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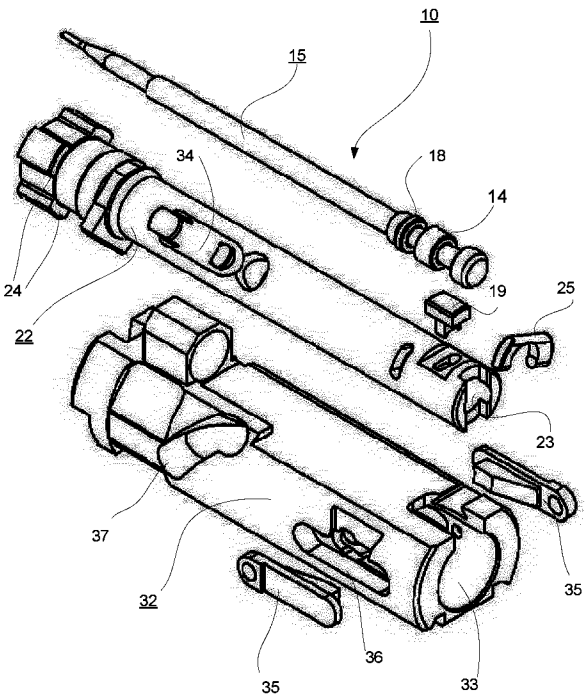
(54) Keksinnön nimitys - Uppfinningens benämning - Title of the invention
Aseen lukon iskupiikkivarmistin
Slagstiftssäkring för ett vapenlås
Firing pin safety of a bolt of a firearm

(56) Viitejulkaisut - Anförda publikationer - References cited
US 2010313459 A1, GB 2493002 A, US 2015330727 A1, EP 0146359 A2, US 4658529 A

(57) Tiivistelmä - Sammandrag - Abstract

Keksinnön kohteena on aseen lukon iskupiikkivarmistin, jossa lukko (10) käsittää lukkoluistin (32), iskupiikin (15) ja lukkorungon (22), jossa lukkorunko (22) on sijoitettu lukkorunkokanavaan (33, joka on muodostettu lukkoluistiin (32) keskiaukkona lukkoluistin (32) pitkittäisessä suunnassa (32), johon on järjestetty kääntötappi (34) lukkorungon (22) kääntöliikettä varten, jossa iskupiikki (15) on sijoitettu iskupiikkikanavaan (23), joka on muodostettu lukkorunkoon (22) keskiaukkona lukkorungon (22) pitkittäisessä suunnassa, ja jossa iskupiikkikanavassa (23) iskupiikin (15) ympärille on sijoitettu jousi (17) iskupiikin (15) pitämiseksi taka-asemassa ja iskupiikin (15) liikkeen hidastamiseksi. Lukko (10) käsittää automaattisen iskupiikkivarmistimen järjestettynä varmuuselementin (25) välityksellä, joka varmuuselementti on sijoitettu lukkoluistin (32) kummallakin puolella olevien ohjaimien (35) väliin varmuuselementin (25) aseman asettamiseksi.

The invention relates to a firing pin safety of a bolt of a firearm, in which the bolt (10) comprises a bolt carrier (32), a firing pin (15) and a bolt body (22), in which the bolt body (22) is located in a bolt body channel (33) formed to the bolt carrier (32) as a central opening in longitudinal direction of the bolt carrier (32), in which a cam pin (34) is provided for turning movement the bolt body (22), in which the firing pin (15) is located in a firing pin channel (23) formed to the bolt body (22) as a central opening in longitudinal direction of the bolt body (22), and in which in the firing pin channel (23) around the firing pin (15) a spring (17) is located for keeping the firing pin (15) in back position and for slowing down movement of the firing pin (15). The bolt (10) comprises an automatic firing pin safety provided by a safety element (25) located in between guides (35) at each side of the bolt carrier (32) setting the position of the safety element (25).



Firing pin safety of a bolt of a firearm

The present invention relates to firing pin safeties for firearms. More precisely the present invention relates to a firing pin safety of a bolt of a firearm according to the preamble part of claim 1.

In US patent publication is disclosed a firearm, firing pin safety catch mechanism comprising a bolt having a face and proximal end for receiving a firing pin, a bolt carrier, a fi ring pin having a distil end, a proximal end opposite the distil end and a recess, or catch surface, disposed in proximity to the proximal end, a hammer which is moveable from a cocked position through a travel path to make contact with the firing pin, a firing pin spring biasing the firing pin into a rest portion wherein the distil end of the firing pin is designed to be spaced from the forward face of the bolt. and a safety catch mechanism.

In US patent publication 4,658,529 is disclosed a firing pin safety mechanism for a weapon provided with a slide having a firing pin channel, comprising: a firing pin mounted for sliding movement between a "ready" position wherein at least one end of the firing pin extends outside said firing pin channel and a "sheathed" position wherein both ends of said firing pin are disposed within the firing pin channel, said firing pin being yieldingly loaded to said "ready" position, a safety channel in the weapon slide extending transversely of the firing pin channel and intersecting the firing pin channel, a safety mounted in said safety channel for sliding movement between "on" and "off" positions, said safety and firing pin being provided with cam means for moving said firing pin to and locking said firing pin in the "sheathed" position when said safety is moved to the "on" position and for releasing said firing pin for movement to said "ready" position when said safety is moved to the "off" position.

One problem in firearms, usually in semi-automatic or automatic firearms, is a slamfire, which is a premature, unintended discharge of a firearm and which typically may occur, when a bolt of the firearm stops rapidly, while a firing pin continues its movement by inertia forward and hits and sets off a primer. Sometimes, the firing pin only causes a dent onto the primer but in the worst cases the slamfire occurs. Typically, the slamfire is prevented by providing the firing pin with a spring around it for slowing down the movement but in all cases the spring is not effective enough as the force of the spring is not enough to prevent

the continuation of the movement of the firing pin. In case one should try to prevent the continuation of the movement of the firing pin in order to prevent the slamfire by increasing preventing force of the spring, it would also mean that the force of the striking hammer should also be increased, which may then cause other problems in the firearm.

An object of the present invention is to create a firing pin safety of a bolt of a firearm by which the above described problems relating to the possible slamfire are eliminated or at least minimized.

Another object of the present invention is to create a new type of a firing pin safety of a bolt of a firearm, in which slamfire is prevented automatically.

In order to achieve the above objects and those that will come apparent later the firing pin safety of a bolt of a firearm is mainly characterized by the features of the characterizing part of claim 1.

Dependent claims present advantageous features and embodiments of the invention.

According to the invention in the firing pin safety of a bolt of a firearm, the bolt comprises a bolt carrier, a firing pin and a bolt body, in which the bolt body is located in a bolt body channel formed to the bolt carrier as a central opening in longitudinal direction of the bolt carrier, in which a cam pin is provided for turning movement of the bolt body, in which the firing pin is located in a firing pin channel formed to the bolt body as a central opening in longitudinal direction of the bolt body, and in which in the firing pin channel around the firing pin a spring is located for keeping the firing pin in back position and for slowing down movement of the firing pin, wherein the bolt comprises an automatic firing pin safety provided by a safety element located in between guides at each side of the bolt carrier setting the position of the safety element.

According to an advantageous feature of the invention the safety element is used by the turning of the bolt body.

According to an advantageous feature of the invention the spring is located between the cam pin and a radially extending shoulder formed on and around the firing pin for keeping the firing pin in its back position.

According to an advantageous feature of the invention the guides are movable in respect of the bolt body forward/backward by turning movement of and simultaneously moves by the bolt body such that the guides move the safety element sideways.

According to an advantageous feature of the invention the bolt closed or near closed the safety element is movable sideways to a position, where the firing pin passes the safety element and the firearm can be fired.

According to an advantageous feature of the invention a stopper is provided at the back part of the firing pin resting in a groove of the firing pin for keeping the firing pin inside the bolt body and in the firing pin channel.

By the firing pin safety according to the invention the slamfire is automatically prevented and the firing pin safety according to the invention is applicable in all firearms with revolving type bolts.

In the following the invention and its advantages are explained in greater detail below in the sense of example and with reference to accompanying drawing, where

in figure 1 is schematically shown an exploded view of an advantageous example of the invention,

in figure 2 is schematically shown the advantageous example of figure 1, when the bolt is open,

in figure 3 is schematically shown the example of figure 2 with projections of figures 4A-4B marked,

in figures 4A-4B are schematically shown the projections A-A and B-B of figure 3,

in figure 5 is schematically shown the example of figure 1, when the bolt is closed,

in figure 6 is schematically shown the example of figure 5 with projections of figures 7A-7B marked and

in figures 7A-7B are schematically shown the projections C-C and D-D of figure 6.

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During the course of the following description like numbers and signs will be used to identify like elements according to the different views which illustrate the invention and its advantageous example. In the figures some repetitive reference signs have been omitted for clarity reasons.

As shown in the example of figure 1 the bolt 10 comprises a firing pin 15, a bolt body 22, a bolt carrier 32 with a cam pin 34 and guides 35 located in openings 36 at each side of the bolt carrier 32. Through the bolt carrier 32 extends a bolt body channel 33, into which the bolt body 22 is located and through the bolt body 22 extends a firing pin channel 23 for the firing pin 15. To secure the firing pin 15 a stopper 19 is provided. Additionally, the bolt comprises a spring 17 located around the firing pin 15 in the firing pin channel 23, as can be seen for example in figures 4A-4B and 7A-7B.

In figures 2-4B the bolt 10 and the firing pin safety is shown, when the bolt is open. As can be seen in this position the movement of the firing pin 15 is prevented by the safety element 25 positioned between the guides 35 after the cam pin 34 has turned the bolt body 22 to the open position.

In figures 5-7B the bolt 10 and the firing pin safety is shown, when the bolt is closed. As can be seen in this position the firing pin 15 can pass the safety element 25 and the firearm can be fired as the safety element 25 has been moved sideways to a position guided by the guides after the cam pin 34 has turned the bolt body 22 to the closed position.

In the following function of the bolt 10 and the firing pin safety is explained with reference to the figures 1-7B.

The cam pin 34 is in contact with the bolt body 22 and when the cam pin 34 is turned also the bolt body 22 moves. The bolt carrier 32 is provided with a cam pin groove 37 for the pivot pin 34. The bolt body 22 can turn for example 45º as defined by the cam pin 34 and the cam pin groove 37 in the bolt carrier 32. Due to the turning movement of the bolt body 22, the bolt body 22 moves forwards/backward in the bolt body channel 33. The turning movement of for example 45 º causes that locking surfaces 24, for example four locking surfaces 24 of the bolt body 22 will be set locked and thus to a bolt closed position, in which the firearm can be fired. Inside the bolt body 22 in the firing pin channel 23 the firing pin 15 is provided to move. Around the firing pin 15 and between the cam pin 34 and a shoulder 18 of the firing pin 15 the spring 17 is located to

keep the firing pin 15 in its back position. A stopper 19 is provided at the back part of the firing pin 15 resting in a groove 14 of the firing pin 15 to keep the firing pin 15 inside the bolt body 22 and in the firing pin channel 23.

When the firearm is fired a strike hammer of the firearm strikes the back end of the firing pin 15 and the movement of the firing pin 15 caused by the strike sets primer of the cartridge. During the charging cycle the bolt 10 is pushed backwards by a force of the gas piston and/or recoil simultaneously the used case is ejected. The force of the bolt return spring (not shown) returns the bolt 10 forward and a next cartridge is provided.

The bolt 10 according to the invention comprises an automatic firing pin safety provided by a safety element, which is used by the turning of the bolt body 22 in the bolt carrier 32.

When the bolt 10 is moving in open state forward until the bolt body 22 stops, the safety element 25 is in on-position and prevents movement of the firing pin 15 further forward and the movement of the firing pin 15 is prevented. The safety element 25 is located in between the guides 35 at each side of the bolt carrier 32 setting the position of the safety element 25 preventing the movement of the firing pin 15.

When the bolt body 22 turns the guides 35 move in respect of the bolt body 22 forward and simultaneously moves by the guides the safety element 25 sideways. At this stage the movement and inertia of the firing pin 15 is over. When the bolt 10 is closed or near closed-position, the safety element 25 has been moved sideways to a position, where the firing pin 15 can pass the safety element 25 and the firearm can be fired.

In the description in the foregoing, although some functions have been described with reference to certain features, those functions may be performable by other features whether described or not. Although features have been described with reference to certain embodiments or examples, those features may also be present in other embodiments or examples whether described or not.

Reference signs used in the drawing

10 bolt

14 groove

15 firing pin

17 spring

18 shoulder

19 stopper

22 bolt body

23 firing pin channel

24 locking surfaces

25 safety element

32 bolt carrier

33 bolt body channel

34 cam pin

35 guide

36 guide opening

37 cam pin groove

Claims

1. Firing pin safety of a bolt of a firearm, in which the bolt (10) comprises a bolt carrier (32), a firing pin (15) and a bolt body (22),

   in which the bolt body (22) is located in a bolt body channel (33) formed to the bolt carrier (32) as a central opening in longitudinal direction of the bolt carrier (32),

   in which a cam pin (34) is provided for turning movement of the bolt body (22),

   in which the firing pin (15) is located in a firing pin channel (23) formed to the bolt body (22) as a central opening in longitudinal direction of the bolt body (22),

   and in which in the firing pin channel (23) around the firing pin (15) a spring (17) is located for keeping the firing pin (15) in back position and for slowing down movement of the firing pin (15),

   characterized in that the bolt (10) comprises an automatic firing pin safety provided by a safety element (25) located in between guides (35) at each side of the bolt carrier (32) setting the position of the safety element (25).

2. Firing pin safety according to claim 1, **characterized in that** the safety element (25) is used by the turning of the bolt body (22).

3. Firing pin safety according to claim 1 or 2, **characterized in that** the spring (17) is located between the cam pin (34) and a radially extending shoulder (18) formed on and around the firing pin (15) for keeping the firing pin (15) in its back position.

4. Firing pin safety according to any of claims 1 - 3, **characterized in that** the guides (35) are movable in respect of the bolt body (22) forward/backward by turning movement of and simultaneously moves by the bolt body (22) such that the guides (35) move the safety element (25) sideways.

5. Firing pin safety according to any of previous claims, **characterized in that** the bolt (10) closed or near closed the safety element (25) is movable sideways to a position, where the firing pin (15) passes the safety element (25) and the firearm can be fired.

6. Firing pin safety according to any of previous claims, **characterized in that** a stopper (19) is provided at the back part of the firing pin (15) resting in a groove (14) of the firing pin (15) for keeping the firing pin (15) inside the bolt body (22) and in the firing pin channel (23).

Patenttivaatimukset

1. Aseen lukon iskupiikkivarmistin, jossa lukko (10) käsittää lukkoluistin (32), iskupiikin (15) ja lukkorungon (22),

   jossa lukkorunko (22) on sijoitettu lukkorunkokanavaan (33, joka on muodostettu lukkoluistiin (32) keskiaukkona lukkoluistin (32) pitkittäisessä suunnassa (32),

   johon on järjestetty kääntötappi (34) lukkorungon (22) kääntöliikettä varten,

   jossa iskupiikki (15) on sijoitettu iskupiikkikanavaan (23), joka on muodostettu lukkorunkoon (22) keksiaukkona lukkorungon (22) pitkittäisessä suunnassa,

   ja jossa iskupiikkikanavassa (23) iskupiikin (15) ympärille on sijoitettu jousi (17) iskupiikin (15) pitämiseksi taka-asemassa ja iskupiikin (15) liikkeen hidastamiseksi,

   tunnettu siitä, että lukko (10) käsittää automaattisen iskupiikkivarmistimen järjestettynä varmuuselementin (25) välityksellä, joka varmuuselementti on sijoitettu lukkoluistin (32) kummallakin puolella olevien ohjaimien (35) väliin varmuuselementin (25) aseman asettamiseksi.

2. Patenttivaatimuksen 1 mukainen iskupiikkivarmistin, **tunnettu siitä, että** varmuuselementtiä (25) käytetään kääntämällä lukkorunkoa (22).

3. Patenttivaatimuksen 1 tai 2 mukainen iskupiikkivarmistin, **tunnettu siitä, että** jousi (17) on sijoitettu kääntötapin (34) ja säteittäisesti ulottuvan olakkeen (18) väliin, joka olake on muodostettu iskupiikille (15) ja sen ympärille iskupiikin (15) pitämiseksi taka-asemassaan.

4. Jonkin patenttivaatimuksen 1 - 3 mukainen iskupiikkivarmistin, **tunnettu siitä, että** ohjaimet (35) ovat siirrettävissä eteenpäin/taaksepäin suhteessa lukkorunkoon (22) lukkorungon kääntöliikkeellä ja samanaikaisesti lukkorunko (22) siirtyy siten, että ohjaimet (35) siirtävät varmuuselementtiä (25) sivuttain.

5. Jonkin edellisen patenttivaatimuksen mukainen iskupiikkivarmistin, **tunnettu siitä, että** lukko (10) suljettuna tai lähes suljettuna varmuuselementti (25) on siirrettävissä sivuttain asentoon, jossa iskupiikki (15) ohittaa varmuuselementin (25) ja ase voidaan laukaista.

6. Jonkin edellisen patenttivaatimuksen mukainen iskupiikkivarmistin, **tunnettu siitä, että** pysäytin (19) on järjestetty iskupiikin (15) takaosaan tukeutumaan iskupiikin (15) uraan (14) iskupiikin (15) pitämiseksi lukkorungon (22) sisäpuolella ja iskupiikkikanavassa (23).

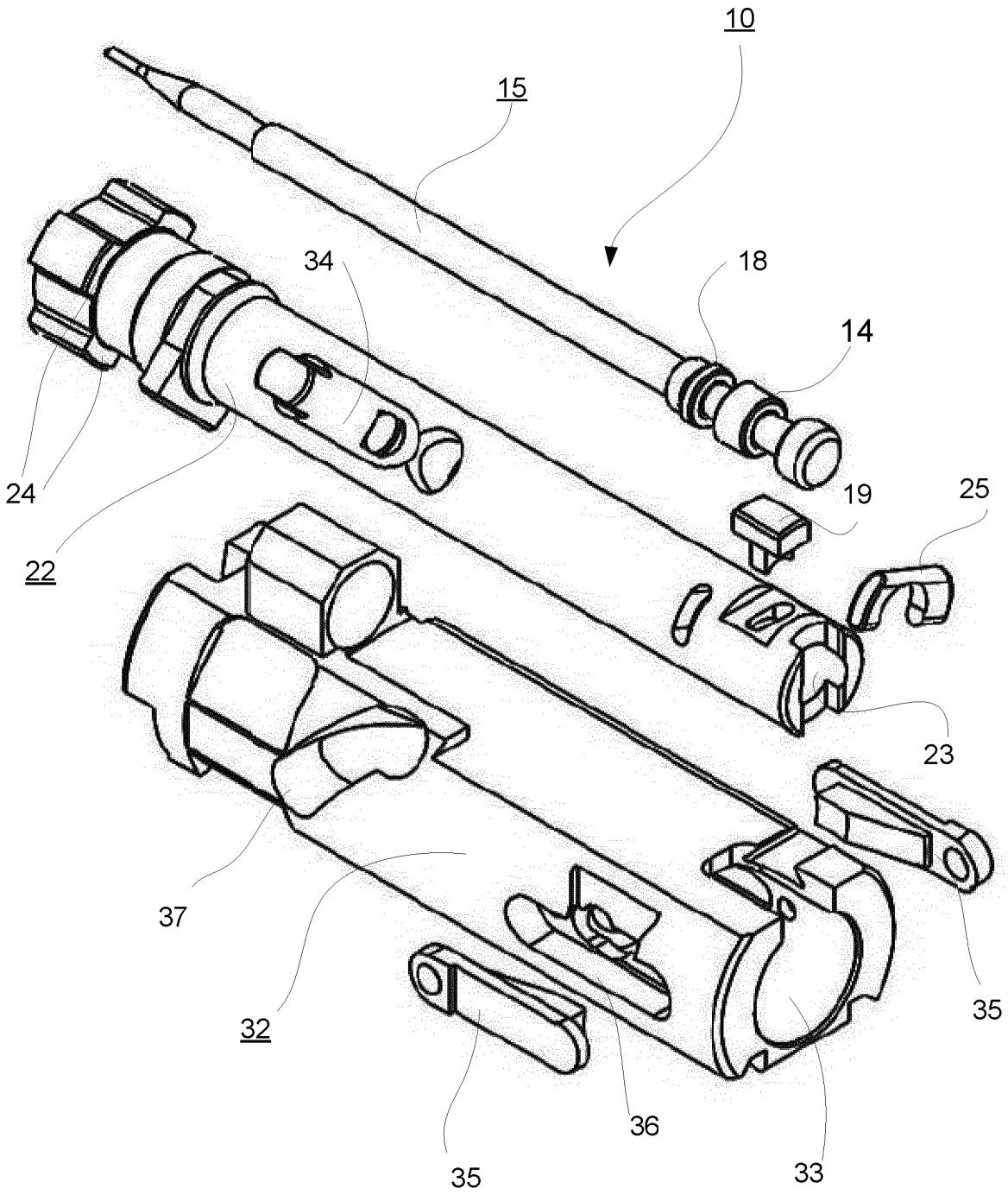

Fig. 1

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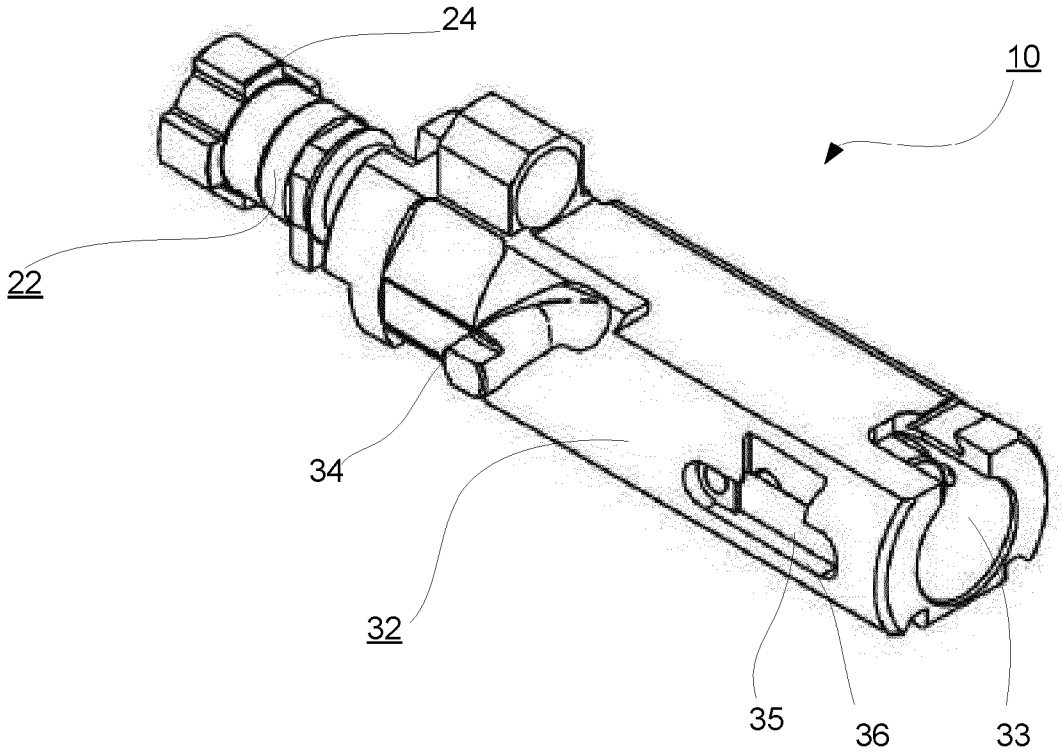

Fig. 2

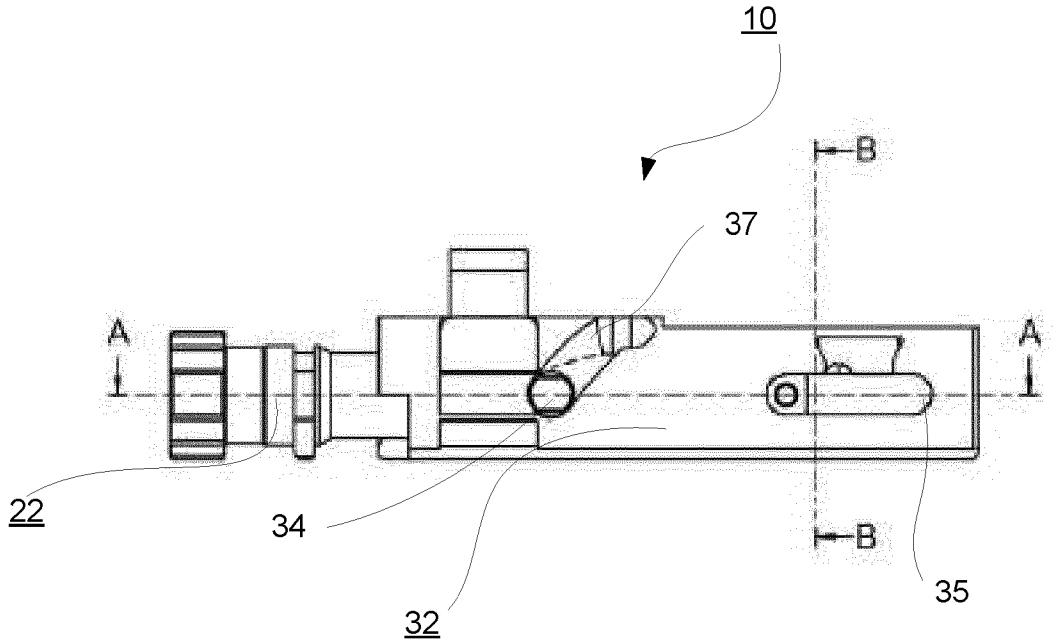

Fig. 3

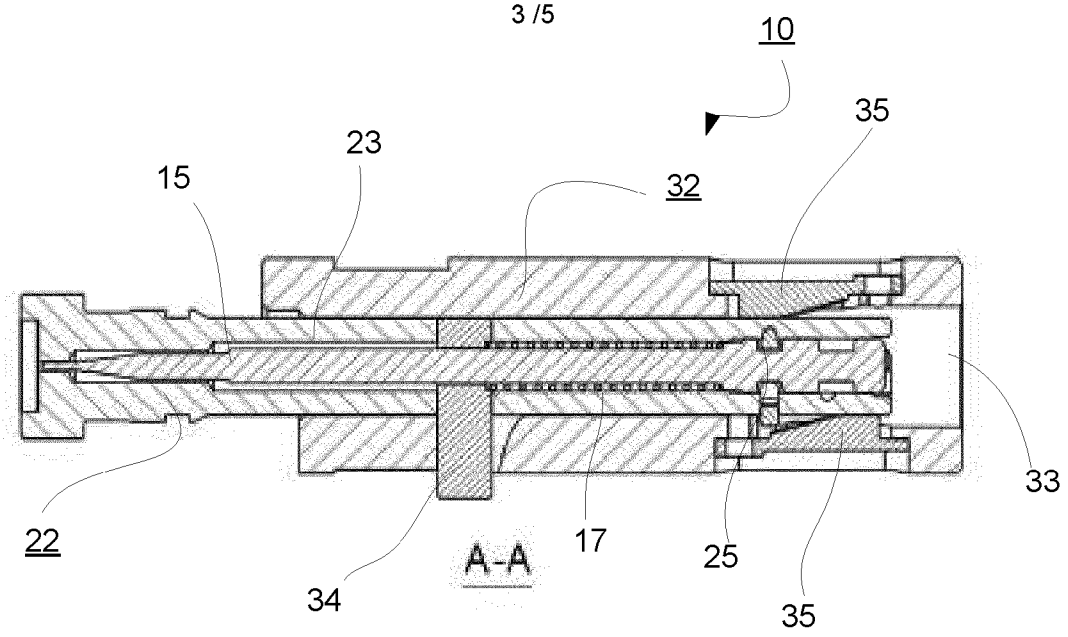

Fig. 4A

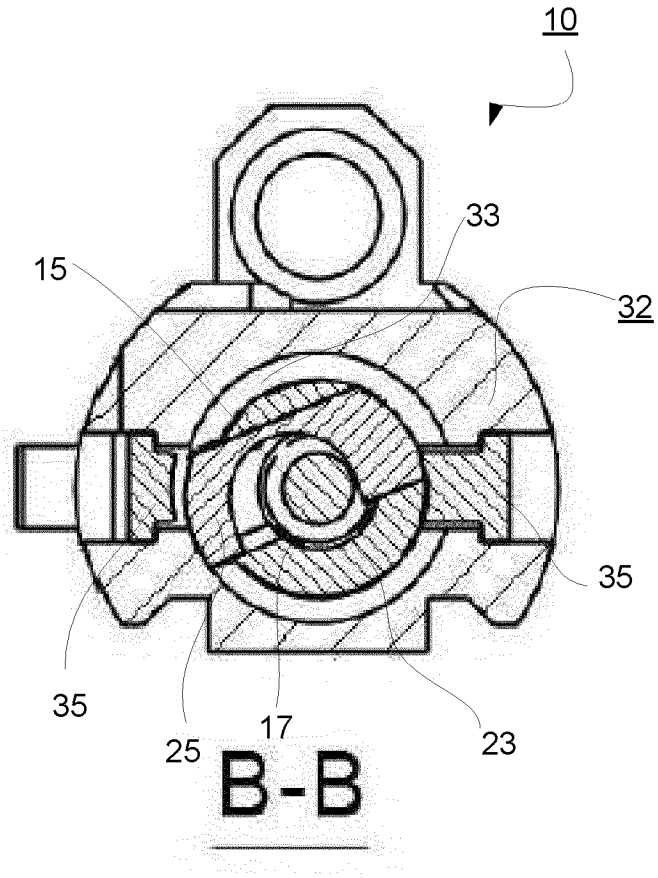

Fig. 4B

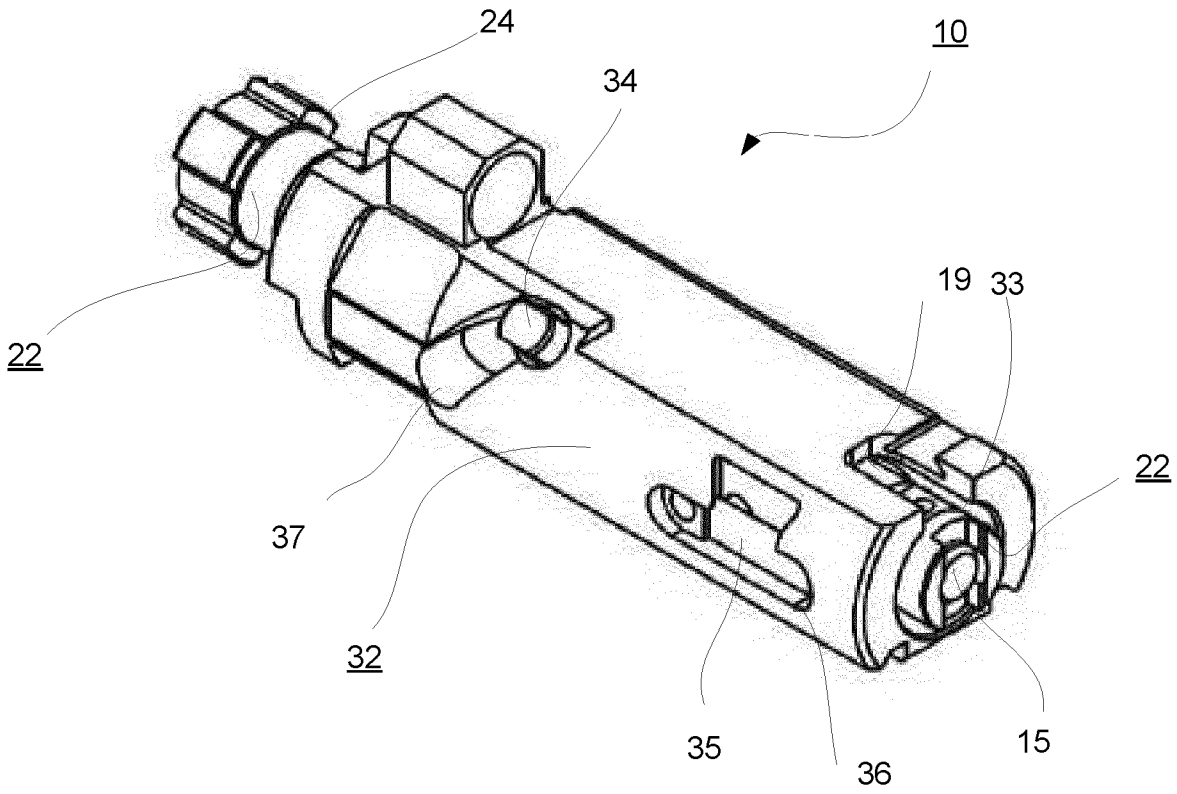

Fig. 5

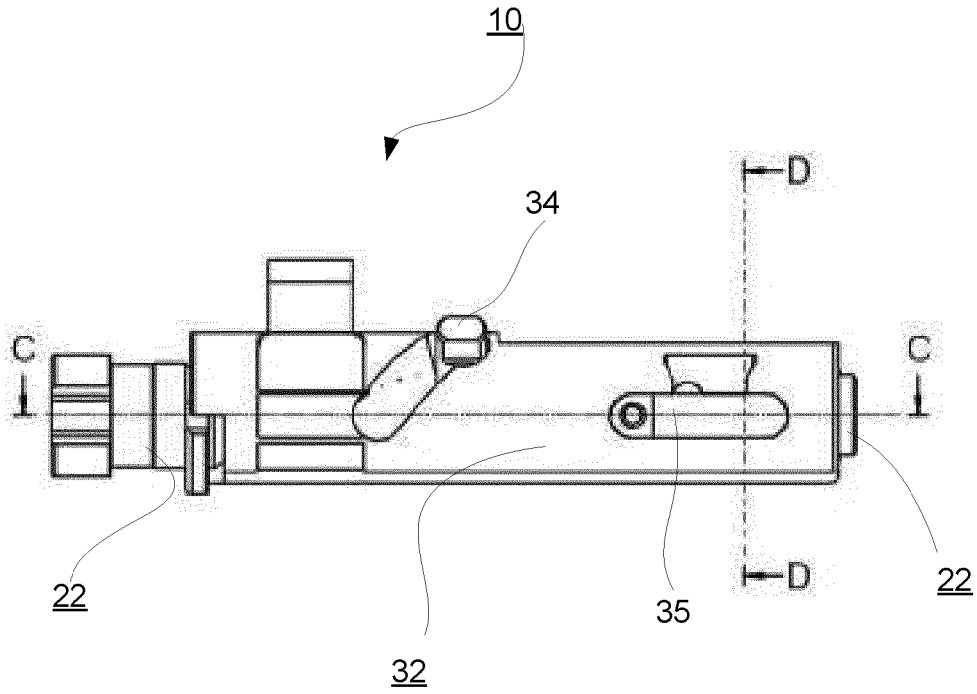

Fig. 6

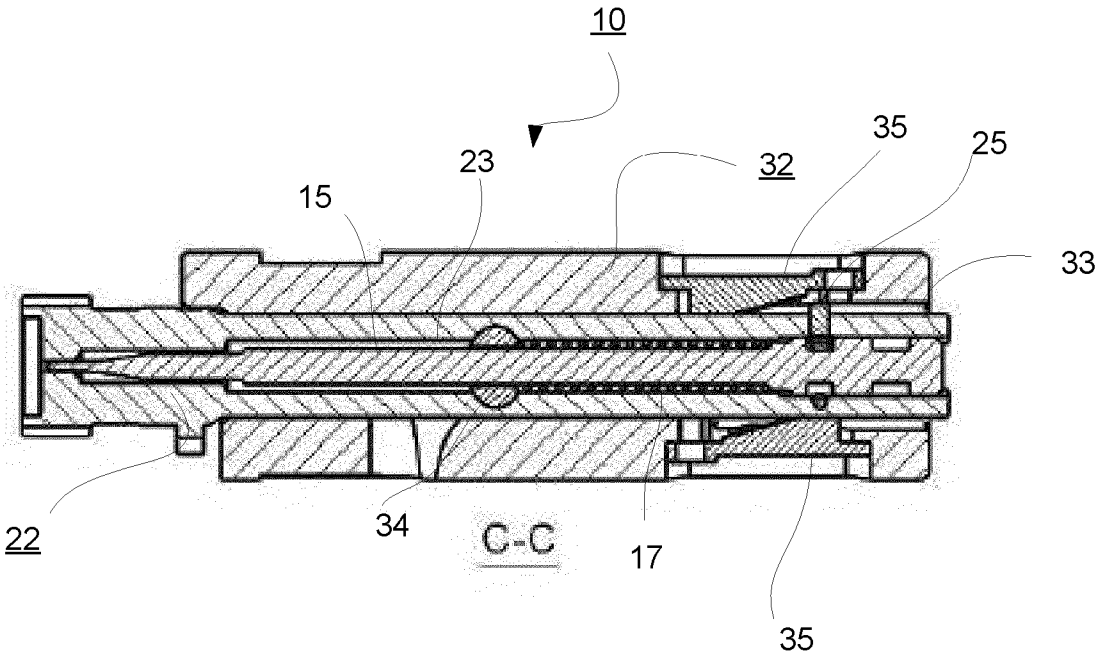

Fig. 7A

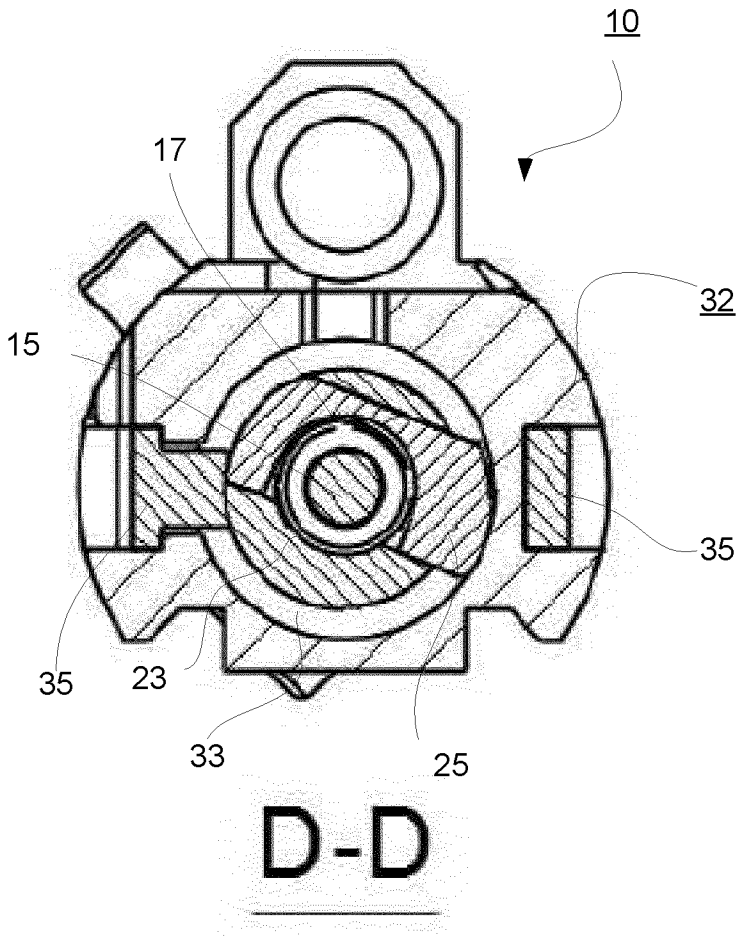

Fig. 7B