least reduce said disadvantages.

This object is achieved, respectively, by the subject matter of the independent Claims 1, 15 and 21.

The generic ejector thus has, according to Claim 1, additionally, the following features: the ejector additionally comprises means, by means of which the ejector is flexibly mounted in relation to the receiver, such that it returns in a straight line for a short distance, as a result of an interaction with the casing base, together with the casing base, along which path it is slowed until reaching a standstill, and ejects/discards the cartridge casing thereby.

The subject matter of Claims 15 and 21 are distinguished in that a receiver and a firearm are each provided with an ejector of this type.

The ejector according to the invention is fail-safe and increases the reliability of a firearm equipped therewith, even with high cadences and long firing sequences in sustained fire. Firearms as intended by the invention comprise automatic firearms, in particular machineguns. According to the invention, force peaks of a cartridge casing extracted from the breechblock and returning at high speed, which act on the individual components, in particular the ejector and the extractor, can be buffered well, without compromising the reset forces of the recoil spring for the breechblock.

The buffering slows down the impact energy, slows the casing rotation and causes a counter reaction of the buffered ejector main body, and a harmonization, overall, of the entire ejection

~~process. This leads to a softer engagement of the ejector with the cartridge casing in a first phase~~ of the ejection process, when the base of the casing strikes the ejector main body, which enables a controlled, homogenous initial rocking motion of the cartridge casing. Because the cartridge casing is retained by the extractor at the bottom and/or at the side, and is ejected from above by the ejector, this causes the cartridge casing to rotate. After overcoming the inertia and friction, in a second phase of the ejection process, during the casing ejection, the at least one elastic element forces the ejector, or ejector main body, back into its starting position, wherein the ejector increases its ejection force exerted on the cartridge casing, and further homogenizes the downward rocking motion of the cartridge casing. This homogenizes the rotational speeds of the cartridge casings, and enables a continuous defined ejection, even at relatively strongly fluctuating return speeds of the bolt. The design features of the ejector element according to Claims 12 to 14 also contribute thereto, for which Claims independent protection is sought.

The buffering of the force peaks acting on the individual elements also improves the durability of the individual components, because it reduces the load thereto, and thus the wear thereof. As such, with the claimed ejector, it is possible to increase the lifetime of the spring loaded ejector to over 118,000 shots, and the lifetime of the extractor to over 50,000 shots. Furthermore, according to the invention, the cartridge casing ejection and the ejection failure rate can be improved to statistical failure rates for over 50,000 shots.

On the whole, the ejector according to the invention is less prone to malfunction, and exhibits less wear in comparison with the known prior art, thus increasing the lifetime of the components subject to load.

Preferably, the means in the ejector for a flexible mounting of the ejector, at least in or on the receiver, have a supporting elastic element.

~~The at least one elastic element can, for example, be formed as an elastomer in a simple design.~~ Other elastic elements can also be used, however.

The elastic element is preferably a spring, in particular a spiral spring. A spring is a simple and inexpensive means, which can be connected to the ejector main body with little structural effort, and which provides a sufficient reset force, which also requires the reproducibility of the rotational movement of the cartridge casing during its ejection. In the case of a malfunction, the at least one spring can be replaced.

The means in the ejector for the flexible support of the ejector element preferably comprise at least one accommodating recess in the ejector main body for guiding and accommodating the at least one spring element.

This enables a compact construction and reduces susceptibility to soiling. Furthermore, this reduces susceptibility to failure of the ejector, because the elastic element is prevented from bending. In a structurally simple design, the accommodating recess is designed as a blind bore in the ejector main body.

Preferably the means of the ejector comprise at least one accommodating and guide element that can be supported on the receiver, for additional accommodation and guidance of the at least one elastic element.

In a simple design, the accommodating and guide element is designed as a guide sleeve, into which the elastic element can be inserted. As a result, the functionality of the elastic element can be ensured, because, for example, a bending of the elastic element, in particular a spring, is prevented. The interior dimensions of the guide sleeve are preferably complementary to the exterior dimensions of the elastic element thereby. The accommodating and guide sleeve can be

closed at its end facing away from the ejector, which results in an increase in the functional reliability of the at least one elastic element, because it can be supported thereon.

The ejector preferably comprises a securing element, which retains the elastic element in a pretensioned state in the receiver, and secures it there.

The securing element can be designed as a bolt, screw or other suitable fastener. The ejector main body is preferably retained in a pretensioned manner thereby, such that, when in the standby position, it is always in the same defined position on/in the receiver. This ensures that a cartridge casing can strike the ejector element in the same defined ejection position, and also that the first force peak when the casing base strikes the ejector element is always countered at the same location with the same reset force.

Preferably at least one contact and/or guide surface is provided on the ejector main body of the ejector for the contact and/or guidance thereof on the at least one securing element.

As a result, it can be ensured that the ejector main body is located in the same defined position, by means of which, additionally, the defined ejection position is ensured.

Preferably the ejector main body of the ejector is designed in the manner of a U-shape, and can be disposed with a connecting part, that connects its two U-legs in the manner of a bridge, in or on the receiver, transverse to the direction of firing, and extends thereby over the width of the receiver, while its two U-legs extend in the longitudinal direction of the receiver, toward the back.

The ejector element can be disposed thereby, laterally or centrally, in a guide channel in the receiver. In a simple design, the ejector element is disposed centrally. This enables a highly symmetrical arrangement in relation to the longitudinal axis of the firearm, and thus a highly symmetrical introduction and distribution of forces to the ejector and the receiver; additionally, a

stable design of the ejector as well, and a defined contact point for a cartridge casing on the ejector element are ensured. This also enables a stable design of the ejector main body and reduces the risk of functional failures, such as a canting during its longitudinal movement.

The accommodating recess for guiding and accommodating the at least one elastic element is provided in each of the ends of the U-legs. Normally the elastic element cushions the ejector such that the leg end(s) are spaced apart from the receiver. The leg end can, however, be designed such that it serves as a stop in the receiver, in case the spring element fails, for example.

The U-legs of the ejector main body preferably comprise, in each case, guide surfaces for guiding the ejector main body in or on the receiver.

The guide surfaces can be formed on the top surface, the outer surface, the inner surface and/or the undersurface of the U-legs. The guide surfaces can also be provided only in part, on at least one U-leg, in order to provide the smallest possible contact surface in or on the receiver. This ensures a longitudinal movement of the ejector in or on the receiver that is frictionless to the greatest possible extent.

At least one recess is preferably provided in each of the guide surfaces of the U-legs of the ejector main body.

The recesses can extend in part, or entirely, over the respective upper surface, outer surface, undersurface and/or inner surface of the at least one leg. As a result, the longitudinal movement of the ejector main body in the receiver can be ensured, even in the case of soiling with, for example, sand or earth, because any soiling occurring on the guide surfaces is forced into the recess during the longitudinal movement.

The ejector preferably comprises two elastic elements that are disposed symmetrically to one another, each having associated accommodating and guide recesses in the two U-legs of the ejector main body and accommodating and guide elements that can bear against the receiver.

In particular in one design of the ejector main body, having two U-legs that are parallel to one another, two elastic elements ensure the functionality of the ejector and prevent, for example, a canting or other functional disorders.

The ejector element of the ejector preferably comprises a basically cuboid guide and impact recess on its end extending into the movement path of the breechblock, which extends backward, toward the returning cartridge casing, and as a result, has at least one guide and impact surface running in this direction, for the cartridge casing that is to be ejected.

Due to the necessary manufacturing tolerances and strong accelerations, a breechblock does not normally always run centrally in the receiver during return, but instead, oscillates inside the receiver. The oscillations in the bolt motion can be attributed to a play in the lateral guides of the bolt. As a result, a cartridge casing frequently strikes the ejector element of the ejector at different contact points.

The two impact and guide surfaces are designed to engage with the casing base of a cartridge casing during an ejection process, and to guide the casing base in a defined, precisely repeatable, ejection position inside the recess. This is preferably that position in which the rearward casing region lies snuggly in the corner of the recess.

During ejection, the respective guide and impact surface thus guides a cartridge casing arriving there into the guide and impact recess. The guide and impact recess can be substantially, or nearly rectangular thereby. The guide and impact surface compensates for irregularities in the

ejection movement and thus at in the contact points of the cartridge casing, because the at least one guide and impact surface guides the cartridge casing to nearly the same ejection position inside the impact recess. A cartridge casing thus cannot deviate inside the impact recess, and therefore always ends up in the defined contact position. This enables a defined, precisely repeatable, ejection, which in turn leads to a defined and precisely repeatable rotation of the cartridge casing.

The at least one guide and impact surface of the guide and impact recess preferably runs toward the back and is tilted downward and/or has a guide channel that is at least nearly complementary to the casing base.

These measure also facilitate a guiding of the cartridge into the defined ejection position.

Preferably the guide and impact recess has at least one vertical guide and impact surface for the casing base of the cartridge casing that is to be ejected.

In the defined ejection position, the casing base then lies on the rear, vertical impact and guide surface, and the region of the casing shell protruding therefrom lies on the horizontal impact and guide surface.

With a receiver equipped with the ejector according to the invention, the receiver comprises at least one recess that is complementary to the ejector main body for the accommodation and longitudinal movement guidance thereof.

The ejector can be accommodated thereby, entirely or in part, in the receiver in the respective, at least one, recess. Alternatively, a supplementary structure can also be provided on the receiver, in which the ejector is entirely or partially accommodated. The complementary design of the recess ensures a stable longitudinal movement of the ejector main body during an ejection

~~process, and prevents it from tilting or canting. Guide surfaces counter to the guide surface of~~ the ejector may be provided in the recess.

The receiver as set forth in the present invention comprises a single-piece receiver as well as a multi-piece receiver. The ejector is provided there at a suitable position. In the case of a multi-piece design, the receiver can be composed, in the known manner, of two receiver halves or shells, separated vertically in relation to one another. Different suitable substances for the receiver or the receiver shells, or the parts thereof, may be used thereby, and are already known from DE 10 2010 009 488 B3.

The receiver preferably comprises at least one recess for accommodating and guiding the at least one accommodating and guide element, wherein the recess having the recess for accommodating the ejector main body is designed such that it is flush with and complementary to the accommodating and guide element.

The second recess for accommodating and guiding the accommodation and guide element can, for example, be introduced, or designed, in a structurally simple manner, as a blind bore in the receiver or in a supplementary structure attached thereto. This increases the stability of the ejector and ensures the longitudinal movement of the ejector main body. This also improves the buffering and accommodation of the force peaks exerted on the ejector by a cartridge casing during an ejection process, in particular the ejector main body, because the accommodation and guide element is received in the recess in the receiver, and is supported therein.

The receiver preferably comprises at least two recess formed in the receiver that are symmetrical to one another, for accommodating, in each case, one of two accommodation and guide elements.

The symmetrical design prevents a tipping or canting of the ejector main body during its longitudinal movement in the course of the ejection.

~~A stabilizing element is preferably provided in the receiver, for stabilizing the receiver, which~~ element is disposed transverse to the direction of firing.

The stabilizing element can be designed as a bridge element, and can be disposed at suitable positions on a receiver. The stabilizing element is preferably disposed on the upper surface of the receiver, centrally, for example. Thus, the stability of the receiver can be increased, and a tilting of the receiver shells can be prevented. Fundamentally, it is possible to permanently connect the stabilizing element to the receiver, by welding, gluing or suchlike, for example. It is, however, preferably placed on the upper surface of the receiver.

The stabilizing element is preferably secured and/or aligned on the receiver by at least one securing element, and at the same time, also retains and secures the ejector main body, in a tensioned manner, in the receiver.

Screws may be provided as the securing element, for example. Other suitable mechanical attachment and securing elements are also possible, which pass through the stabilizing element in corresponding holes, e.g. bores, at basically a right angle, and connect the element, in each case, to a receiver half. The holes, or bores, provided on the receiver ensure a positioning and alignment therein for the position of the securing element.

Preferably, at least one recess is provided on the receiver, in which the at least one securing element can be placed and secured.

For this, a bore or other suitable hole, for example, may be provided in the receiver, or a receiver half, in each case, in which the securing element can be inserted from above, and secured, for example, via a threaded connection.

The ejector is preferably also designed as a retrofitting kit for firearms.

~~Due to the simple construction of the ejector according to the invention, existing receivers can~~ also be retrofitted with a minimum of mechanical reworking. With modern, newly produced weapons, the ejector according to the invention is preferably a component of the receiver from the start, or, respectively, the receiver is designed to accommodate an ejector of this type.

On the whole, an ejector is provided in accordance with the invention, which ejects cartridges in a defined manner, with increased precision, and reduces the wear to the components subjected to load.

Description of the Figures

Exemplary embodiments of the invention are explained in greater detail below, with reference to the attached, schematic drawings. Therein:

Figure 1 shows a perspective exploded depiction of an ejector according to the invention, and beneath this, a perspective view of a receiver in a diagonal view from behind and above;

Figure 2 shows a perspective depiction of an ejector main body, likewise according to the invention, of the ejector according to the invention, in a diagonal view from the front and above;

Figure 3 shows a perspective depiction of an ejector according to the invention mounted in a receiver, in a diagonal view from the front and above;

Figure 4 shows an enlargement of a section of Figure 3;

Figure 5 shows a longitudinal section through a receiver, with a returning bolt prior to an extracted cartridge casing striking the ejector according to the invention;

Figure 6 shows a longitudinal section through the receiver in Figure 5, when the cartridge casing strikes the ejector;

Figure 7 shows a longitudinal section through the receiver in Figure 6, in two section planes, wherein the ejector according to the invention cushions the cartridge casing;

Figure 8 shows a longitudinal section through the receiver in Figure 7; and

Figure 9 shows a longitudinal section through the receiver in Figure 8, after ejecting the cartridge casing.

The construction of the ejector according to the invention shall first be described with reference to Figs. 1 to 4. Figures 5 to 9 show the functional sequence of the ejection of a cartridge already extracted from the cartridge chamber, in various positions.

In accordance with Figs. 1 to 4, the ejector 1 comprises an ejector main body 5, which, substantially, has the shape of a U (lying flat) when seen from above, and shall be described in greater detail in reference to Figure 2.

Furthermore, the ejector 1 comprises two spring elements 7a, b for cushioning the main body 5. The spring elements 7a, b are designed as helical springs and can be inserted in guide and accommodating sleeves 9a, b, which accommodate the spring elements 7a, b in their interiors, and are supported on the receiver 3 when in the assembled state. The guide/accommodating sleeves 9a, b are closed at their rear ends, such that the spring elements 7a, b can each be supported there at their rear ends. The spring elements 7a, b are inserted into the guide/accommodating sleeves 9a, b such that a bending of the spring elements 7a, b, and thus a malfunctioning thereof, is nearly impossible.

The spring elements 7a, b can be inserted at their front ends in accommodations 11a, b in the main body 5 having the form of blind bores. Guide surfaces 13a, b formed on the main body 5

~~in front of the blind bores 11a, b facilitate the insertion of the spring elements 7a, b.~~

The receiver 3 is substantially composed of two receiver shells 23 and 25, and a connecting block 31. The receiver shells 23 and 25 can be brought into their final form, for example, during the production thereof, or they can also be subsequently milled, drilled or otherwise suitably processed. The connecting block 31 forms the front part of the receiver, is flush with the longitudinal axis of the receiver, and serves to accommodate the barrel (not shown) and a gas piston rod (not shown) in the present example. For this, it comprises a cylindrical gas piston rod receiver 33 and a barrel receiver 35 formed above it. The gas piston rod receiver 33 accommodates a gas piston rod guide (not shown) having an appropriate fit, which actuates a pressurized gas reloading mechanism in the known manner.

Guide tappets 37a, b, formed such that they are parallel to one another, in each case, are provided on the barrel receiver 35, for aligning the barrel; additional connecting pins 39a, b, c, engage in complementary positioning recesses 41a, b, c in the respective receiver shells 23, 25, and are connected there to the positioning recesses 41a, b, c. The receiver shells 23, 25 are thus secured to the connecting block 31.

A guide channel 29 for a breechblock that is guided such that it can move longitudinally therein is formed between the two receiver shells 23 and 25. For this, guide rails 65a, b that lie opposite one another, among other things, are provided on the interior surfaces of the receiver shells 23, 25 in each case, which are in a guiding engagement with the (not shown) breechblock. The breechblock can comprise, for example, a roller guide or other suitable guidance means (not shown). The guide rails 65a, b can each be designed as grooves or depressions, or even as rises, in the receiver shells 23, 25.

A trigger device (not shown) can be inserted in the receiver 3, at the undersurface of the assembled receiver shells 23, 25, which extends into the guide channel 29. Additionally, a cartridge ejection window (not shown) is provided, in each case, on the undersurface of the two

receiver shells 23, 25. The upper surface of the receiver 3 can be closed via a (not shown) cartridge supply cover.

Eyelets 62a, b for a carrying strap are formed at the rear ends of the receiver shells 23 25; additionally, recesses 67a, b are provided, such as bores, for attaching and/or securing a shoulder rest (not shown). The rear end of the receiver shells 23, 25 is designed as a stock accommodating region, which can be connected to a (not shown) shoulder rest via a (not shown) shoulder rest receiver in the known manner.

The ejector 1 can be inserted in the receiver 3. For this, complementary recesses 27a, b are provided in the receiver 3, which are designed such that they enable a longitudinal movement of the ejector main body 5. The recesses 27a, b can be formed as openings, for example, in the production of the receiver shells 23, 25, or, however, they can be formed subsequently through appropriate suitable processing, e.g. they can be milled or drilled therein.

Furthermore, a recess 63a, b (Figs. 3, 4) for accommodating and guiding the accommodation and guide sleeves 9a, b is provided in the receiver 3, on both sides, meaning in each receiver shell 23, 25, each of which recesses is flush with the recesses 27a, b for accommodating the ejector 1, and which extend these recesses toward the rear. These recesses 63a, b can be formed by bores in the respective receiver shells 23, 25, and are designed to be complementary to the accommodating and guide sleeves 9a, 9b. The recesses 63a, b can extend over the entire length of the accommodation and guide sleeves 9a, b. In the depicted embodiment, however, they only accommodate the rear ends of the accommodating and guide sleeves 9a, b. The exposed region of the accommodating and guide sleeves 9a, b is, in each case, encompassed by a rib-like structure of the receiver 3, which is of a structural nature.

In order to secure the ejector 1 in the receiver, two securing elements in the form of screws 19a, b are provided. The screws 19a, b are designed to pass through a recess, basically a bore 43a, b,

in each case, in the receiver 3, and to be tightened in each case into an accommodation 42a, b, basically a threaded bore, in the receiver 3.

In addition, a stabilizing element 15 is provided, which can be placed on positioning shoulders 16a, b provided in the receiver 3, in the manner of a connecting yoke, transverse to the direction of firing. The stabilizing element 15 has recesses in the form of bores 17a, b on its two outer ends, through which the screws 19a, b pass. Additionally, washers 21a, b are provided, which can be placed on the stabilizing element 15 from above, and thus prevent the screw heads from penetrating the stabilizing element 15.

The ejector main body 5 has – as has already been pointed out, and is visible in Fig. 2, in an enlargement – substantially, the form of a U, lying flat. The open side of the U points toward the shoulder rest when in the installed position. A connecting element 44, designed in the manner of a bridge, connects the identical two lateral legs 45a, b, which extend at the ends of their legs toward the rear. An ejector element 46 is disposed, centrally, on the undersurface of the connecting element 44, which extends downward in the manner of a tappet. In the assembled state of the ejector 1, the ejector element 46 extends with its lower end into the guide channel 29 of the receiver 3.

A recess 47 is provided at the lower end of the ejector element 46, which is designed in the manner of a right angled step in the depicted exemplary embodiment, and thus depicts a basically cuboid recess. The recess 47 thus forms a vertical impact and guide surface 49 and a horizontal impact and guide surface 51 for the returning cartridge casing 59. Alternatively, the horizontal impact and guide surface 51 is slanted downward toward the back slightly, and/or is designed as a guide channel that is nearly complementary to the casing base. With the return of the bolt, the cartridge casing 59 that has been grabbed by an extractor claw 69 strikes either the impact and guide surface 49 or the impact and guide surface 51, or both, depending on the current bolt movement. The two impact and guide surfaces 49, 51 are designed to engage with the casing base 61 of a cartridge casing 59 during an ejection process, and to guide the casing base 61 into

~~an ejection position that can be precisely repeated inside the recess 47, which is preferably~~ that position in which the rear casing region rests snuggly in the corner of the recess 47, thus the casing base 61 rests against the impact and guide surface 49, and the region of the casing shell protruding therefrom rests against the impact and guide surface 51.

With a bridge-like connecting element 44, the two front corner regions – in differing from that forming the generic prior art (DE 10 2010 009 488 B3) – are each designed as L-shaped recesses in terms of their cross-sections, which are designed as contact and guide surfaces 53a, b so that the ejector main body 5 comes in contact with and is guided to the screws 19a, b from both sides.

The outer surfaces of the legs 45a, b of the ejector main body 5 extending toward the back each have guide surfaces 55a, b, which are each interrupted by flat recesses 57a, b. The guide surfaces 55a extend on the upper surface, the undersurface, and/or the exterior of the ejector main body 5. The recesses 57a, b ensure a maneuverability of the guide surfaces 55a, b, even when soiled, because sand or sludge can be conveyed away therewith.

The upper, rear and outer surfaces on the rear ends of the two legs 45a, b are each hollowed out such that the basically L-shaped guide surfaces 13a, b are obtained there in each case. These guide surfaces 13a, b facilitate the insertion of the spring elements 7a, b into the recesses, or accommodating bores 11a, b in the two legs 45a, b. In addition, the guide surfaces 13a, b each form stops, which stop the spring elements 7a, b inside the recesses 27a, b in the case of a malfunction.

Figures 3 and 4 show the installed state of the ejector 1 in a receiver 3. The ejector is inserted thereby in the respective receiver shells 23, 25 in the recesses 27a, b, and the guide sleeves 9a, b are inserted in the bores 63. The stabilizing element 15 is placed on the two receiver shells 23, 25 from above in the manner of a bridge. The screws 19a, b pass through the bores 17a, b in the

stabilizing element 15, as well as the bores 43a, b in the respective receiver shells 23, 25, and are tightened into the recesses 42a, b.

The stabilizing element 15 stabilizes the assembled receiver shells 23 and 25, in particular the exposed upper edges running in the longitudinal direction. The screws 19a, b center the stabilizing element 15 in the longitudinal and transverse directions, and secure it in its installed position. Additionally, they secure the ejector 1 in the receiver 3. For this, the screws 19a, b are disposed in the receiver 3 such that the ejector main body 5 rests against the screws 19a, b with its contact surfaces 53a, b. The recesses 63a, b for the guide sleeves 9a, b of the spring element 7a, b are designed such that the spring elements 7a, b are already tensioned when in the installed position, and push the ejector main body 5, with its contact surfaces 53a, b, against the screws 19a, b. The springs 7a, b are supported thereby at their rear ends in the accommodating and guide sleeves 9a, b. The tensioning is obtained via the length of the accommodating bore 63, or their spacing to the screws 19a, b and the corresponding spring lengths or strengths.

The ejector element 46 extends into the guide channel 29 at the undersurface of the connecting element 44. The ejector element 46 is designed and disposed such that it protrudes into a recess 77 designed in the manner of a longitudinal groove in the breechblock.

The ejector main body 5 is supported inside the recess 27a in the receiver 3, such that it can be displaced in a longitudinal movement toward the back. The spring 7a is accommodated in the guide and accommodation sleeve 9a, which in turn is accommodated at its rear end in the recess 63, for the accommodation and guidance thereof. The spring 7a extends in part out of the guide and accommodation sleeve 9a, and compressed toward the rear during an ejection process. The ejector main body 5 approaches the guide and accommodation sleeve 9b thereby. The construction (Fig. 7) illustrated here for the right receiver shell 23 is mirrored for the opposing – partially hidden here – left receiver shell 25.

Figures 5 to 9 illustrate the functional sequence for the ejector 1 according to the invention, during the ejection of the cartridge casing 59 from the receiver 3.

After firing, the breechblock moves via the not shown gas piston rod, from the connecting block 31 toward the rear, in the direction of the stock accommodation. The breechblock comprises a bolt carrier and a bolt head 71 here, wherein the extractor 69 is disposed on the bolt head 71. The extractor 69 grips the cartridge casing 59 from below, at the casing base 61, and pulls this toward the rear during the breechblock return, removing it from the cartridge chamber (not shown). The ejector element 46 protrudes into the groove 77 extending in the longitudinal direction in the bolt head 71, such that the cartridge casing 59 in the recess 47 strikes at least one of the two impact and guide surfaces 49, 51 at high speed, and is guided therein.

In Fig. 5 the bolt carrier and the bolt head 7a move together with the extracted cartridge casing 59 toward the rear after firing a shot. The extractor 69 is movably supported about a pivotal axis 75 via a spring-loaded bolt 73. Inside the breechblock, or the bolt head 71, respectively, a firing pin 79 is supported in a firing pin guide 81 such that it can move longitudinally. The recess 47 is depicted in the ejector element 46, with its impact and guide surfaces 49, 51. In Fig. 5, the casing base 61 is still spaced apart from the ejector element 46.

Figure 6 shows the arrival of the casing base 61 at the ejector element 46, and there in the recess 47 at its impact and guide surface 49. The bolt does not execute a straight linear movement during its return – as described above – but rather, it vibrates due to the gas forces acting on it, and is deflected laterally, upward and/or downward. The impact and guide surfaces 49, 51 thus guide the cartridge casing 59 into the recess 47, and improve thereby the repetition precision of the positioning of the casing base 69 in the recess 47.

The ejector main body 5 returns a short distance inside the receiver shells 23, 25 thereby, counter to the return force of the springs 7a, b. The springs 7a, b buffer the force peaks acting on the ejector 1 and the extractor 69 entirely thereby. This slows the ejection movement, or the speed of the cartridge casing 59 in the first phase of the ejection.

~~The ejection by the ejector 1 is illustrated in Figures 7 and 8. In Fig. 7, the ejector 1 is already~~ driven further back, in comparison with Fig. 6, toward the stock, and has compressed the springs 7a, b for buffering the force peaks thereby. The bolt head 71 travels, together with the bolt carrier, further back.

The spring assembly that is to be compressed is designed thereby, such that the blown back ejector main body (5) rotates on the compressed springs 7a, b and does not strike against the receiver 3.

Because the cartridge casing 59 is held at its casing base 61 by the extractor 69, and at its upper edge by the ejector element 46, more precisely, is pushed forward by the impact surface 49 thereof, it starts to rotate as soon as the inertia and the frictional forces are overcome. The extractor 69 functions as a counter bearing thereby, which holds the casing base 61 at its lower edge.

Figure 7 shows, furthermore, a second section plane through the accommodating and guide sleeves 9a, b, in which the compression of the spring 7a is depicted. The ejector element 46 engages with the upper end of the casing base 61 with its impact and guide surfaces 49, 51, and forces the cartridge casings 59 out at their upper casing bases 61. The rear end of the right leg 45a of the U-shaped ejector main body 5 is still spaced apart from the rear end of the recess 27a and from the front end of the accommodating and guide sleeve 9a for the spring 7a located in the recess 63a.

When the springs 7a, b relax, the ejector main body 5 again moves forward, in the second ejection phase, counter to the direction of movement for the breechblock, and the ejector element 46 forces the casing base 61 of the cartridge casing 59 further forward. The cartridge casing 59 tips further downward, wherein the extractor 69, with a rear contact edge lying opposite the casing base, forces the bolt 73 back, against a spring 74. The extractor 69 pivots thereby, about its pivotal axis 75, in order to release the cartridge casing 59. The cartridge casing 59 is

~~subsequently ejected downward, through a cartridge ejection window formed between the~~ receiver shells 23 and 25.

Figure 9 shows the ejector 1 after the ejection process, in its pre-tensioned installation position, in which the rear end of the leg 45a is further spaced apart from the front end of the accommodation and guide sleeve 9a. The breechblock is in its rearward position and is loaded by, not shown, bolt springs, or a buffer mechanism, which buffers the forces of the return movement of the breechblock in the known manner. The extractor 69 is pivoted back via the spring force of the spring 74 about the pivotal axis 75, and rests against the bolt head 71.

The breechblock can introduce a new cartridge into the cartridge chamber in the known manner, when moved forward, such that it is possible once again to fire the firearm.

Further, obvious designs of the invention can be derived by the person skilled in the art from the scope of the following Claims.

Claims

1. An ejector (1) for a firearm, comprising

an ejector main body (5) having an ejector element (46) disposed thereon, such that the ejector element (46), after mounting the ejector (1) on the receiver (3) of the firearm

- extends into the movement path of a forward and backward running breechblock (71) that is guided in the receiver (3) such that it can move longitudinally,
- forms a counter bearing for the casing base (61) of a cartridge casing (59) extracted by the returning breechblock (71) from the cartridge chamber, and
- ejects and/or discards the cartridge casing (59) from the receiver (3) after interacting with the casing base (61),

characterized in that

the ejector (1) comprises additional means (7a, b, 9a, b, 11a, b, 13a, b), by means of which the ejector element (46) is flexibly supported in relation to the receiver (3) such that it returns slightly in a straight line together with the casing base (61) as a result of an interaction with said casing base, until the ejector is slowed to a standstill, and ejects/discards the cartridge casing (59) thereby.

2. The ejector according to Claim 1, the means (7a, b, 9a, b, 11a, b, 13a, b) of which for a flexible support of the ejector element (46) include at least one elastic element (7a, b) that can be secured in or on the receiver (3).

3. The ejector according to Claim 2, the elastic element (7a, b) of which is a spring, in particular a spiral spring.

4. The ejector (1) according to Claim 2 or 3, the means (7a, b, 9a, b, 11a, b, 13a, b) of which for the flexible support of the ejector element (46) comprise at least one accommodating recess (11a, b) in the ejector main body (5) for guiding and accommodating the at least one elastic element (7a, b).

5. The ejector (1) according to one of the Claims 2 to 4, the means (7a, b, 9a, b, 11a, b, 13a, b) of which comprise at least one accommodating and guide element (9a, b) that can be secured on the receiver (3) for a supplementary accommodation and guidance of the at least one elastic element (7a, b).

6. The ejector (1) according to one of the Claims 2 to 5, comprising at least one securing element (19a, b), which retains and secures the elastic element (7a, b) in a pretensioned state.

7. The ejector (1) according to Claim 6, on the ejector main body (5) of which, at least one contact and/or guide surface (53a, b) is provided, for the contact and/or guidance thereof on the at least one securing element (19a, b).

8. The ejector (1) according to one of the preceding Claims, the ejector main body (5) of which is designed in the manner of a U, and which can be disposed in or on the receiver (3), transverse to the direction of firing, with a connecting part (44) that connects its two U-legs (45a, b) in the manner of a bridge, and which extends thereby over the width of the receiver, while its two U-legs (45a, b) extend toward the rear in the longitudinal direction of the receiver.

9. The ejector (1) according to Claim 8, the U-legs (45a, b) of which each comprise guide surfaces (55a, b) for guiding the ejector main body (5) in or on the receiver (3).

10. The ejector (1) according to Claim 9, having at least one recess (57a, b) in each of the guide surfaces (55a, b).

11. The ejector (1) according to one of the Claims 2 to 10, having two elastic elements (7a, b) disposed symmetrically to one another, each having associated accommodating and guide recesses (11a, b) in the two U-legs (45a, b) of the ejector main body (5) and having accommodating and guide elements (9a, b) that can be secured on the receiver (3).

12. The ejector (1), in particular according to Claim 1, the ejector element (46) of which comprises a basically cuboid guide and impact recess (47) on its end protruding into the movement path (3) of the breechblock, which extends backward, toward the returning cartridge casing (69), and as a result, has at least one guide and impact surface (51) running in this direction, for the cartridge casing (59) that is to be ejected.

13. The ejector (1) according to Claim 12, the at least one guide and impact surface (51) of which runs toward the rear and is slanted downward thereby, and/or has a guide channel that is at least nearly complementary to the casing base (61).

14. The ejector (1) according to Claim 12 or 13, the guide and impact recess (47) of which has at least one vertical guide and impact surface (49) for the casing base (61) of the cartridge casing (59) that is to be ejected.

15. A receiver (3) comprising:
a breechblock guided in the receiver (3) such that it can move longitudinally, and
an ejector (1) according to one of the preceding Claims.

16. The receiver (3) according to Claim 15, comprising at least one recess (27a, b) that is complementary to the ejector main body (5), for the accommodation and longitudinal movement guidance thereof.

17. The receiver (3) according to Claim 16, comprising at least one recess (63a, b) for accommodating and guiding the at least one accommodation and guide element (9a, b), wherein the recess (63a, b) is flush with the recess (27a, b) for accommodating the ejector main body (5), and is designed such that it is complementary to the accommodation and guide element (9a, b).

18. The receiver (3) according to Claim 16 or 17, comprising at least two recesses (27a, b) that are formed symmetrical to one another in the receiver (3), for accommodating, in each case, one of two accommodating and guide elements (9a, b).

19. The receiver (3) according to one of the Claims 15 to 18, in which a stabilizing element (15) is provided, for stabilizing the receiver (1), disposed transverse to the direction of firing.

20. The receiver (3) according to Claim 19, the stabilizing element (15) of which is secured and/or is aligned via at least one securing element (19a, b) on the receiver (1), and the securing element (19a, b) also simultaneously retains and secures the ejector main body (5) in the receiver (3) in a tensioned manner.

21. A firearm having an ejector (1) according to one of the Claims 1 to 14 and/or a receiver (3) according to one of the Claims 15 to 20.

Ejector for a Firearm as well as a Receiver and Firearm Having an Ejector

The invention relates to an ejector for a firearm, comprising an ejector main body having an ejector element disposed thereon such that the ejector element, after mounting the ejector on the receiver of the firearm, extends into the movement path of a forward and backward running breechblock, guided such that it moves longitudinally in the receiver, forming a counter bearing for the casing base of a cartridge casing extracted from the cartridge chamber by the returning breechblock and, after interacting with the casing base, ejects and/or discards the cartridge casing from the receiver

The invention also relates to a receiver as well as a firearm, each of which are equipped with an ejector of this type.

In these documents, positional terms such as "up," "down," "front," "back," etc. are always from the perspective of a shooter holding the weapon in the normal shooting stance, with the bore axis running horizontally.

Prior Art

Ejectors are known in various embodiments and have the duty of ejecting or discarding a cartridge casing from a firearm, which has been removed from the cartridge chamber of the firearm immediately prior to this by an extractor disposed on a breechblock.

The operating sequence when shooting a cartridge and the subsequent ejection of the empty cartridge casing is known *per se* and can be depicted in a simplified manner in brief as follows: For firing, first a breechblock, in particular a bolt head, guides a cartridge from the cartridge supply device into the cartridge chamber of a firearm. The actuation of a trigger mechanism releases a firing pin, which then strikes the cartridge base and there ignites a charge, such that a projectile is shot out of the cartridge casing through a barrel.

The forces, or gases, respectively, released during the firing process are used to displace the bolt in a return movement. With a gas-operated reloading, for example, the discharged firing gases drive the breechblock at a high speed toward the back, in the direction of the stock via a piston rod. At least one cartridge extractor is provided thereby on the breechblock, on the bolt head, specifically. This extractor encompasses the spent cartridge casings, at their edge on the casing base, and removes them from the cartridge chamber during the return movement of the breechblock. An ejector then forces the cartridge casing out of the receiver.

The generic ejector specified in the introduction is known from DE 10 2010 009 488 B3, and is used, for example, in the machinegun HK121 of the applicant. A longitudinal groove is provided in the breechblock, on its upper surface, in which the ejector tappet of the stationary ejector extends during the return of the bolt. After firing, the cartridge casing retained by the extractor on the bolt head moves at high speed toward the ejector tappet, which ejects the cartridge casing and in doing so rotates it. This leads to a heavy load to the extractor, which functions as a counter bearing when the cartridge casing strikes the ejector tappet. The cartridge casing rotating out of the extractor then strikes the piston rod in a defined manner, where it is deflected and exits the machinegun receiver downward, through a cartridge ejector window, at high speed.

This ejector leads to heavy loads to the individual elements, in particular the ejector and the extractor, such that there is more wear to these components, and the service life thereof is reduced.

Furthermore, ejectors are known from the prior art, in which a thrust bolt is spring mounted in the bolt head. The thrust bolt is pretensioned thereby, via a spring, against a cartridge base of a cartridge casing located in the cartridge chamber, and is retained in the bolt head. During the return of the bolt, and during the extraction of the cartridge casing from the cartridge chamber, the spring relaxes and forces the thrust bolt outward. The thrust bolt acts on the cartridge base thereby, and pushes the cartridge casing out. Such thrust bolts are known, for example, from the firearms by the applicant, G36, HK416, HK417 and from the GPMG. US 2011/0168009 A1 also discloses a semiautomatic firearm having such a thrust bolt.

The disadvantage of thrust bolts of this type is that only relatively weak spring forces can act on this thrust bolt because otherwise the recoil springs of these bolts can no longer securely return these bolts against the force of the thrust bolt spring. Furthermore, there is relatively little space in these bolts for a markedly strong thrust bolt spring. This applies in particular to rotating bolts, such as those known from DE 10 2010 009 427 B4 by the applicant.

The above solution is also not suitable for a high cadence range and long firing sequences in sustained fire because there is little time for the ejection process, and the relatively weak thrust bolt springs cannot move the casings quickly enough. With high cadences and long firing sequences in sustained fire, an ejection system of this type leads to malfunctioning of the firearm and in particular to ejection failures due to cartridge casings not being ejected.

Furthermore, the semiautomatic rifles HK-SL6 and HK-SL7 by the applicant are known. These semiautomatic rifles comprise a rolling block. A two-armed rocker lever is provided with these firearms as an ejector, which is disposed on the side of the receiver and extends in the longitudinal direction of the semiautomatic rifle. A bolt head returning after firing

extracts a cartridge from the cartridge chamber with an extractor. It runs thereby to the rocker lever with a lateral guide recess. Because the rocker lever has ends that curve upward at both ends thereof, the returning bolt forces the back end of the rocker lever downward and the front end upward. The front end engages in the bolt head and forces the cartridge casing out of the bolt head from below. The rocker lever is spring mounted via a spring assembly, such that it can be displaced toward the back.

This construction, having a rocker lever, also requires a relatively weak ejector spring, because the kinematically unstable rocker lever does not allow for a strong return pressure spring, but rather, only a relatively weak, purely buffering spring.

The embodiment of the ejector as a rocker lever having a casing advance buffer is prone to wear and is not suitable for higher cadences and continuous firing loads in sustained fire.

Lastly, DE 1 015 724 shows an ejector for automatic firearms. A spring mounted ejector slider is provided in the bolt head. During the bolt return, the ejector slider strikes a spring mounted, pivotable mass, which drives the ejector slider forward, out of the bolt, and strikes the cartridge base thereby.

This design has a complex structure and comprises numerous components, which are prone to wear and soiling. In particular, a construction of this type, having a relatively light stopping mass subjected to spring pressure, results in this stopping mass being deflected, as desired, after being struck by the ejector slider, and then, however, it releases its entire acquired kinematic energy on the receiver part, without buffering, which would destroy both the stopping mass as well as the receiver part in a very short time.

On the whole, known ejectors are prone to wear, structurally complex, and not suited for continuous sustained fire and long component downtimes, as is required of modern machineguns.

Object and Solution Therefor of the Invention

With this background, the object of the present invention is to provide an improved ejector as well as a receiver and a firearm having such an ejector, in order to overcome the disadvantages specified above, or to at least reduce said disadvantages.

This object is achieved, respectively, by the subject matter of the independent Claims 1, 14 and 20.

The generic ejector thus has, according to Claim 1, additionally, the following features: the ejector additionally comprises means, by means of which the ejector is flexibly mounted in relation to the receiver, such that it returns in a straight line for a short distance, as a result of an interaction with the casing base, together with the casing base, along which path it is slowed until reaching a standstill, and ejects/discards the cartridge casing thereby and the ejector element of the ejector comprises a basically cuboid guide and impact recess on its end extending into the movement path of the breechblock, which extends backward, toward the returning cartridge casing, and as a result, has at least one guide and impact surface running in this direction, for the cartridge casing that is to be ejected.

The subject matter of Claims 14 and 20 are distinguished in that a receiver and a firearm are each provided with an ejector of this type.

The ejector according to the invention is fail-safe and increases the reliability of a firearm equipped therewith, even with high cadences and long firing sequences in sustained fire. Firearms as intended by the invention comprise automatic firearms, in particular machineguns. According to the invention, force peaks of a cartridge casing extracted from the breechblock and returning at high speed, which act on the individual components, in particular the ejector and the

extractor, can be buffered well, without compromising the reset forces of the recoil spring for the breechblock.

The buffering slows down the impact energy, slows the casing rotation and causes a counter reaction of the buffered ejector main body, and a harmonization, overall, of the entire ejection process. This leads to a softer engagement of the ejector with the cartridge casing in a first phase of the ejection process, when the base of the casing strikes the ejector main body, which enables a controlled, homogenous initial rocking motion of the cartridge casing. Because the cartridge casing is retained by the extractor at the bottom and/or at the side, and is ejected from above by the ejector, this causes the cartridge casing to rotate. After overcoming the inertia and friction, in a second phase of the ejection process, during the casing ejection, the at least one elastic element forces the ejector, or ejector main body, back into its starting position, wherein the ejector increases its ejection force exerted on the cartridge casing, and further homogenizes the downward rocking motion of the cartridge casing. This homogenizes the rotational speeds of the cartridge casings, and enables a continuous defined ejection, even at relatively strongly fluctuating return speeds of the bolt. The design features of the ejector element according to Claims 12 and 13 also contribute thereto, for which Claims independent protection is sought.

The buffering of the force peaks acting on the individual elements also improves the durability of the individual components, because it reduces the load thereto, and thus the wear thereof. As such, with the claimed ejector, it is possible to increase the lifetime of the spring loaded ejector to over 118,000 shots, and the lifetime of the extractor to over 50,000 shots. Moreover, according to the invention, the cartridge casing ejection and the ejection failure rate can be improved to statistical failure rates for over 50,000 shots.

Due to the necessary manufacturing tolerances and strong accelerations, a breechblock does not normally always run centrally in the receiver during return, but instead, oscillates inside the receiver. The oscillations in the bolt motion can be attributed to a play in the lateral guides of the

bolt. As a result, a cartridge casing frequently strikes the ejector element of the ejector at different contact points.

The two impact and guide surfaces are designed to engage with the casing base of a cartridge casing during an ejection process, and to guide the casing base into a defined, precisely repeatable, ejection position inside the recess. This is preferably that position in which the rearward casing region lies snuggly in the corner of the recess.

During ejection, the respective guide and impact surface thus guides a cartridge casing arriving there into the guide and impact recess. The guide and impact recess can be substantially, or nearly, rectangular thereby. The guide and impact surface compensates for irregularities in the ejection movement and thus in the contact points of the cartridge casing, because the at least one guide and impact surface guides the cartridge casing to nearly the same ejection position inside the impact recess. A cartridge casing thus cannot deviate inside the impact recess, and therefore always ends up in the defined contact position. This enables a defined, precisely repeatable, ejection, which in turn leads to a defined and precisely repeatable rotation of the cartridge casing.

On the whole, the ejector according to the invention is less prone to malfunction, and exhibits less wear in comparison with the known prior art, thus increasing the lifetime of the components subject to load.

Preferably, the means in the ejector for a flexible mounting of the ejector, at least in or on the receiver, have a supporting elastic element.

The at least one elastic element can, for example, be formed as an elastomer in a simple design. Other elastic elements can also be used, however.

The elastic element is preferably a spring, in particular a spiral spring. A spring is a simple and inexpensive means, which can be connected to the ejector main body with little structural effort, and which provides a sufficient reset force, which also requires the reproducibility of the rotational movement of the cartridge casing during its ejection. In the case of a malfunction, the at least one spring can be replaced.

The means in the ejector for the flexible support of the ejector element comprise at least one accommodating recess in the ejector main body for guiding and accommodating the at least one spring element.

This enables a compact construction and reduces susceptibility to soiling. Furthermore, this reduces susceptibility to failure of the ejector, because the elastic element is prevented from bending. In a structurally simple design, the accommodating recess is designed as a blind bore in the ejector main body.

Preferably the means of the ejector comprise at least one accommodating and guide element that can be supported on the receiver, for additional accommodation and guidance of the at least one elastic element.

In a simple design, the accommodating and guide element is designed as a guide sleeve, into which the elastic element can be inserted. As a result, the functionality of the elastic element can be ensured, because, for example, a bending of the elastic element, in particular a spring, is prevented. The interior dimensions of the guide sleeve are preferably complementary to the exterior dimensions of the elastic element thereby. The accommodating and guide sleeve can be closed at its end facing away from the ejector, which results in an increase in the functional reliability of the at least one elastic element, because it can be supported thereon.

The ejector preferably comprises a securing element, which retains the elastic element in a pretensioned state in the receiver, and secures it there.

The securing element can be designed as a bolt, screw or other suitable fastener. The ejector main body is preferably retained in a pretensioned manner thereby, such that, when in the standby position, it is always in the same defined position on/in the receiver. This ensures that a cartridge casing can strike the ejector element in the same defined ejection position, and also that the first force peak when the casing base strikes the ejector element is always countered at the same location with the same reset force.

Preferably at least one contact and/or guide surface is provided on the ejector main body of the ejector for the contact and/or guidance thereof on the at least one securing element.

As a result, it can be ensured that the ejector main body is located in the same defined position, by means of which, additionally, the defined ejection position is ensured.

Preferably the ejector main body of the ejector is designed in the manner of a U-shape, and can be disposed with a connecting part, that connects its two U-legs in the manner of a bridge, in or on the receiver, transverse to the direction of firing, and extends thereby over the width of the receiver, while its two U-legs extend in the longitudinal direction of the receiver, toward the back.

The ejector element can be disposed thereby, laterally or centrally, in a guide channel in the receiver. In a simple design, the ejector element is disposed centrally. This enables a highly symmetrical arrangement in relation to the longitudinal axis of the firearm, and thus a highly symmetrical introduction and distribution of forces to the ejector and the receiver; additionally, a stable design of the ejector as well, and a defined contact point for a cartridge casing on the ejector element are ensured. This also enables a stable design of the ejector main body and reduces the risk of functional failures, such as a canting during its longitudinal movement.

The accommodating recess for guiding and accommodating the at least one elastic element is provided in each of the ends of the U-legs. Normally the elastic element cushions the ejector such that the leg end(s) are spaced apart from the receiver. The leg end can, however, be designed such that it serves as a stop in the receiver, in case the spring element fails, for example.

The U-legs of the ejector main body preferably comprise, in each case, guide surfaces for guiding the ejector main body in or on the receiver.

The guide surfaces can be formed on the top surface, the outer surface, the inner surface and/or the undersurface of the U-legs. The guide surfaces can also be provided only in part, on at least one U-leg, in order to provide the smallest possible contact surface in or on the receiver. This ensures a longitudinal movement of the ejector in or on the receiver that is frictionless to the greatest possible extent.

At least one recess is preferably provided in each of the guide surfaces of the U-legs of the ejector main body.

The recesses can extend in part, or entirely, over the respective upper surface, outer surface, undersurface and/or inner surface of the at least one leg. As a result, the longitudinal movement of the ejector main body in the receiver can be ensured, even in the case of soiling with, for example, sand or earth, because any soiling occurring on the guide surfaces is forced into the recess during the longitudinal movement.

The ejector preferably comprises two elastic elements that are disposed symmetrically to one another, each having associated accommodating and guide recesses in the two U-legs of the ejector main body and accommodating and guide elements that can bear against the receiver.

In particular in one design of the ejector main body, having two U-legs that are parallel to one another, two elastic elements ensure the functionality of the ejector and prevent, for example, a canting or other functional disorders.

The at least one guide and impact surface of the guide and impact recess preferably runs toward the back and is tilted downward and/or has a guide channel that is at least nearly complementary to the casing base.

These measure also facilitate a guiding of the cartridge into the defined ejection position.

Preferably the guide and impact recess has at least one vertical guide and impact surface for the casing base of the cartridge casing that is to be ejected.

In the defined ejection position, the casing base then lies on the rear, vertical impact and guide surface, and the region of the casing shell protruding therefrom lies on the horizontal impact and guide surface.

With a receiver equipped with the ejector according to the invention, the receiver comprises at least one recess that is complementary to the ejector main body for the accommodation and longitudinal movement guidance thereof.

The ejector can be accommodated thereby, entirely or in part, in the receiver in the respective, at least one, recess. Alternatively, a supplementary structure can also be provided on the receiver, in which the ejector is entirely or partially accommodated. The complementary design of the recess ensures a stable longitudinal movement of the ejector main body during an ejection process, and prevents it from tilting or canting. Guide surfaces counter to the guide surface of the ejector may be provided in the recess.

The receiver as set forth in the present invention comprises a single-piece receiver as well as a multi-piece receiver. The ejector is provided there at a suitable position. In the case of a

multi-piece design, the receiver can be composed, in the known manner, of two receiver halves or shells, separated vertically in relation to one another. Different suitable substances for the receiver or the receiver shells, or the parts thereof, may be used thereby, and are already known from DE 10 2010 009 488 B3.

The receiver preferably comprises at least one recess for accommodating and guiding the at least one accommodating and guide element, wherein the recess having the recess for accommodating the ejector main body is designed such that it is flush with and complementary to the accommodating and guide element.

The second recess for accommodating and guiding the accommodation and guide element can, for example, be introduced, or designed, in a structurally simple manner, as a blind bore in the receiver or in a supplementary structure attached thereto. This increases the stability of the ejector and ensures the longitudinal movement of the ejector main body. This also improves the buffering and accommodation of the force peaks exerted on the ejector by a cartridge casing during an ejection process, in particular the ejector main body, because the accommodation and guide element is received in the recess in the receiver, and is supported therein.

The receiver preferably comprises at least two recess formed in the receiver that are symmetrical to one another, for accommodating, in each case, one of two accommodation and guide elements.

The symmetrical design prevents a tipping or canting of the ejector main body during its longitudinal movement in the course of the ejection.

A stabilizing element is preferably provided in the receiver, for stabilizing the receiver, which element is disposed transverse to the direction of firing.

The stabilizing element can be designed as a bridge element, and can be disposed at suitable positions on a receiver. The stabilizing element is preferably disposed on the upper surface of the receiver, centrally, for example. Thus, the stability of the receiver can be increased, and a

tilting of the receiver shells can be prevented. Fundamentally, it is possible to permanently connect the stabilizing element to the receiver, by welding, gluing or suchlike, for example. It is, however, preferably placed on the upper surface of the receiver.

The stabilizing element is preferably secured and/or aligned on the receiver by at least one securing element, and at the same time, also retains and secures the ejector main body, in a tensioned manner, in the receiver.

Screws may be provided as the securing element, for example. Other suitable mechanical attachment and securing elements are also possible, which pass through the stabilizing element in corresponding holes, e.g. bores, at basically a right angle, and connect the element, in each case, to a receiver half. The holes, or bores, provided on the receiver ensure a positioning and alignment therein for the position of the securing element.

Preferably, at least one recess is provided on the receiver, in which the at least one securing element can be placed and secured.

For this, a bore or other suitable hole, for example, may be provided in the receiver, or a receiver half, in each case, in which the securing element can be inserted from above, and secured, for example, via a threaded connection.

The ejector is preferably also designed as a retrofitting kit for firearms.

Due to the simple construction of the ejector according to the invention, existing receivers can also be retrofitted with a minimum of mechanical reworking. With modern, newly produced weapons, the ejector according to the invention is preferably a component of the receiver from the start, or, respectively, the receiver is designed to accommodate an ejector of this type.

On the whole, an ejector is provided in accordance with the invention, which ejects cartridges in a defined manner, with increased precision, and reduces the wear to the components subjected to load.

Description of the Figures

Exemplary embodiments of the invention are explained in greater detail below, with reference to the attached, schematic drawings. Therein:

Figure 1 shows a perspective exploded depiction of an ejector according to the invention, and beneath this, a perspective view of a receiver in a diagonal view from behind and above;

Figure 2 shows a perspective depiction of an ejector main body, likewise according to the invention, of the ejector according to the invention, in a diagonal view from the front and above;

Figure 3 shows a perspective depiction of an ejector according to the invention mounted in a receiver, in a diagonal view from the front and above;

Figure 4 shows an enlargement of a section of Figure 3;

Figure 5 shows a longitudinal section through a receiver, with a returning bolt prior to an extracted cartridge casing striking the ejector according to the invention;

Figure 6 shows a longitudinal section through the receiver in Figure 5, when the cartridge casing strikes the ejector;

Figure 7 shows a longitudinal section through the receiver in Figure 6, in two section planes, wherein the ejector according to the invention cushions the cartridge casing;

Figure 8 shows a longitudinal section through the receiver in Figure 7; and

Figure 9 shows a longitudinal section through the receiver in Figure 8, after ejecting the cartridge casing.

The construction of the ejector according to the invention shall first be described with reference to Figs. 1 to 4. Figures 5 to 9 show the functional sequence of the ejection of a cartridge already extracted from the cartridge chamber, in various positions.

In accordance with Figs. 1 to 4, the ejector 1 comprises an ejector main body 5, which, substantially, has the shape of a U (lying flat) when seen from above, and shall be described in greater detail in reference to Figure 2.

Furthermore, the ejector 1 comprises two spring elements 7a, b for cushioning the main body 5. The spring elements 7a, b are designed as helical springs and can be inserted in guide and accommodating sleeves 9a, b, which accommodate the spring elements 7a, b in their interiors, and are supported on the receiver 3 when in the assembled state. The guide/accommodating sleeves 9a, b are closed at their rear ends, such that the spring elements 7a, b can each be supported there at their rear ends. The spring elements 7a, b are inserted into the guide/accommodating sleeves 9a, b such that a bending of the spring elements 7a, b, and thus a malfunctioning thereof, is nearly impossible.

The spring elements 7a, b can be inserted at their front ends in accommodations 11a, b in the main body 5 having the form of blind bores. Guide surfaces 13a, b formed on the main body 5 in front of the blind bores 11a, b facilitate the insertion of the spring elements 7a, b.

The receiver 3 is substantially composed of two receiver shells 23 and 25, and a connecting block 31. The receiver shells 23 and 25 can be brought into their final form, for example, during the production thereof, or they can also be subsequently milled, drilled or otherwise suitably

processed. The connecting block 31 forms the front part of the receiver, is flush with the longitudinal axis of the receiver, and serves to accommodate the barrel (not shown) and a gas piston rod (not shown) in the present example. For this, it comprises a cylindrical gas piston rod receiver 33 and a barrel receiver 35 formed above it. The gas piston rod receiver 33 accommodates a gas piston rod guide (not shown) having an appropriate fit, which actuates a pressurized gas reloading mechanism in the known manner.

Guide tappets 37a, b, formed such that they are parallel to one another, in each case, are provided on the barrel receiver 35, for aligning the barrel; additional connecting pins 39a, b, c, engage in complementary positioning recesses 41a, b, c in the respective receiver shells 23, 25, and are connected there to the positioning recesses 41a, b, c. The receiver shells 23, 25 are thus secured to the connecting block 31.

A guide channel 29 for a breechblock that is guided such that it can move longitudinally therein is formed between the two receiver shells 23 and 25. For this, guide rails 65a, b that lie opposite one another, among other things, are provided on the interior surfaces of the receiver shells 23, 25 in each case, which are in a guiding engagement with the (not shown) breechblock. The breechblock can comprise, for example, a roller guide or other suitable guidance means (not shown). The guide rails 65a, b can each be designed as grooves or depressions, or even as rises, in the receiver shells 23, 25.

A trigger device (not shown) can be inserted in the receiver 3, at the undersurface of the assembled receiver shells 23, 25, which extends into the guide channel 29. Additionally, a cartridge ejection window (not shown) is provided, in each case, on the undersurface of the two receiver shells 23, 25. The upper surface of the receiver 3 can be closed via a (not shown) cartridge supply cover.

Eyelets 62a, b for a carrying strap are formed at the rear ends of the receiver shells 23 25; additionally, recesses 67a, b are provided, such as bores, for attaching and/or securing a shoulder rest (not shown). The rear end of the receiver shells 23, 25 is designed as a stock

accommodating region, which can be connected to a (not shown) shoulder rest via a (not shown) shoulder rest receiver in the known manner.

The ejector 1 can be inserted in the receiver 3. For this, complementary recesses 27a, b are provided in the receiver 3, which are designed such that they enable a longitudinal movement of the ejector main body 5. The recesses 27a, b can be formed as openings, for example, in the production of the receiver shells 23, 25, or, however, they can be formed subsequently through appropriate suitable processing, e.g. they can be milled or drilled therein.

Furthermore, a recess 63a, b (Figs. 3, 4) for accommodating and guiding the accommodation and guide sleeves 9a, b is provided in the receiver 3, on both sides, meaning in each receiver shell 23, 25, each of which recesses is flush with the recesses 27a, b for accommodating the ejector 1, and which extend these recesses toward the rear. These recesses 63a, b can be formed by bores in the respective receiver shells 23, 25, and are designed to be complementary to the accommodating and guide sleeves 9a, 9b. The recesses 63a, b can extend over the entire length of the accommodation and guide sleeves 9a, b. In the depicted embodiment, however, they only accommodate the rear ends of the accommodating and guide sleeves 9a, b. The exposed region of the accommodating and guide sleeves 9a, b is, in each case, encompassed by a rib-like structure of the receiver 3, which is of a structural nature.

In order to secure the ejector 1 in the receiver, two securing elements in the form of screws 19a, b are provided. The screws 19a, b are designed to pass through a recess, basically a bore 43a, b, in each case, in the receiver 3, and to be tightened in each case into an accommodation 42a, b, basically a threaded bore, in the receiver 3.

In addition, a stabilizing element 15 is provided, which can be placed on positioning shoulders 16a, b provided in the receiver 3, in the manner of a connecting yoke, transverse to the direction of firing. The stabilizing element 15 has recesses in the form of bores 17a, b on its two outer ends, through which the screws 19a, b pass. Additionally, washers 21a, b are provided,

which can be placed on the stabilizing element 15 from above, and thus prevent the screw heads from penetrating the stabilizing element 15.

The ejector main body 5 has – as has already been pointed out, and is visible in Fig. 2, in an enlargement – substantially, the form of a U, lying flat. The open side of the U points toward the shoulder rest when in the installed position. A connecting element 44, designed in the manner of a bridge, connects the identical two lateral legs 45a, b, which extend at the ends of their legs toward the rear. An ejector element 46 is disposed, centrally, on the undersurface of the connecting element 44, which extends downward in the manner of a tappet. In the assembled state of the ejector 1, the ejector element 46 extends with its lower end into the guide channel 29 of the receiver 3.

A recess 47 is provided at the lower end of the ejector element 46, which is designed in the manner of a right angled step in the depicted exemplary embodiment, and thus depicts a basically cuboid recess. The recess 47 thus forms a vertical impact and guide surface 49 and a horizontal impact and guide surface 51 for the returning cartridge casing 59. Alternatively, the horizontal impact and guide surface 51 is slanted downward toward the back slightly, and/or is designed as a guide channel that is nearly complementary to the casing base. With the return of the bolt, the cartridge casing 59 that has been grabbed by an extractor claw 69 strikes either the impact and guide surface 49 or the impact and guide surface 51, or both, depending on the current bolt movement. The two impact and guide surfaces 49, 51 are designed to engage with the casing base 61 of a cartridge casing 59 during an ejection process, and to guide the casing base 61 into an ejection position that can be precisely repeated inside the recess 47, which is preferably that position in which the rear casing region rests snuggly in the corner of the recess 47, thus the casing base 61 rests against the impact and guide surface 49, and the region of the casing shell protruding therefrom rests against the impact and guide surface 51.

With a bridge-like connecting element 44, the two front corner regions – in differing from that forming the generic prior art (DE 10 2010 009 488 B3) – are each designed as L-shaped recesses in terms of their cross-sections, which are designed as contact and guide surfaces 53a, b so that the ejector main body 5 comes in contact with and is guided to the screws 19a, b from both sides.

The outer surfaces of the legs 45a, b of the ejector main body 5 extending toward the back each have guide surfaces 55a, b, which are each interrupted by flat recesses 57a, b. The guide surfaces 55a extend on the upper surface, the undersurface, and/or the exterior of the ejector main body 5. The recesses 57a, b ensure a maneuverability of the guide surfaces 55a, b, even when soiled, because sand or sludge can be conveyed away therewith.

The upper, rear and outer surfaces on the rear ends of the two legs 45a, b are each hollowed out such that the basically L-shaped guide surfaces 13a, b are obtained there in each case. These guide surfaces 13a, b facilitate the insertion of the spring elements 7a, b into the recesses, or accommodating bores 11a, b in the two legs 45a, b. In addition, the guide surfaces 13a, b each form stops, which stop the spring elements 7a, b inside the recesses 27a, b in the case of a malfunction.

Figures 3 and 4 show the installed state of the ejector 1 in a receiver 3. The ejector is inserted thereby in the respective receiver shells 23, 25 in the recesses 27a, b, and the guide sleeves 9a, b are inserted in the bores 63. The stabilizing element 15 is placed on the two receiver shells 23, 25 from above in the manner of a bridge. The screws 19a, b pass through the bores 17a, b in the stabilizing element 15, as well as the bores 43a, b in the respective receiver shells 23, 25, and are tightened into the recesses 42a, b.

The stabilizing element 15 stabilizes the assembled receiver shells 23 and 25, in particular the exposed upper edges running in the longitudinal direction. The screws 19a, b center the stabilizing element 15 in the longitudinal and transverse directions, and secure it in its installed position. Additionally, they secure the ejector 1 in the receiver 3. For this, the screws 19a, b are

disposed in the receiver 3 such that the ejector main body 5 rests against the screws 19a, b with its contact surfaces 53a, b. The recesses 63a, b for the guide sleeves 9a, b of the spring element 7a, b are designed such that the spring elements 7a, b are already tensioned when in the installed position, and push the ejector main body 5, with its contact surfaces 53a, b, against the screws 19a, b. The springs 7a, b are supported thereby at their rear ends in the accommodating and guide sleeves 9a, b. The tensioning is obtained via the length of the accommodating bore 63, or their spacing to the screws 19a, b and the corresponding spring lengths or strengths.

The ejector element 46 extends into the guide channel 29 at the undersurface of the connecting element 44. The ejector element 46 is designed and disposed such that it protrudes into a recess 77 designed in the manner of a longitudinal groove in the breechblock.

The ejector main body 5 is supported inside the recess 27a in the receiver 3, such that it can be displaced in a longitudinal movement toward the back. The spring 7a is accommodated in the guide and accommodation sleeve 9a, which in turn is accommodated at its rear end in the recess 63, for the accommodation and guidance thereof. The spring 7a extends in part out of the guide and accommodation sleeve 9a, and compressed toward the rear during an ejection process. The ejector main body 5 approaches the guide and accommodation sleeve 9b thereby. The construction (Fig. 7) illustrated here for the right receiver shell 23 is mirrored for the opposing – partially hidden here – left receiver shell 25.

Figures 5 to 9 illustrate the functional sequence for the ejector 1 according to the invention, during the ejection of the cartridge casing 59 from the receiver 3.

After firing, the breechblock moves via the not shown gas piston rod, from the connecting block 31 toward the rear, in the direction of the stock accommodation. The breechblock comprises a bolt carrier and a bolt head 71 here, wherein the extractor 69 is disposed on the bolt head 71. The extractor 69 grips the cartridge casing 59 from below, at the casing base 61, and pulls this toward the rear during the breechblock return, removing it from the cartridge chamber (not

shown). The ejector element 46 protrudes into the groove 77 extending in the longitudinal direction in the bolt head 71, such that the cartridge casing 59 in the recess 47 strikes at least one of the two impact and guide surfaces 49, 51 at high speed, and is guided therein.

In Fig. 5 the bolt carrier and the bolt head 7a move together with the extracted cartridge casing 59 toward the rear after firing a shot. The extractor 69 is movably supported about a pivotal axis 75 via a spring-loaded bolt 73. Inside the breechblock, or the bolt head 71, respectively, a firing pin 79 is supported in a firing pin guide 81 such that it can move longitudinally. The recess 47 is depicted in the ejector element 46, with its impact and guide surfaces 49, 51. In Fig. 5, the casing base 61 is still spaced apart from the ejector element 46.

Figure 6 shows the arrival of the casing base 61 at the ejector element 46, and there in the recess 47 at its impact and guide surface 49. The bolt does not execute a straight linear movement during its return – as described above – but rather, it vibrates due to the gas forces acting on it, and is deflected laterally, upward and/or downward. The impact and guide surfaces 49, 51 thus guide the cartridge casing 59 into the recess 47, and improve thereby the repetition precision of the positioning of the casing base 69 in the recess 47.

The ejector main body 5 returns a short distance inside the receiver shells 23, 25 thereby, counter to the return force of the springs 7a, b. The springs 7a, b buffer the force peaks acting on the ejector 1 and the extractor 69 entirely thereby. This slows the ejection movement, or the speed of the cartridge casing 59 in the first phase of the ejection.

The ejection by the ejector 1 is illustrated in Figures 7 and 8. In Fig. 7, the ejector 1 is already driven further back, in comparison with Fig. 6, toward the stock, and has compressed the springs 7a, b for buffering the force peaks thereby. The bolt head 71 travels, together with the bolt carrier, further back.

The spring assembly that is to be compressed is designed thereby, such that the blown back ejector main body (5) rotates on the compressed springs 7a, b and does not strike against the receiver 3.

Because the cartridge casing 59 is held at its casing base 61 by the extractor 69, and at its upper edge by the ejector element 46, more precisely, is pushed forward by the impact surface 49 thereof, it starts to rotate as soon as the inertia and the frictional forces are overcome. The extractor 69 functions as a counter bearing thereby, which holds the casing base 61 at its lower edge.

Figure 7 shows, furthermore, a second section plane through the accommodating and guide sleeves 9a, b, in which the compression of the spring 7a is depicted. The ejector element 46 engages with the upper end of the casing base 61 with its impact and guide surfaces 49, 51, and forces the cartridge casings 59 out at their upper casing bases 61. The rear end of the right leg 45a of the U-shaped ejector main body 5 is still spaced apart from the rear end of the recess 27a and from the front end of the accommodating and guide sleeve 9a for the spring 7a located in the recess 63a.

When the springs 7a, b relax, the ejector main body 5 again moves forward, in the second ejection phase, counter to the direction of movement for the breechblock, and the ejector element 46 forces the casing base 61 of the cartridge casing 59 further forward. The cartridge casing 59 tips further downward, wherein the extractor 69, with a rear contact edge lying opposite the casing base, forces the bolt 73 back, against a spring 74. The extractor 69 pivots thereby, about its pivotal axis 75, in order to release the cartridge casing 59. The cartridge casing 59 is subsequently ejected downward, through a cartridge ejection window formed between the receiver shells 23 and 25.

Figure 9 shows the ejector 1 after the ejection process, in its pre-tensioned installation position, in which the rear end of the leg 45a is further spaced apart from the front end of the accommodation and guide sleeve 9a. The breechblock is in its rearward position and is loaded

by, not shown, bolt springs, or a buffer mechanism, which buffers the forces of the return movement of the breechblock in the known manner. The extractor 69 is pivoted back via the spring force of the spring 74 about the pivotal axis 75, and rests against the bolt head 71.

The breechblock can introduce a new cartridge into the cartridge chamber in the known manner, when moved forward, such that it is possible once again to fire the firearm.

Further, obvious designs of the invention can be derived by the person skilled in the art from the scope of the following Claims.

Claims

1. An ejector (1) for a firearm, comprising

an ejector main body (5) having an ejector element (46) disposed thereon, such that the ejector element (46), after mounting the ejector (1) on the receiver (3) of the firearm

- extends into the movement path of a forward and backward running breechblock (71) that is guided in the receiver (3) such that it can move longitudinally,
- forms a counter bearing for the casing base (61) of a cartridge casing (59) extracted by the returning breechblock (71) from the cartridge chamber, and
- ejects and/or discards the cartridge casing (59) from the receiver (3) after interacting with the casing base (61),

wherein

the ejector (1) comprises additional means (7a, b, 9a, b, 11a, b, 13a, b), by means of which the ejector element (46) is flexibly supported in relation to the receiver (3) such that it returns slightly in a straight line together with the casing base (61) as a result of an interaction with said casing base, until the ejector is slowed to a standstill, and ejects/discards the cartridge casing (59) thereby

characterized in that

the ejector element (46) comprises a basically cuboid guide and impact recess (47) on its end protruding into the movement path (3) of the breechblock, which extends backward, toward the returning cartridge casing (69), and as a result, has at least one guide and impact surface (51) running in this direction, for the cartridge casing (59) that is to be ejected.

2. The ejector according to Claim 1, the means (7a, b, 9a, b, 11a, b, 13a, b) of which for a flexible support of the ejector element (46) include at least one elastic element (7a, b) that can be secured in or on the receiver (3).

3. The ejector according to Claim 2, the elastic element (7a, b) of which is a spring, in particular a spiral spring.

4. The ejector (1) according to Claim 2 or 3, the means (7a, b, 9a, b, 11a, b, 13a, b) of which for the flexible support of the ejector element (46) comprise at least one accommodating recess (11a, b) in the ejector main body (5) for guiding and accommodating the at least one elastic element (7a, b).

5. The ejector (1) according to one of the Claims 2 to 4, the means (7a, b, 9a, b, 11a, b, 13a, b) of which comprise at least one accommodating and guide element (9a, b) that can be secured on the receiver (3) for a supplementary accommodation and guidance of the at least one elastic element (7a, b).

6. The ejector (1) according to one of the Claims 2 to 5, comprising at least one securing element (19a, b), which retains and secures the elastic element (7a, b) in a pretensioned state.

7. The ejector (1) according to Claim 6, on the ejector main body (5) of which, at least one contact and/or guide surface (53a, b) is provided, for the contact and/or guidance thereof on the at least one securing element (19a, b).

8. The ejector (1) according to one of the preceding Claims, the ejector main body (5) of which is designed in the manner of a U, and which can be disposed in or on the receiver (3), transverse to the direction of firing, with a connecting part (44) that connects its two U-legs (45a, b) in the manner of a bridge, and which extends thereby over the width of the receiver, while its two U-legs (45a, b) extend toward the rear in the longitudinal direction of the receiver.

9. The ejector (1) according to Claim 8, the U-legs (45a, b) of which each comprise guide surfaces (55a, b) for guiding the ejector main body (5) in or on the receiver (3).

10. The ejector (1) according to Claim 9, having at least one recess (57a, b) in each of the guide surfaces (55a, b).

11. The ejector (1) according to one of the Claims 2 to 10, having two elastic elements (7a, b) disposed symmetrically to one another, each having associated accommodating and guide recesses (11a, b) in the two U-legs (45a, b) of the ejector main body (5) and having accommodating and guide elements (9a, b) that can be secured on the receiver (3).

12. The ejector (1) according to one of the preceding Claims, the at least one guide and impact surface (51) of which runs toward the rear and is slanted downward thereby, and/or has a guide channel that is at least nearly complementary to the casing base (61).

13. The ejector (1) according to one of the preceding Claims, the guide and impact recess (47) of which has at least one vertical guide and impact surface (49) for the casing base (61) of the cartridge casing (59) that is to be ejected.

14. A receiver (3) comprising:
a breechblock guided in the receiver (3) such that it can move longitudinally, and
an ejector (1) according to one of the preceding Claims.

15. The receiver (3) according to Claim 14, comprising at least one recess (27a, b) that is complementary to the ejector main body (5), for the accommodation and longitudinal movement guidance thereof.

16. The receiver (3) according to Claim 15, comprising at least one recess (63a, b) for accommodating and guiding the at least one accommodation and guide element (9a, b), wherein

the recess (63a, b) is flush with the recess (27a, b) for accommodating the ejector main body (5), and is designed such that it is complementary to the accommodation and guide element (9a, b).

17. The receiver (3) according to Claim 15 or 16, comprising at least two recesses (27a, b) that are formed symmetrical to one another in the receiver (3), for accommodating, in each case, one of two accommodating and guide elements (9a, b).

18. The receiver (3) according to one of the Claims 14 to 17, in which a stabilizing element (15) is provided, for stabilizing the receiver (1), disposed transverse to the direction of firing.

19. The receiver (3) according to Claim 18, the stabilizing element (15) of which is secured and/or is aligned via at least one securing element (19a, b) on the receiver (1), and the securing element (19a, b) also simultaneously retains and secures the ejector main body (5) in the receiver (3) in a tensioned manner.

20. A firearm having an ejector (1) according to one of the Claims 1 to 13 and/or a receiver (3) according to one of the Claims 14 to 19.