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(54) **Title:** EXTRACTOR ASSEMBLY FOR PISTOLS

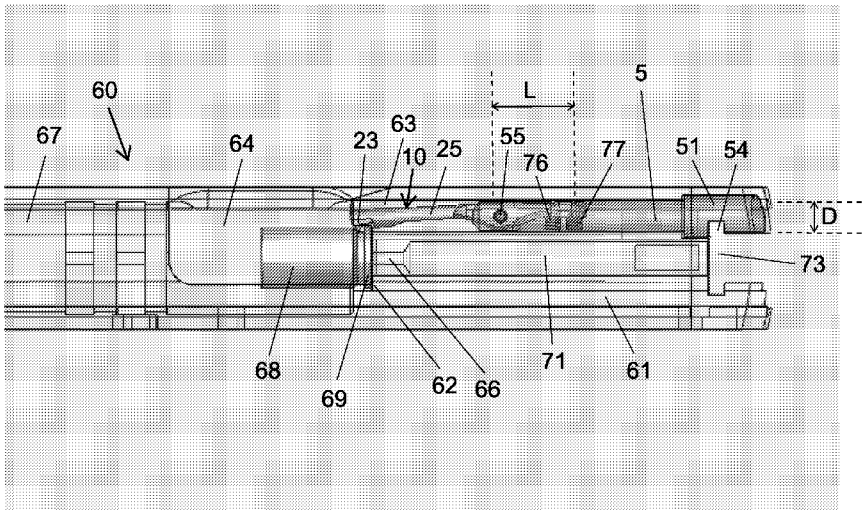


Fig. 5

(57) **Abstract:** An extractor assembly for a 1911-type pistol having a slide configured with elongated and forwardly extending extractor and firing pin bores comprises a rear member positionable within the extractor bore and securable to the slide; a forward member with a forward hook which is positionable within the extractor bore and pivotally connected to the rear member; and one or more extractor springs positioned between the rear and forward members and biased to constantly apply a force onto a portion of the forward member in a direction radially outwardly from the extractor bore that causes the forward member to pivot in a direction inwardly towards a firing chamber located forwardly to the firing pin bore and the hook to tensionably hold a rim of a cartridge loaded in the firing chamber.

*[Continued on next page]*

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— *of inventorship (Rule 4.17(iv))*

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# EXTRACTOR ASSEMBLY FOR PISTOLS

## Field of the Invention

The present invention relates to the field of firearms. More particularly, the invention relates to an extractor assembly for pistols, particularly semi-automatic pistols of the 1911 type.

## Background of the Invention

Semi-automatic pistols generally comprise a frame to which a magazine of cartridges is securable, and a slide which is slidably mounted to the frame for front to rear recoiling movement when a bullet is fired from within the barrel, and a hammer. The slide houses a firing pin and an extractor. When the spring-loaded hammer pivotally mounted within the frame is released after pressure has been applied to the trigger, the hammer cocks and then strikes the firing pin, which ignites the primer charge to propel, from the muzzle end of the barrel, a bullet of a cartridge that has been loaded into a firing chamber.

The extractor, which is involved with cartridge feeding, extraction, and ejection, is mounted within a dedicated bore of the slide which extends from a rear end of the slide to a forward breechface. When the slide is forced rearwardly by the reaction force in response to the thrust generated following a firing action, the extractor holding a cartridge rim by a hook element pulls the spent cartridge rearwardly together with the slide. The spent cartridge is pulled rearwardly until it forcefully contacts an ejector attached to the frame, and is consequently caused to be released from the hook element and ejected via an ejection port of the pistol.

After contacting a stop, the slide is thrust forwardly by the recoil action and its breechface pushes the next cartridge forwardly via a feed ramp to the firing chamber, to permit another firing cycle.

Many pistols are subjected to jams when the spent cartridge is not properly extracted from the firing chamber due to a malfunctioning extractor, requiring the user to manually extract the spent cartridge and requiring the firing cycle to be interrupted. The extractor is generally a resilient element that is biased by its elasticity towards the loaded cartridge, to ensure engagement with the cartridge rim while the cartridge is being loaded into the firing chamber. When the extractor is malfunctioning, the extractor does not always maintain engagement with the cartridge rim.

Some extractors attempt to ensure consistent extraction of spent cartridges by means of spring force, whereby the extractor spring is adapted to cause a pivoting action. However, the extractor spring is subjected to cyclic bending during the pivoting action in response to each firing action. Bending stress develops, and the stress alternates between equal positive and negative peak stresses during each cycle, leading to fatigue failure, which depends on the number of stress reversals. Prior to fatigue failure, the extractor spring is weakened and a spent cartridge will not be reliably extracted from the firing chamber. Also, the extractor spring transmits only a limited spring force to the extractor while inefficiently utilizing the stored potential energy. The relatively weak transmitted spring force is another factor that results in a reduced grip between the extractor and the cartridge rim, and often in disengagement of the cartridge rim.

It is an object of the present invention to provide a spring biased extractor assembly for pistols that is assured of maintaining engagement with a cartridge rim, while its extractor spring efficiently transmits its spring force without being subject to bending stress.

Other objects and advantages of the invention will become apparent as the description proceeds.

**Summary of the Invention**

An extractor assembly for a 1911-type pistol having a slide configured with elongated and forwardly extending extractor and firing pin bores comprises a rear member positionable within said extractor bore and securable to said slide; a forward member with a forward hook which is positionable within said extractor bore and pivotally connected to said rear member; and one or more extractor springs positioned between said rear and forward members and biased to constantly apply a force onto a portion of said forward member in a direction radially outwardly from said extractor bore that causes said forward member to pivot in a direction inwardly towards a firing chamber located forwardly to said firing pin bore and said hook to tensionably hold a rim of a cartridge loaded in said firing chamber.

As referred to herein, an "outward" direction is in a direction away from the slide, and an "inward" direction is in a direction towards the firing chamber.

The extractor assembly may further comprise a pin interengageable with the forward and rear members and about which the forward member pivots, said pin oriented substantially

perpendicularly to a longitudinal axis of the extractor bore. The pin is received within an aperture provided in each of two diametrically opposite pin holders formed at a forward end of a tubular body of the rear member and within an aperture formed in a rear mounting portion of the forward member.

In one aspect, the portion of the forward member to which a force is applied by the one or more extractor springs is an abutment plate extending rearwardly from the aperture formed in the rear mounting portion. The abutment plate is generally significantly thinner than a thickness of a projection within which the forward member aperture is formed and from which the abutment plate continuously extends rearwardly.

In one aspect, an internal face of an inward side of the tubular body is recessed with one or more seats to accommodate positioning therewithin of the one or more extractor springs, respectively.

In one aspect, the internal face of the inward side of the tubular body is recessed with two longitudinally spaced seats to accommodate positioning therewithin of two extractor springs, respectively.

**Brief Description of the Drawings**

In the drawings:

- Fig. 1 is a perspective view from the front of an embodiment of an extractor assembly;
- Fig. 2 is a perspective view from the side of a forward member used in conjunction with the extractor assembly of Fig. 1;
- Fig. 3 is a perspective inward view of a rear member used in conjunction with the extractor assembly of Fig. 1;
- Fig. 4 is a perspective outward view of a rear member used in conjunction with the extractor assembly of Fig. 1;
- Fig. 5 is a transparent plan view of a portion of a slide in which the extractor assembly of Fig. 1 is mounted; and
- Fig. 6 is a transparent perspective view from the top of a portion of a slide in which the extractor assembly of Fig. 1 is mounted, showing a cartridge rim when being tensionably held thereby.

**Detailed Description of the Invention**

The jointed extractor assembly of the present invention is biased by means of one or more extractor springs that are oriented substantially perpendicularly to the longitudinal axis of the barrel of the pistol. The spring force transmitted by each extractor spring is accordingly able to be maximized since the extractor spring extends substantially in the direction of movement of the pivoting member which is adapted to engage the cartridge rim.

Fig. 1 illustrates the jointed extractor assembly, generally indicated by numeral 10, according to one embodiment of the invention. Extractor assembly 10 comprises rear member 5 and forward member 25, which is narrower than rear member 5 and pivotally mounted to rear member 5 by a pin introduced through a pair of opposed apertures 9 formed at a forward region of rear member 5. Extractor assembly 10 is generally suitable for use in conjunction with the M1911 semi-automatic pistol as it is configured similarly to the standard 1911-extractor and is adapted to perform the functions of the standard 1911-extractor. More particularly, extractor assembly 10 has an elongated configuration which is suitable for insertion within a dedicated bore formed within the slide, so that forward member 25 will be able to hold a cartridge rim at the same time that rear member 5 is secured to the slide. The specific configuration of extractor assembly 10 will be described hereinafter.

Fig. 2 illustrates forward pivoting member 25, which has a forward variable-thickness, cartridge-engaging body 14 and a rear mounting portion 32. Variable-thickness body 14 is configured with a notch 21 between a thickened locator portion 17 for indicating the point along notch 21 which contacts the cartridge rim and a beveled hook 23, which is configured with a forward face 26 being beveled at an angle of e.g. 30 degrees, at the extreme forward portion of body 14. When forward member 25 is pivoted, the cartridge rim is received within notch 21, and the wall 24 of notch 21 applies sufficient lateral pressure to the cartridge rim to resist disengagement therefrom during a firing action as well as during the subsequent rearward displacement of the slide, until the spent cartridge contacts the ejector. Forward body 14 may have a planar front wall 17 extending rearwardly from locator portion 17 and a planar back wall 19 extending throughout the length of body 14.

Although wall 24 of notch 21 appears to be perpendicular to the side wall of hook 23, in reality it will generally be rounded or ramped to allow the cartridge rim to be gradually cammed into notch 21.

Also, the underside of hook 23 may be rounded or ramped to facilitate cartridge ejection without interference.

Rear mounting portion 32, by which pivoting member 25 is mounted to the rear member, extends continuously and rearwardly from body 14. Aperture 34, which is aligned with the apertures 9 of rear member 5 (Fig. 1), is provided within projection 36 of rear mounting portion 32, e.g. a sinusoidal projection, so as to be substantially perpendicular to wall 24 of notch 21. The thickness of projection 36 is continuously reduced in a rearward direction, from a maximum thickness in the vicinity of aperture 34 to a minimum thickness at the rear extremity of mounting portion 32 which defines abutment plate 38, e.g. elliptical.

Figs. 3 and 4 illustrate rear member 5. Rear member 5 is configured with a tubular body 42 that terminates at its rearward end with a protuberance 51 radially wider than body 42. A circumferentially recessed notch 54 substantially perpendicular to the longitudinal axis of tubular body 42 and engageable with the firing pin stop is formed in the inward side of protuberance 51. The rear face 56 of protuberance 51 may be beveled to conform to the beveled rear face of the slide within a dedicated bore of which the elongated extractor assembly is mounted.

The forward end of tubular body 42 is formed with two elongated and diametrically opposite pin holders 44 and 45, in each of which is formed an aperture 9 for receiving a pin passing through aperture 34 of projection 36 (Fig. 2). The internal face of each of pin holders 44 and 45 may be mutually parallel. Two semielliptical cutouts 47 and 48 are removed from peripheral regions of body 42 between pin holders 44 and 45. Cutout 48 formed in the outward side of body 42, i.e. the side opposite to notch 54, is significantly longer than cutout 47 formed in the inward side of body 42, to accommodate the rotary movement of rounded projection 36 (Fig. 2) while forward member 25 pivots.

The interior of tubular body 42 is hollowed out, at least from the forward extremity 52 of the pin holders to the rear edge 59 of cutout 48. The internal face 56 of the inward side of body 42 extending rearwardly from the rear edge 53 of cutout 47 is recessed with two longitudinally spaced seats 57 and 58 to accommodate the positioning therewithin of corresponding extractor springs.

A transparent plan view of slide 60 is shown in Fig. 5 to illustrate the operation of extractor assembly 10. Extractor assembly 10 is mounted within elongated bore 63 formed within a right portion of the thickened slide body 61 and to the rear of ejection port 64, according to the illustrated orientation. Pin 55, engaged with the pin holders of rear member 5 and about which forward member 25 pivots, is upwardly oriented and substantially perpendicular to the longitudinal axis of bore 63. This pin orientation allows hook 23 of pivoting member 25 to pivot laterally, i.e. generally widthwise with respect to the longitudinal axis of bore 63. Bore 63 may be of a uniform diameter D with the exception of a rear widened and opened portion to accommodate the placement therein of protuberance 51. Bore 63 extends forwardly beyond breechface 62, to allow hook 23 of pivoting member 25, which protrudes forwardly from bore 63, to hold the rim 69 of cartridge 68, which has been loaded into the firing chamber.

Another bore 66 adapted to receive firing pin 71 is formed centrally to bore 63 within slide body 61, and extends forwardly to breechface 62. Spring loaded firing pin 71 is able to pass forwardly through an aperture of breechface 62 with sufficient momentum after being struck by the hammer to impact the primer of cartridge 68 and to cause ignition of the propellant and the subsequent forward discharge of a bullet through the barrel which is fitted within the forward end 67 of slide 60. The rear edge of bore 66 is coincident with the forward edge of groove 73, which is adapted to receive the firing pin stop to prevent release of firing pin 71 from bore 66. The firing pin stop, which is formed with an opening through which an element of the hammer is introduced to enable forceful contact with firing pin 71, is also configured to be engaged with the rear notch 54 of rear member 5 of the extractor assembly which is aligned with groove 73.

Rear member 5 is substantially stationary while engaged with the firing pin stop. The small radial clearance between the tubular body and the wall of bore 66 also assists in minimizing movement of rear member 5. At the same time, there is sufficient radial clearance between the relatively narrow body of forward member 25 and the wall of bore 66 to allow forward member 25 to pivot about pin 55.

Extractor springs 76 and 77 inserted in seats 56 and 57 (Fig. 4) of rear member 5, respectively, are biased to constantly apply a force onto abutment plate 38 (Fig. 2) of forward member 25. Consequently abutment plate 38 is displaced radially outwardly to cause counterclockwise rotation of the body 14 of forward member 25, according to the illustrated orientation. The spring force

applied by extractor springs 76 and 77 is generally constant and efficiently transmitted since it is applied in the direction of movement of the abutment plate. As a result of this counterclockwise rotation, hook 23 located at the terminal end of body 14 is urged to pivot laterally. Thus cartridge 68 will be guided into, and held with tension by, hook 23, as also shown in Fig. 6, when slide 60 is advanced forwardly into the firing chamber to initiate another firing cycle. Cartridge 68 will also contact breechface 62 when being laterally tensioned. When slide 60 is subsequently forced rearwardly in response to a firing action, the spent cartridge forcefully contacts the ejector. The force applied by the ejector onto cartridge 68 is greater than the total biasing force applied by extractor springs 76 and 77 and transmitted to the cartridge, causing cartridge 68 to be disengaged from hook 34 and ejected via ejection port 64.

By virtue of the configuration of extractor assembly 10 by which the longitudinal length L from pin 55 to a spring applied portion of abutment plate 38 is relatively short, the force applied by extractor springs 76 and 77 needs to be only of a relatively small magnitude so that a sufficiently large moment will be produced that will cause hook 23 to hold cartridge rim 69 with sufficient lateral pressure to resist disengagement. If so desired, a single extractor spring may be employed, as long as it applies sufficiently high spring power. Although extractor springs 76 and 77 provide sufficient spring power to resist disengagement from cartridge rim 69, they are not excessively stiff to ensure that hook 23 will properly engage with the rim 69 of new cartridges 68 as they are fed into the firing chamber.

The moment arm L for ensuring a relatively small-magnitude spring force is generally less than 15 mm, e.g. 13 mm. For example, first extractor spring 76 is spaced 8.6 mm from pin 55 and second extractor spring 77 is spaced 12.1 mm from pin 55.

The size of extractor springs 76 and 77 of course is limited by the diameter of bore 63, which is generally less than 6 mm, e.g. 5.30 mm, thus limiting the magnitude of the spring force that needs to be applied. A ratio of moment arm L to bore diameter D may range from 1.0 to 2.6, 1.0 to 2.2, or 2.2 to 2.6, for example 1.26 or 2.48.

While some embodiments of the invention have been described by way of illustration, it will be apparent that the invention can be carried out with many modifications, variations and adaptations, and with the use of numerous equivalents or alternative solutions that are within the scope of persons skilled in the art, without exceeding the scope of the claims.

## CLAIMS

1. An extractor assembly for a 1911-type pistol having a slide configured with elongated and forwardly extending extractor and firing pin bores, comprising:

a) a rear member positionable within said extractor bore and securable to said slide;

b) a forward member with a forward hook which is positionable within said extractor bore and pivotally connected to said rear member; and

c) one or more extractor springs positioned between said rear and forward members and biased to constantly apply a force onto a portion of said forward member in a direction radially outwardly from said extractor bore that causes said forward member to pivot in a direction inwardly towards a firing chamber located forwardly to said firing pin bore and said hook to tensionably hold a rim of a cartridge loaded in said firing chamber.

2. The extractor assembly according to claim 1, further comprising a pin interengageable with the forward and rear members and about which the forward member pivots, said pin oriented substantially perpendicularly to a longitudinal axis of the extractor bore.

3. The extractor assembly according to claim 2, wherein the pin is received within an aperture provided in each of two diametrically opposite pin holders formed at a forward end of a tubular body of the rear member and within an aperture formed in a rear mounting portion of the forward member.

4. The extractor assembly according to claim 3, wherein the portion of the forward member to which a force is applied by the one or more extractor springs is an abutment plate extending rearwardly from the aperture formed in the rear mounting portion.

5. The extractor assembly according to claim 3, wherein an internal face of an inward side of the tubular body is recessed with one or more seats to accommodate positioning therewithin of the one or more extractor springs, respectively.

6. The extractor assembly according to claim 5, wherein the internal face of the inward side of the tubular body is recessed with two longitudinally spaced seats to accommodate positioning therewithin of two extractor springs, respectively.

7. The extractor assembly according to claim 4, wherein the abutment plate is significantly thinner than a thickness of a projection within which the forward member aperture is formed and from which the abutment plate continuously extends rearwardly.

8. The extractor assembly according to claim 1, wherein the rear member is formed with an inward notch that is alignable with a groove of the slide positioned rearwardly to the firing pin bore, the rear member being securable to the slide by means of a firing pin stop insertable within said groove and said notch.

9. The extractor assembly according to claim 2, wherein a distance from the pin to the portion of said forward member onto which the spring force is applied is less than 15 mm.

10. The extractor assembly according to claim 9, wherein the distance from the pin to the portion of said forward member onto which the spring force is applied is less than 9 mm.

11. The extractor assembly according to claim 2, wherein a ratio of distance from the pin to the portion of said forward member onto which the spring force is applied to diameter of the extractor bore ranges from 1.0 to 2.6.

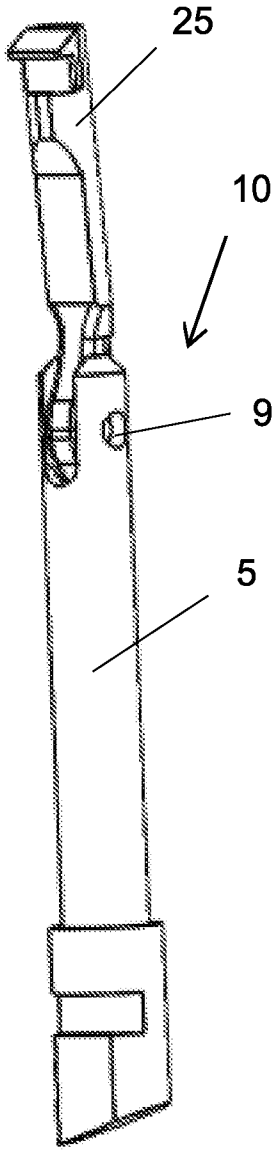


Fig. 1

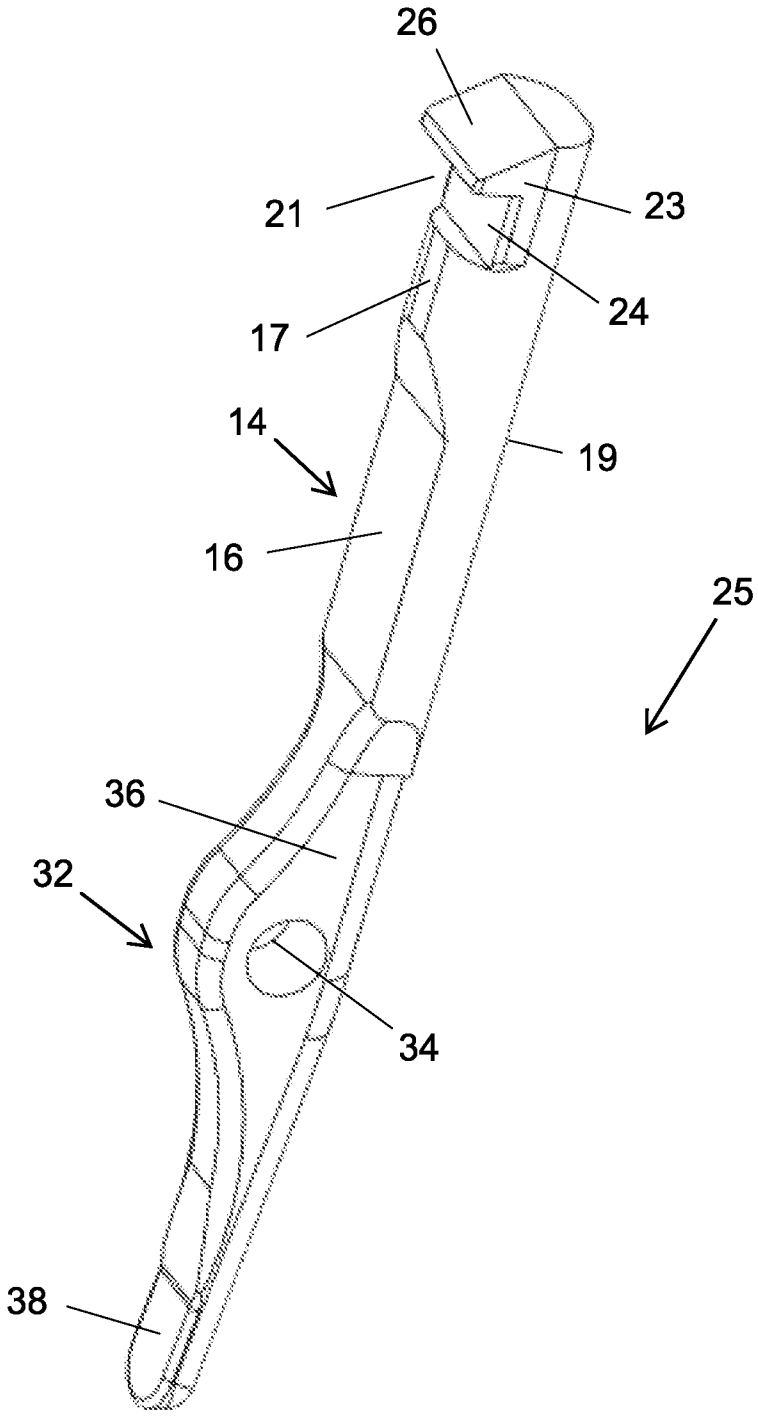


Fig. 2

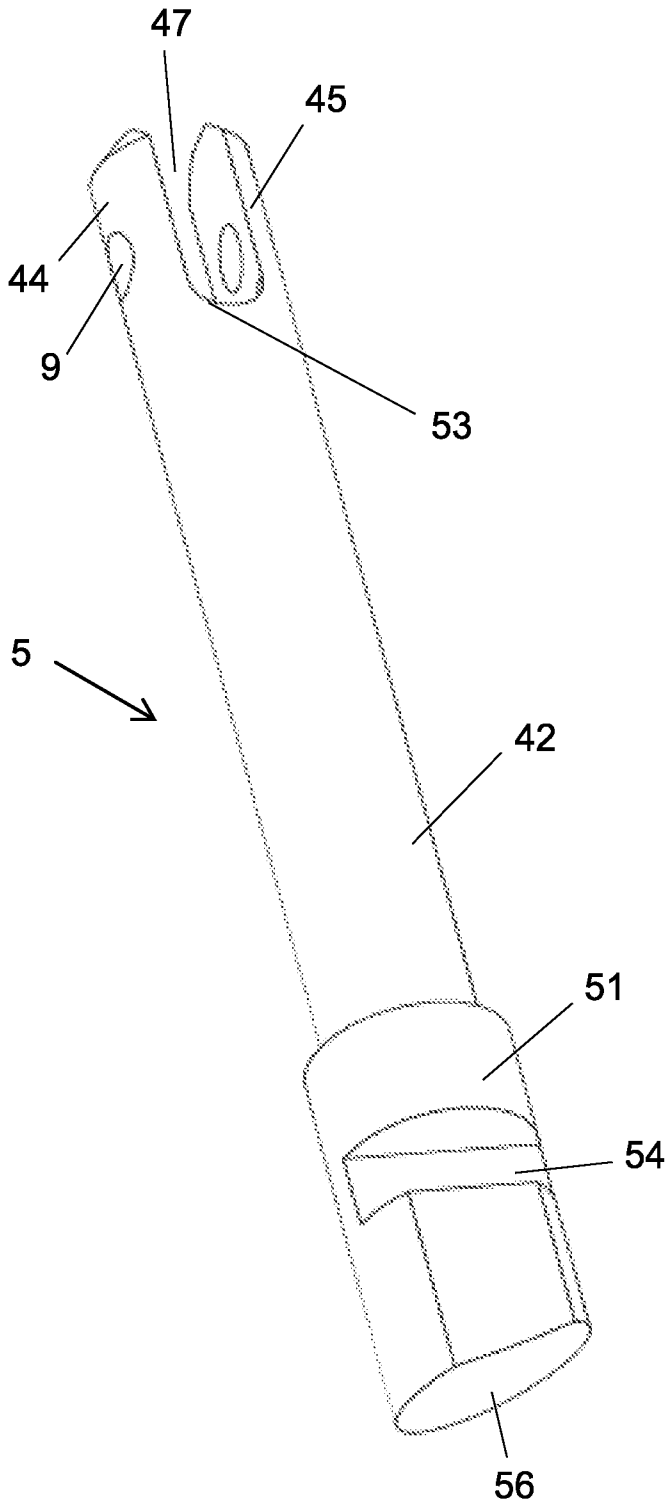


Fig. 3

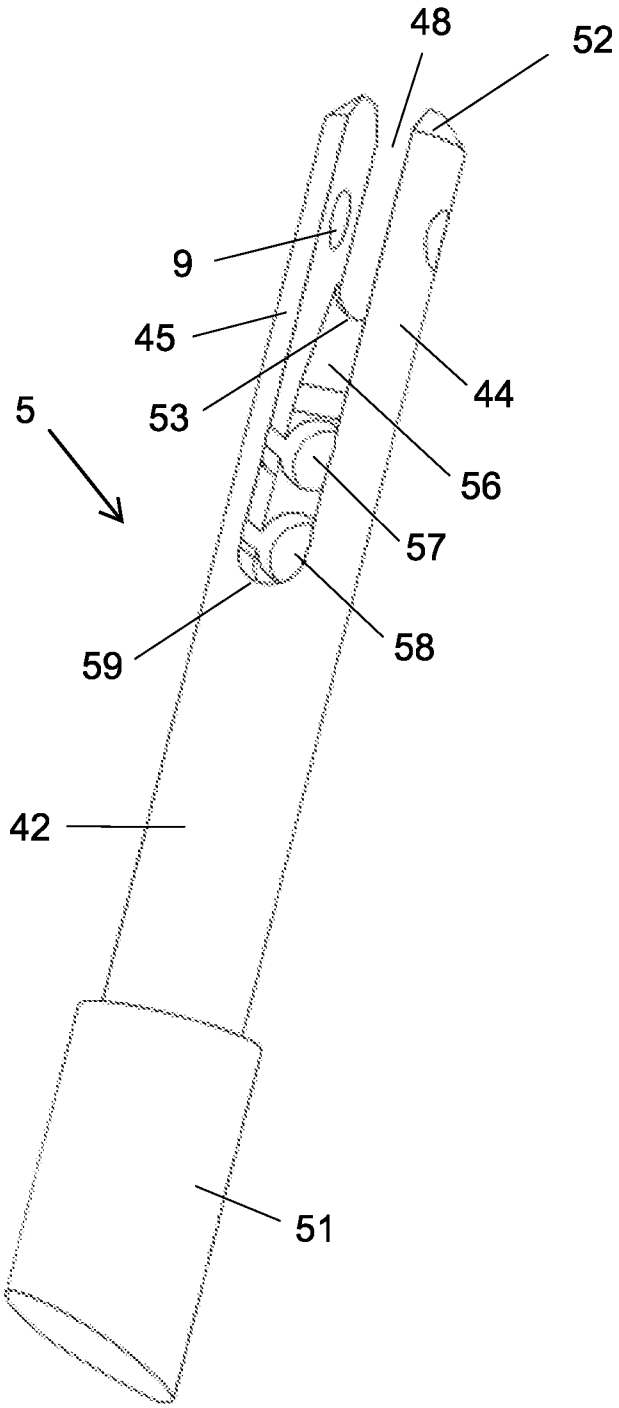


Fig. 4

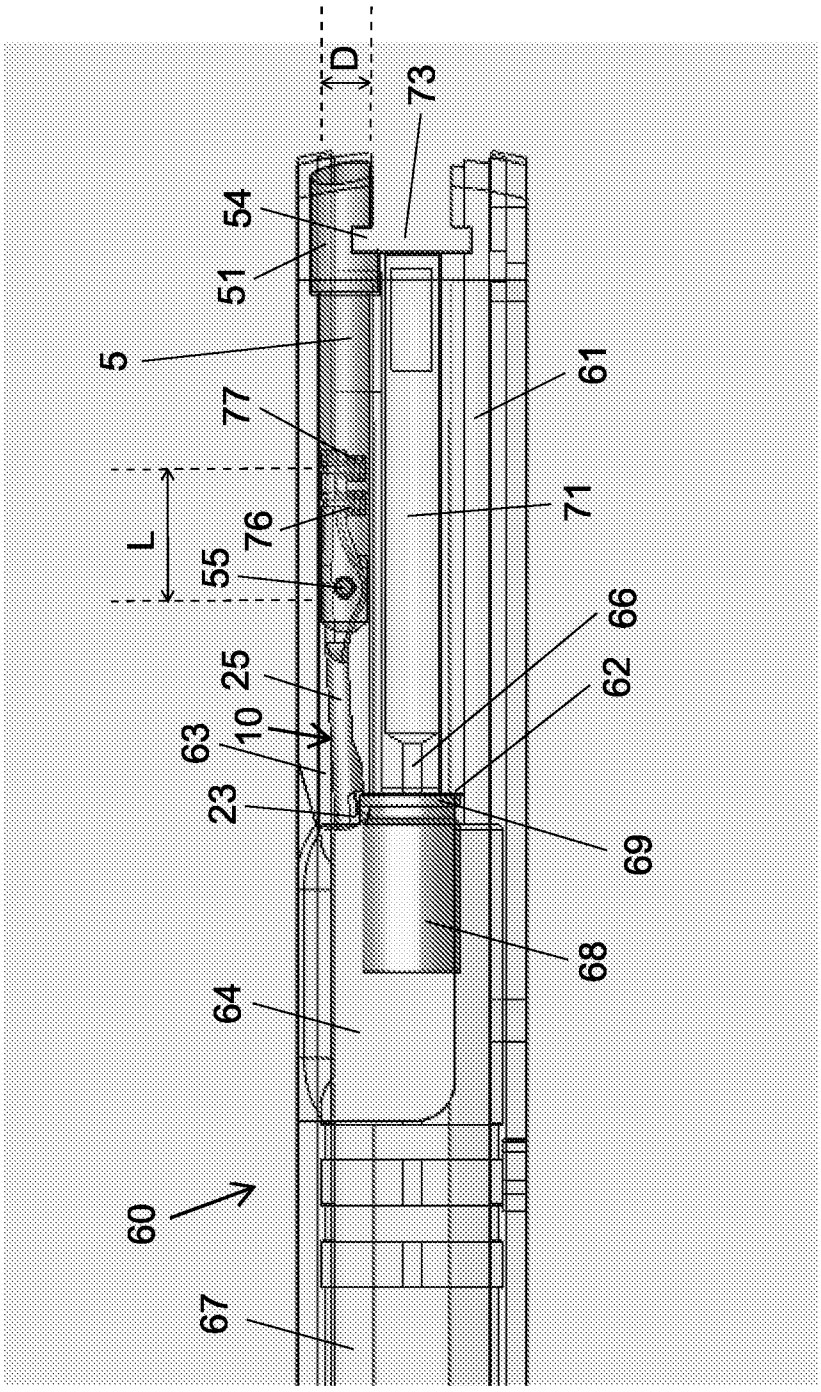


Fig. 5

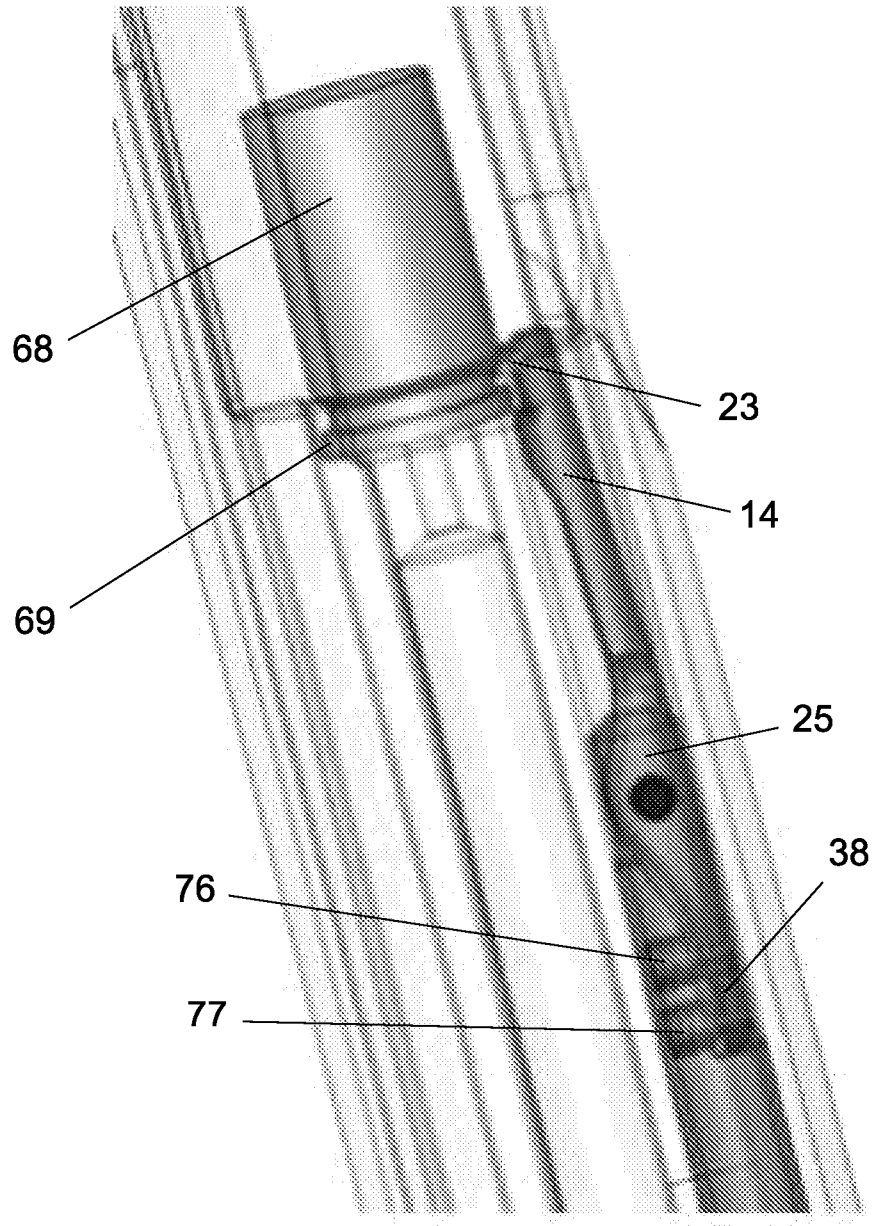


Fig. 6

# INTERNATIONAL SEARCH REPORT

International application No.
PCT/IL2019/051385

A. CLASSIFICATION OF SUBJECT MATTER
IPC (20200101) F41A 15/14, F41A 5/00, F41A 9/41, F41A 15/16
CPC (20130101) F41A 15/14, F41A 5/00, F41A 9/41, F41A 15/16
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC (20200101) F41A 15/14, F41A 5/00, F41A 9/41, F41A 15/16
CPC (20130101) F41A 15/14, F41A 5/00, F41A 9/41, F41A 15/16

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
Databases consulted: Esp@cenet, Google Patents, Orbit
Search terms used: extractor, firearm, pistol, 1911, slide, spring, pivot, forward, rear

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| A | US 2018087857 A1 Quarter Circle 10<br>29 Mar 2018 (2018/03/29)<br>see paragraphs 57-57 and fig. 1 | 1-11 |
| A | US 5974716 A Kidd<br>02 Nov 1999 (1999/11/02)<br>See fig 1 with reference to its description regarding biasing springs 27, hook 25 and locking groove 24 and firing pin stop means (column 5 line s 9-15) for a 1911 pistol and column 5 lines 9-15 | 1,8 |
| A | US 6389725 B1 FN Herstal SA<br>21 May 2002 (2002/05/21)<br>See Figs 4-8 and description thereof relating to spring biased pivoting ejector | 1 |
| A | US 3142923 A Vartanian<br>04 Aug 1964 (1964/08/04)<br>See fig 6 and description thereof for pivoted firing pin and extractor | 1 |

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
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| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| 12 Feb 2020 | 13 Feb 2020 |


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VASL Robert

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**INTERNATIONAL SEARCH REPORT**
Information on patent family members

International application No.
PCT/IL2019/051385

| Patent document cited search report | Publication date | Patent family member(s) | Publication Date |
|---|---|---|---|
| US 2018087857 A1 | 29 Mar 2018 | US 2018087857 A1 | 29 Mar 2018 |
| | | US 2018087855 A1 | 29 Mar 2018 |
| | | US 10393458 B2 | 27 Aug 2019 |
| | | US 2019226784 A1 | 25 Jul 2019 |
| US 5974716 A | 02 Nov 1999 | US 5974716 A | 02 Nov 1999 |
| US 6389725 B1 | 21 May 2002 | US 6389725 B1 | 21 May 2002 |
| | | AR 022831 A1 | 04 Sep 2002 |
| | | AT 216769 T | 15 May 2002 |
| | | AU 1636300 A | 07 Sep 2000 |
| | | AU 738758 B2 | 27 Sep 2001 |
| | | BE 1012500 A3 | 07 Nov 2000 |
| | | BR 0000987 A | 31 Oct 2000 |
| | | CA 2299153 A1 | 04 Sep 2000 |
| | | CA 2299153 C | 19 Feb 2008 |
| | | DE 60000136 D1 | 29 May 2002 |
| | | DE 60000136 T2 | 12 Dec 2002 |
| | | DK 1033548 T3 | 19 Aug 2002 |
| | | EP 1033548 A1 | 06 Sep 2000 |
| | | EP 1033548 B1 | 24 Apr 2002 |
| | | ES 2174792 T3 | 16 Nov 2002 |
| | | HK 1032622 A1 | 27 Sep 2002 |
| | | ID 24991 A | 07 Sep 2000 |
| | | IL 134329 D0 | 30 Apr 2001 |
| | | IL 134329 A | 05 Oct 2006 |
| | | JP 2000274998 A | 06 Oct 2000 |
| | | JP 4092058 B2 | 28 May 2008 |
| | | KR 20010014508 A | 26 Feb 2001 |
| | | KR 100388715 B1 | 25 Jun 2003 |

**INTERNATIONAL SEARCH REPORT**
Information on patent family members

International application No.
PCT/IL2019/051385

| Patent document cited search report | Publication date | Patent family member(s) | Publication Date |
|---|---|---|---|
| | | PT 1033548 E | 30 Sep 2002 |
| | | SG 76002 A1 | 24 Oct 2000 |
| | | TR 200000584 A2 | 23 Oct 2000 |
| | | TR 200000584 A3 | 23 Oct 2000 |
| | | TW 480328 B | 21 Mar 2002 |
| | | ZA 200000934 B | 11 Oct 2000 |
| US 3142923 A | 04 Aug 1964 | US 3142923 A | 04 Aug 1964 |