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(54) Title: BRAKING MECHANISM FOR A GUN

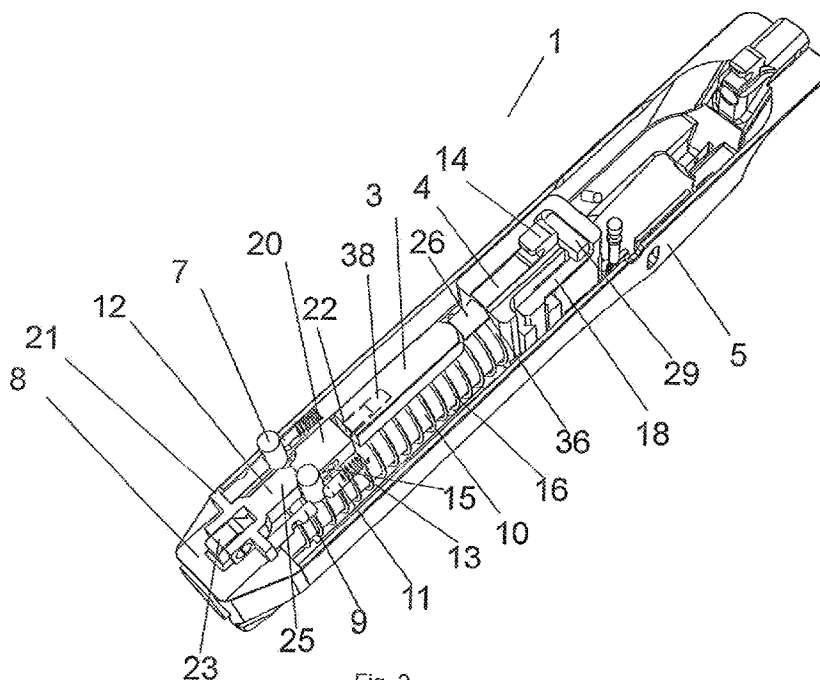


Fig. 2

(57) Abstract: Braking mechanism for a gun consisting of a fork (12) whose arms (21) are abutted by supporting pins (9), which from the other end abut on brake rollers (7), wherein on the flanks of a breech (2) vertical engagement grooves (24) are provided. These are part of vertical shaped grooves (6), wherein against supporting pins (9) spring-loaded pins (11) with compression springs (13) are arranged. The body (25) of the fork (12) is terminated by a tapered tongue (28) extending into a cavity (15) of the ending (20), which follows the fork (12), wherein behind the tongue (28) a rod (22) is arranged, which passes into the cavity (38) in a sleeve (3), which is provided at its other end with an end rod (26), which is provided at its face with a cylindrical ending (27) arranged eccentrically below its center. The supporting pin (9) is provided with a vertical elongated groove (31) to accommodate the safety pin (32). In front of the trigger (19) a locking lever (17) of the control arm (18) is placed, wherein at the end is the control arm (18) provided with a transverse

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beam (29), which is accommodated above the ending (27) of the end rod (26).

Technical field

[0001] The invention relates to the construction of a braking mechanism for a gun for damping of backlash.

State of the art

[0002] In every gun, the breech mechanism plays an indispensable role, ensuring a smooth sequence of actions between each individual shot so that the shot is fired and the gun is restored to its pre-shot condition. The construction of functional parts of a gun is given by the fact that rapid combustion and expansion of gas occurs when the gas escapes from the barrel.

[0003] The breech mechanism is a set of elements that serve to close or lock the cartridge chamber at the time of firing. It is located at the rear of the barrel and holds the cartridge before and during firing. By pulling the trigger, the striker is released and its front part, the primer, initiates the ignition of the cartridge. When the shot is fired, powder gases are released. A channel is drilled into the barrel for the passage of these gases. A backlash spring, which is wound around the rod of the backlash spring guide, pushes the breech to the forward rest position and acts in the opposite direction to the backlash. The disadvantage of the above solution for guns with a large number of consecutive shots is significant heating of the gun. As the barrel temperature increases, mechanical wear by abrasion, wear by erosion, and dilation of bore diameter also increases. Dangerous from the point of view of overheating of the gun is especially the decrease in the strength of the barrel steel, which can lead to permanent deformation and damage. In addition, the strong return spring makes it difficult to manually cock the breech.

[0004] Document US 2011/0041680 presents a semi-automatic pistol comprising a frame, a barrel with a cartridge chamber, a cartridge feeding mechanism, a cartridge removal mechanism and a breech return spring. The breech-block is slidable parallel to the axis of the barrel and includes a firing mechanism consisting of a firing spring stop, a firing spring, a striker, a breech notch and support pads for the striker spring. The invention improves the accuracy of positioning of the striker when the spring loses its elasticity.

[0005] Document CZ 306 500 B1 presents a self-loading gun, the diagram of which is shown in Fig. 1, which comprises a frame on which a breech 59 is mounted, through the frontal part of which a barrel 54 passes, which is fixedly mounted in the frame without possibility of movement, while a backlash spring 52 of the breech 59 is mounted on a return spring guide 53 arranged under the barrel 54 and a mechanism for locking the

breech 59 during firing is arranged in the front of the frame under the barrel 54. By pulling the trigger, the firing spring 57 is tensioned and at the end of the depression, the hammer 56 is released and pushes on the striker 55. The striker 55 initiates the ignition of the cartridge in the cartridge chamber 58 by its front end. A backlash spring 52 on the return spring guide 53 damps the backlash.

[0006] The aim of the invention is to provide a braking mechanism for a gun which would prevent the gun from heating up during repetitive firing and would effectively brake the breech without the need for a strong slide return spring which makes it difficult to manually cock the breech.

Summary of the invention

[0007] The above mentioned deficiencies are eliminated by a braking mechanism for a gun according to the invention, defined in the characterizing part of the claim 1.

Brief description of drawings

[0008] The invention will be further described using drawings, where Fig.1 shows an automatic gun according to the state of the art, Fig. 2 is a perspective view into the barrel frame cavity of a gun according to the invention, Fig. 3 is a horizontal section through the braking mechanism of the gun from Fig. 2, Fig. 4a to 4d represent the staggered movement of the individual parts of the braking mechanism from the rest state during braking to the armed state during firing, Fig. 5 is a perspective view of the partially covered barrel frame from Fig. 2, Fig. 6 is a view of the frame from below with the trigger, Fig. 7 is a detail of the arrangement of the ending at the head of the end rod, Fig. 8 is a side view of the base with the control arm in a situation when the braking mechanism is locked, Fig. 9 is a side view of the base with the control arm in the situation when the braking mechanism is armed and Fig. 10 is a front view of the base from Fig. 9.

Detailed description of the invention

[0009] Fig. 2 is a perspective top view of the frame 5 of the gun 1 according to the invention. A barrel 10 is arranged in the cavity of the frame 5 for guiding the cartridge. Above this barrel 10, a braking mechanism is arranged which comprises a fork 12 which is mounted on the upper protrusion 23 of the head 8 of the frame 5 via a pin. The fork 12 has fork arms 21 projecting laterally on each side. On arms 21 of the fork 12 abut supporting pins 9, whereas from the other side are against these supporting pins 9 rounded spring-

loaded pins 11 with compression springs 13 arranged. The pins 11, 9 are accommodated in the cavities 30, 39 of the breech 2, which can be seen in detail in Fig. 3. The supporting pins 9 interact with brake rollers 7. Brake rollers 7 are also partially disposed in the vertical engagement grooves 24 on the flank of the breech 2, and these engagement grooves 24 are part of the vertical shaped grooves 6 which are arranged in the upper wall of the breech 2, and in these shaped grooves 6 said brake rollers 7 can move. Above mentioned construction arrangement will be explained with reference to Fig. 3.

[0010] Through the front face of the breech 2 supporting pins 9 are passing through. The body 25 of the fork 12 is terminated by a tapered tongue 28, shown in Fig. 3, which fits into the cavity 15 of the sleeve ending 20. However, the cavity 38 in the sleeve 3 for the fork rod 22 is longer than the length of the fork rod 22. This allows the fork rod 22 to be moved when manually cocked. The sleeve 3 is provided at its other end with an end rod 26, which is inserted into a through opening 36 in the base 4 and is provided at its end with an eccentrically arranged cylindrical ending 27. The function of this ending 27 will be discussed in connection with the trigger mechanism described in Fig. 7. The hook 14 on the base 4 serves to secure the unshown top cover of the gun 1.

[0011] Fig. 3 shows a horizontal section of a detail of the braking mechanism of the gun 1. This consists of the fork 12 described in connection with Fig. 2 and brake rollers 7. It can be seen that the arrangement of brake rollers 7 and their cooperating elements is symmetrical. The lower half of the Fig. 3 represents the rest state of the gun 1 when the gun 1 is locked, and the upper half shows the situation when the braking of the sliding portion of the breech 2 is initiated. In the rest position in the lower half of the Fig. 3, it can be seen that the brake roller 7 is inserted into the inner part of the shaped groove 6, which is bounded towards the axis of the breech 2 by the tongue 28 accommodated in the cavity 15 of the sleeve ending 20 and from the other side it is bounded by the engagement groove 24, whereas on the brake roller 7 the spring-loaded pin 11 is pressed by the compression spring 13. Opposite the brake roller 7 is at this time an unloaded supporting pin 9 and both pins 9, 11 are seated in the cavities 30, 39 of the breech 2.

[0012] The front part of the breech 2 includes breech bushings 40 on both flanks, in which two concentric longitudinal cavities 30, 39 are provided opposite each other. The front cavity 30 is open and the rear cavity 39 is closed. These two cavities 30, 39 are separated on the inner wall of the sleeve by a gap 41, and thus the inner wall of cavities is divided into two branches 42, 43, the front branch 42, the rear branch 43. On the inner face of the

front branch 42 is on the edge oriented into the cavities 30, 39 an engagement chamfer 34 provided.

[0013] The supporting pin 9 is provided with a vertical elongated groove 31 for accommodating the safety pin 32, the remaining half of the safety pin 32 is accommodated in a vertical groove 33 arranged in the flank of the breech 2. It can be seen that the elongated groove 31 in the supporting pin 9 is in contact with the safety pin 32 on its front side, i.e. closer to the mouth of the frame 5. It can also be seen that the engagement groove 24 and the engagement chamfer 34 are not in contact with the brake roller 7 and the spring-loaded pin 11 is only in tangential contact with the brake roller 7.

[0014] After the shot, the backlash changes the situation as shown at the top of Fig. 3. The braking roller 7 is pushed away from the tongue 28 into the engagement groove 24, the spring-loaded pin 11 contacts the brake roller 7 and the compression spring 13 is compressed. From the other side, the brake roller 7 abuts the supporting pin 9 and the engagement chamfer 34 and the movement of the supporting pin 9 is stopped by the action of the safety pin 32. It can be seen that the elongated groove 31 in the supporting pin 9 is in contact with the locking safety pin 32 on its rear side, i.e. further away from the mouth of the frame 5. The safety pin 32 also secures the supporting pin 9 against falling out of the housing cavity 30.

[0015] After this braking effect, the individual components return to the position shown at the bottom of Fig. 3. The components are returning by the spring 16 which is wound around the barrel 10, as shown in Fig. 2. As soon as the next shot is fired, the whole situation is repeated. As indicated above, in Fig. 3 both positions of brake rollers 7 are shown, but it is clear that in the rest situation brake rollers 7 will be close to the axis of the gun 1, as shown in the lower half, and when the backlash is damped brake rollers 7 will move away from the axis towards the outside of the frame 5, as shown in the upper half.

[0016] Before the first shot is fired, the gun must be loaded with the first cartridge, which is done by manually pulling the breech backwards. In doing so, the breech 2 and brake rollers 7 are moved rearwards, brake rollers 7 are pushed against the extending flanks of the tongue 28 of the fork 12 and these deflect brake rollers 7 away from the axis of the gun, and this deflection causes from the opposite side pushing of the spring-loaded pin 11, the brake roller 7 is displaced into the engagement groove 24 and thus is off the axis and out of the sleeve ending 20 and no braking action occurs, as brake rollers 7 cannot press on the sleeve 3 via the sleeve ending 20.

[0017] Figs. 4a to 4d represent the staggered movement of the individual parts of the braking mechanism from the rest state during braking to the armed state during firing. Fig. 4a corresponds to the rest state of the gun 1 when the breech 2 pushes brake rollers 7 arranged in the inner part of the shaped groove 6 against the circular recess 45 of the ending 20 of the sleeve 3. The elongated groove 31 in the supporting pin 9 is in contact with the safety pin 32 on its front side. The supporting pins 9 abut the arms 21 of the fork 12 and are not in contact with brake rollers 7. Brake rollers 7 tangentially abut the spring-loaded pins 11.

[0018] Fig. 4b corresponds to the condition when the breech 2 is moved backwards by approximately 1 mm and brake rollers 7 are slightly displaced from their extreme position in the inner part of the shaped groove 6 towards the outer part thereof, i.e. towards the engagement groove 24. Supporting pins 9 move slightly away from the arms 21 of the fork 12, although they are still not in contact with brake rollers 7, but they are already approaching them and are already pushing the spring-loaded pins 11.

[0019] Fig. 4c corresponds to a condition when brake rollers 7 are tangentially in contact with the engagement chamfer 34 on the breech 2 and are just about to be moved to the outer part of the shaped groove 6, i.e. to the engagement groove 24. Supporting pins 9 continue to move away from the arms 21 of the fork 12, although they are still not in contact with brake rollers 7, but they are getting even closer to them and continue to push the spring-loaded pins 11.

[0020] Fig. 4d corresponds to the condition at firing, when the braking mechanism is armed and when brake rollers 7 are already located in the engagement grooves 24 in the outer part of the shaped grooves 6. Supporting pins 9 have moved completely away from the arms 21 of the fork 12, and have come into contact with brake rollers 7, and spring-loaded pins 11 are pressed against them from the other side. When the breech 2 is returned, brake rollers 7 are pushed by spring-loaded pins 11 back to the position shown in Fig. 4a.

[0021] Fig. 5 is a perspective view of the partially covered frame 5 of Fig. 2. It shows the flank of the breech 2 with the engagement grooves 24, which are part of vertical shaped grooves 6 in which the brake rollers 7 move in the direction of the double-sided arrow.

[0022] Fig. 6 is a perspective view from below of the frame 5 of the gun 1. It can be clearly seen here that in front of the trigger 19 a locking lever 17 of the control arm 18 of the actuation of the brake mechanism described above is located. The control arm 18 will be illustrated in Fig. 8.

[0023] The control arm 18 for actuating the braking mechanism has a transverse beam 29 at its other end, which is shown in Fig. 7. The arrangement of the end rod 26 in the view on its face is shown. The transverse beam 29 lies on the ending 27 of the end rod 26, and the cylindrical ending 27 is at the face of end rod 26 arranged eccentrically below the center of the end rod 26.

[0024] This eccentric arrangement allows, the aforementioned transverse beam 29 to be accommodated on this ending 27. This transverse beam 29 blocks the end rod 26 of the sleeve 3, when the locking lever 17 is pressed and thus brake rollers 7 of the braking mechanism are in the rest position. However, once the transverse beam is actuated as a result of pressing of the locking lever 17 by the control arm 18 above the level of the sleeve 3, the entire braking mechanism is locked in terms of its motion and therefore, upon subsequent pulling of the trigger 19 of the gun 1, the braking mechanism can react to the backlash of the upper part of the frame 5.

[0025] Fig. 8 is a side view of the base 4 with the control arm 18 for actuating the braking mechanism of the gun 1. The base 4 is formed as a shaped block substantially of the width of the cavity in the top of the frame 5, with a shaped groove formed therein laterally to receive the control arm 18. It can be seen that the control arm 18 is provided with a groove 37 at its lower end for accommodating one end of the connecting lever 35, the other end of which is connected to the locking lever 17. In the indicated position, the locking lever 17 is in its rear extremity position and the connecting lever 35 and the control arm 18 are in their lower extremity position with the transverse beam 29 resting on the ending 27 of the end rod 26.

[0026] It can be seen in Fig. 9 that as soon as the locking lever 17 is brought to the forward position by means of the springs 44, 44', the connecting lever 35 lifts the control arm 18, thereby lifting the transverse beam 29 and the braking mechanism is armed.

[0027] Fig. 10 is a front view of the base 4, showing that when the transverse beam 29 is in its upper position, the end rod 26 is not blocked.

[0028] List of reference signs:

- 1 gun
- 2 breech
- 3 sleeve
- 4 base
- 5 frame
- 6 shaped groove

- 7 braking roller
- 8 head
- 9 supporting pin
- 10 barrel
- 11 spring-loaded pin
- 12 fork
- 13 compression spring
- 14 hook
- 15 ending cavity
- 16 spring
- 17 locking lever
- 18 control arm for locking the braking mechanism
- 19 trigger
- 20 sleeve ending
- 21 fork arm
- 22 fork rod
- 23 upper head protrusion
- 24 engagement groove
- 25 fork body
- 26 end rod
- 27 ending of end rod
- 28 tongue
- 29 transverse beam
- 30 housing cavity
- 31 elongated groove
- 32 safety pin
- 33 vertical groove
- 34 engagement chamfer
- 35 connecting lever
- 36 through opening in base
- 37 groove
- 38 sleeve cavity
- 39 rear cavity
- 40 breech bushing

- 41 gap
- 42 front branch
- 43 rear branch
- 44, 44' spring
- 45 circular recess
- 52 return spring
- 53 return spring guide
- 54 gun barrel from the state of the art
- 55 striker
- 56 hammer
- 57 firing spring
- 58 cartridge chamber
- 59 breech from the state of the art

CLAIMS

1. Braking mechanism for a gun arranged in the frame and breech of a gun, which is provided with a cavity in which the barrel is arranged, **characterized in that** it consists of a fork (12) deposited on an upper projection (23) on a head (8) of the frame (5) via a pin, wherein the fork (12) has arms (21) projecting laterally on each side, on which supporting pins (9) abut, which from the other side abut on brake rollers (7), wherein on a flank of the breech (2) vertical engagement grooves (24) for receiving the brake roller (7) in the braking function are provided, which are part of vertical shaped grooves (6) for full or partial receiving of the brake roller (7), depending on whether the braking mechanism is in the rest or braking position, which are arranged in the upper wall of the breech (2), wherein from the other side of the brake roller (7), there are against supporting pins (9) for supporting the brake roller (7) during the braking function, spring-loaded pins (11) arranged for pressing brake rollers (7) into the vertical shaped grooves (6) in the rest position of the mechanism (1) with compression springs (13) for pressing the spring-loaded pins (11) against brake rollers (7), wherein the front part of the breech (2) comprises breech bushings (40) on both sides, in which two concentric longitudinal cavities (30, 39) are provided opposite each other, wherein the front cavity (30) for accommodating the supporting pin (9) is open and the rear cavity (39) for accommodating the spring-loaded pin (11) is closed and the two cavities (30, 39) are separated on the inner wall of the breech bushing (40) by a gap (41), thereby dividing the inner wall of the cavities (30, 39) into two branches (42, 43), into a front branch (42) and a rear branch (43), wherein on the inner face of the front branch (42) is on the edge facing the cavities (30, 39) an engagement chamfer (34) provided for abutting the brake roller (7) during the braking function, wherein supporting pins (9) are accommodated in the front cavities (30) and spring-loaded pins (11) are accommodated in the rear cavities (39) of the breech (2), wherein the body (25) of the fork (12) is terminated by a tapered tongue (28) for controlling the position of the brake roller (7) in the shaped groove (6), wherein the tongue (28) extends into the cavity (15) of the sleeve ending (20), which follows the fork (12) and is on the face provided with circular recesses (45) to receive brake rollers (7) in the rest position of the mechanism (1), wherein behind the tongue (28) a fork rod (22) which passes into the cavity (38) in the sleeve (3) is arranged, wherein the sleeve cavity (38) is longer than the length of the fork rod (22), wherein the sleeve (3) is provided at its other end with an end rod (26), which is inserted into a through opening (36) in the base (4), which is formed

as a shaped block substantially of the width of the cavity of the frame (5), and the end rod (26) is provided at its face with a cylindrical ending (27) arranged eccentrically below its centre, wherein the brake roller (7) is inserted into the shaped groove (6), which is bounded on one side by a tongue (28) and on the other side by an engagement groove (24), wherein the supporting pin (9) is provided with a vertical elongated groove (31) for accommodating a safety pin (32) for stopping the movement of the supporting pin (9) during the braking function, while the remaining half of the safety pin (32) is placed in a vertical groove (33) arranged in the side of the breech (2), wherein a locking lever (17) of the control arm (18) for actuating the braking mechanism is placed in front of the trigger (19), the control arm (18) is provided with a control arm groove (37) for inserting the connecting lever (35), which is connected at its other end to the locking lever (17) and, at the opposite end, the control arm (18) is provided with a transverse beam (29) for blocking the end rod (26) of the sleeve (3), which is accommodated above the ending (27) of the end rod (26).

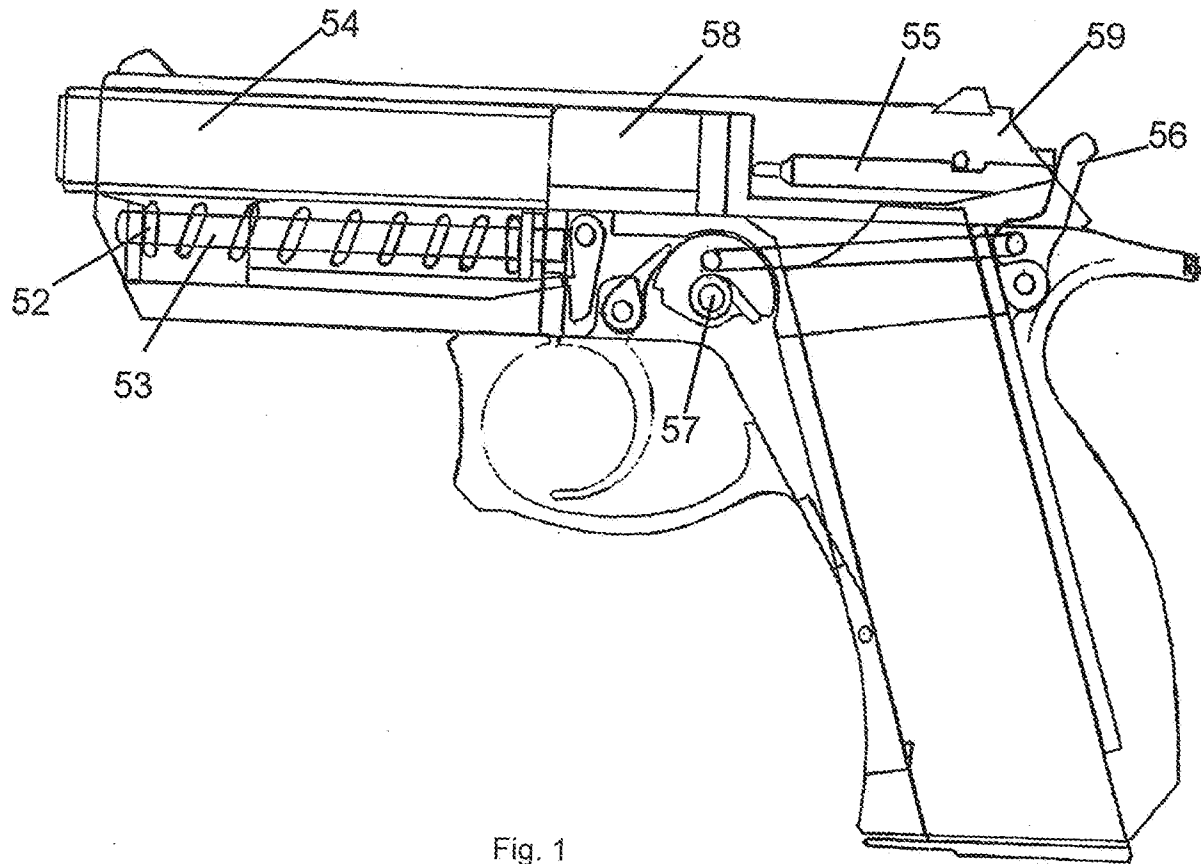


Fig. 1

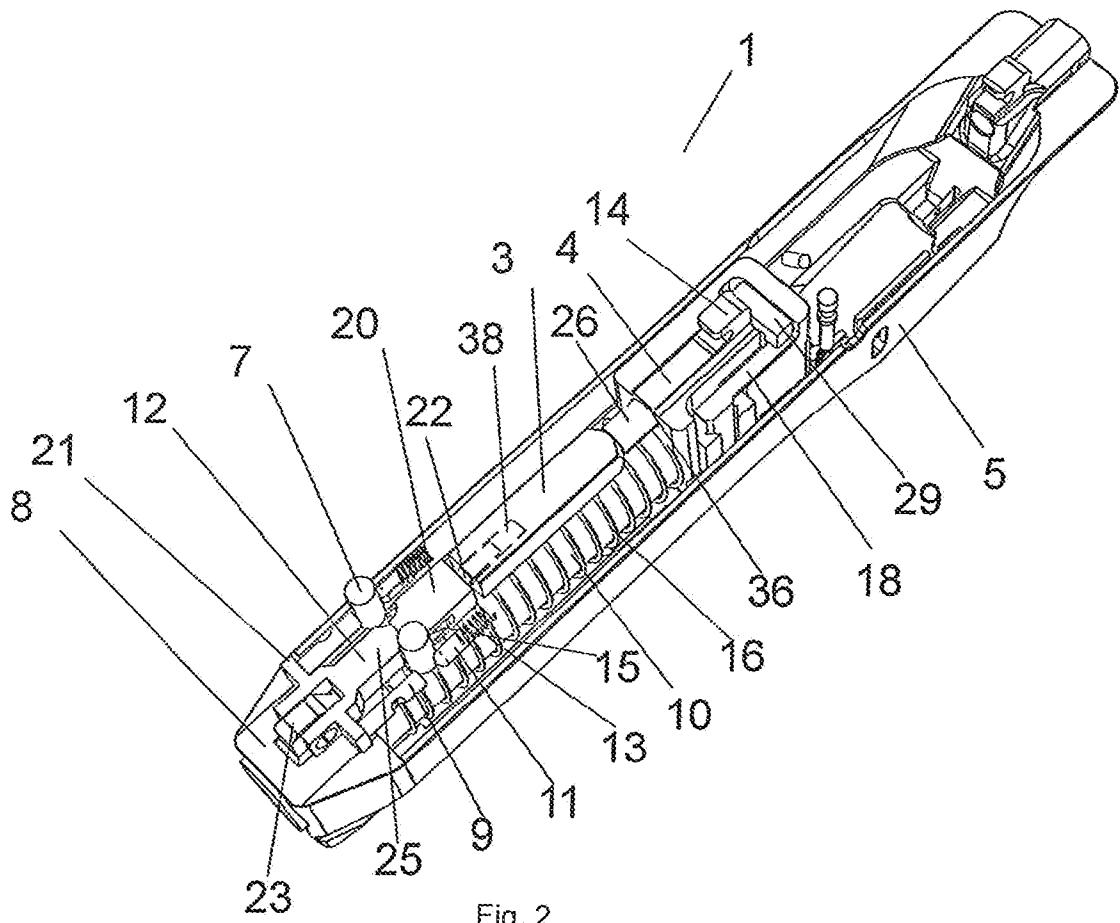


Fig. 2

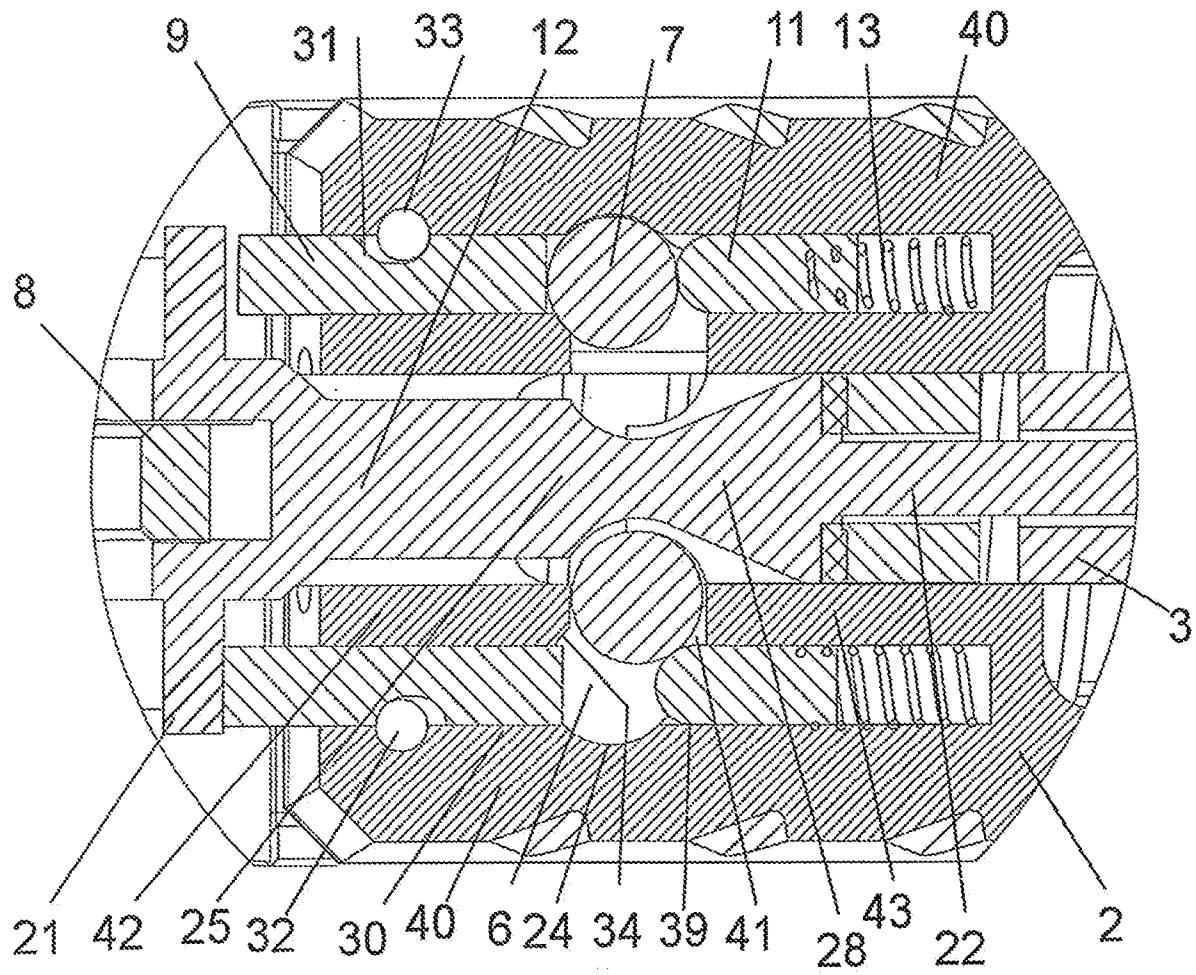


Fig. 3

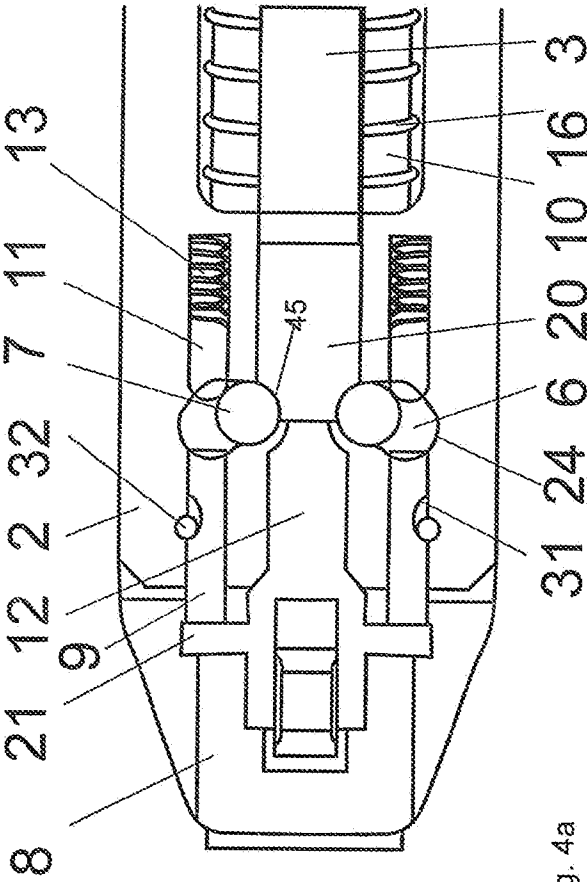


Fig. 4b

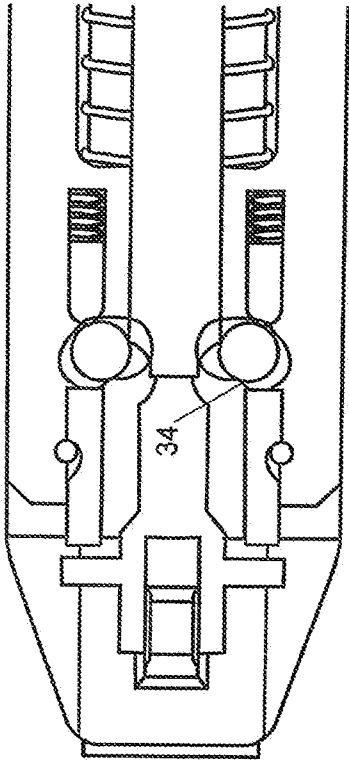


Fig. 4d

Fig. 4c

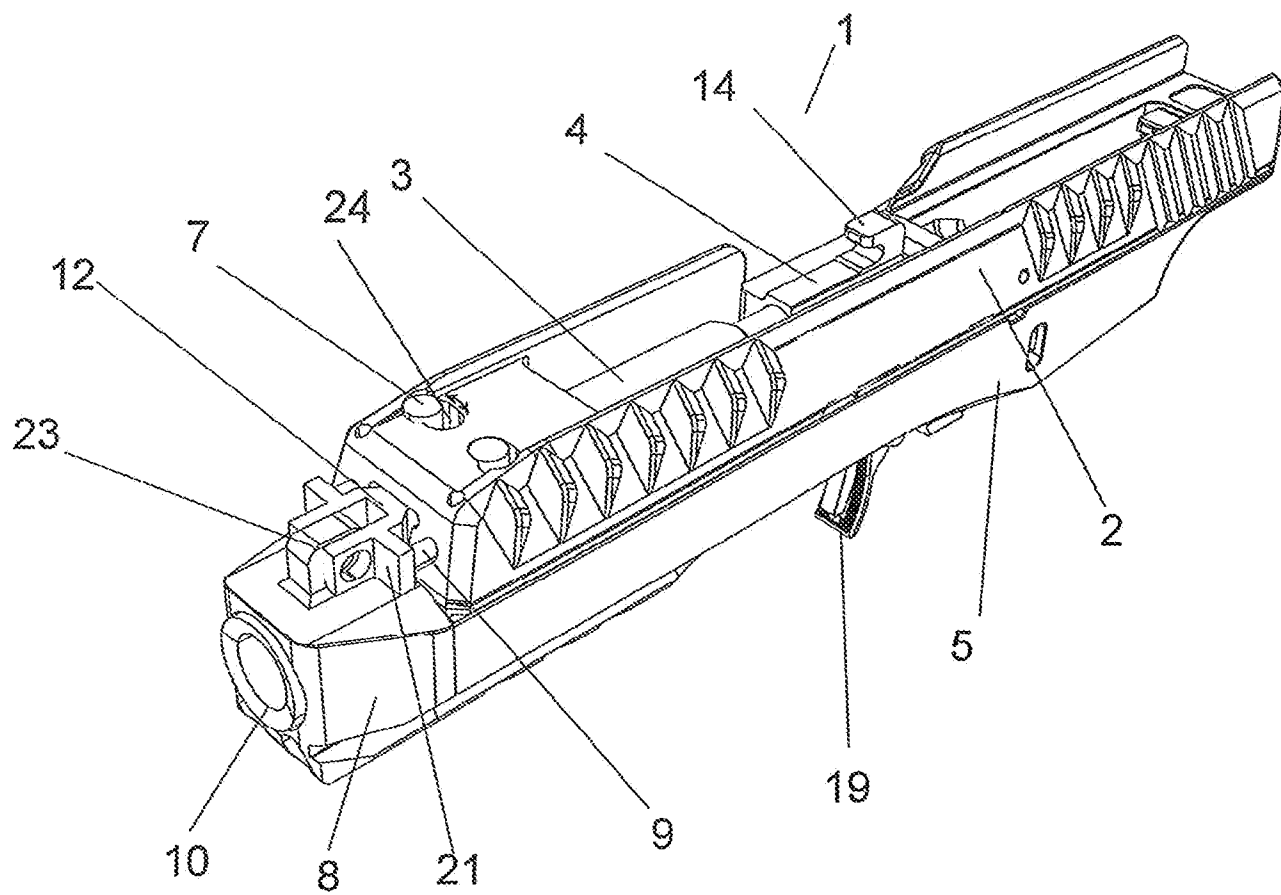


Fig. 5

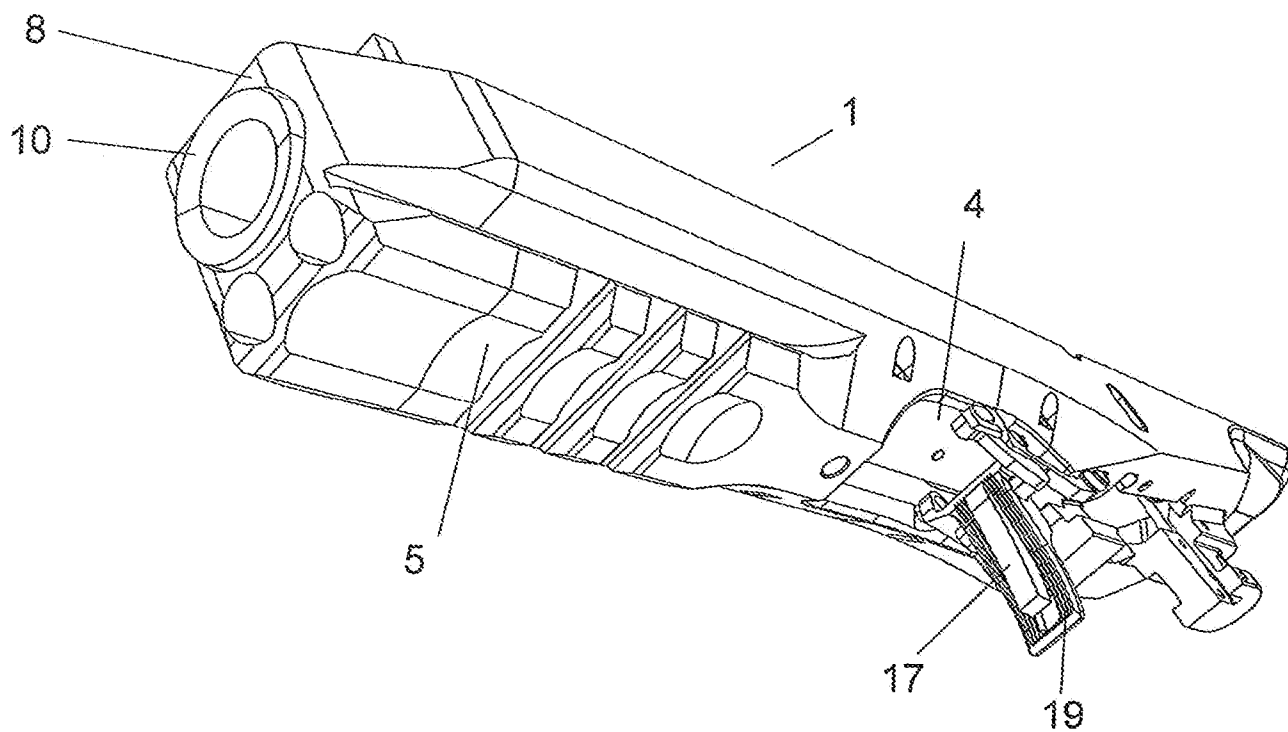


Fig. 6

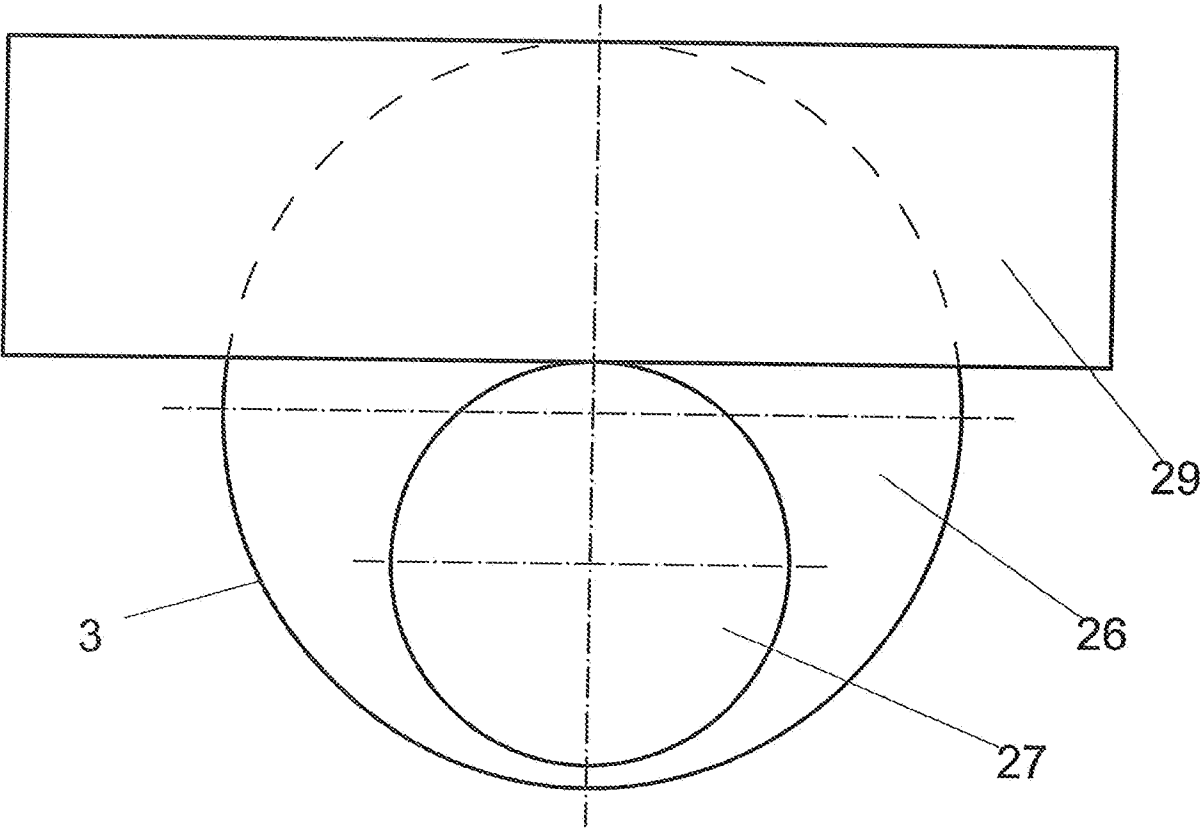


Fig. 7

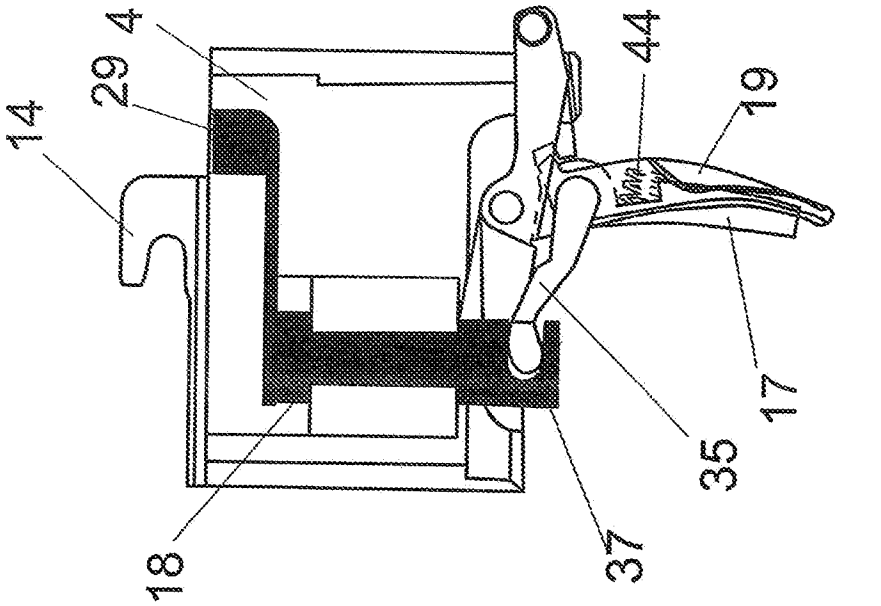


Fig. 8

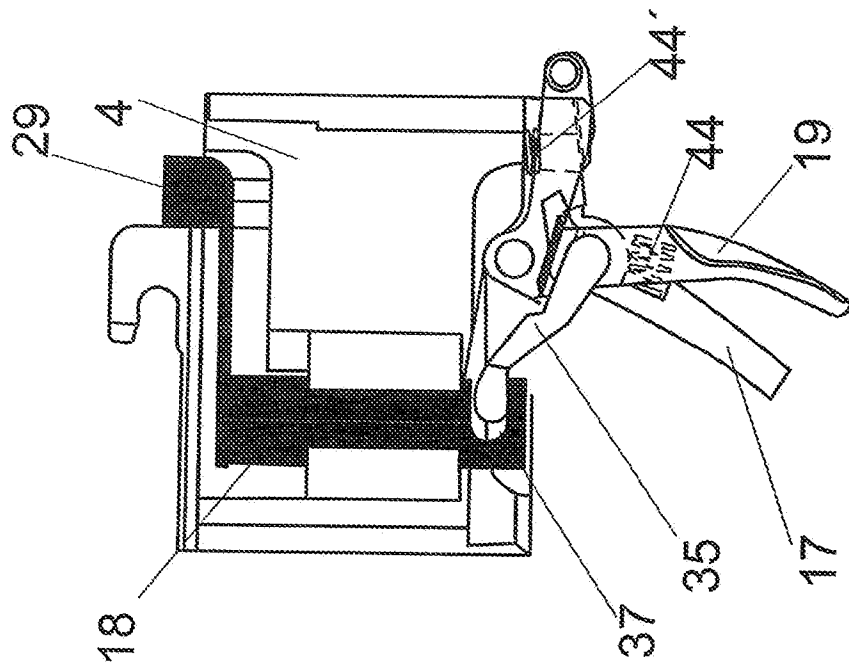


Fig. 9

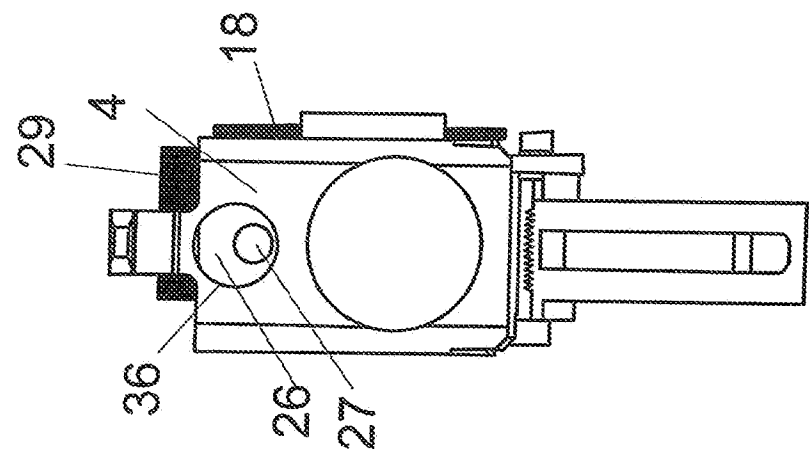


Fig. 10

INTERNATIONAL SEARCH REPORT

International application No
PCT/CZ2023/000007

A. CLASSIFICATION OF SUBJECT MATTER

INV. F41A3/44

ADD.

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)

F41A F41C

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)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	BE 493 387 A (JAN KRATOCHVIL) 16 May 1950 (1950-05-16) page 2, lines 24-37; figures 1,2,3,4 -----	1
A	AT 510 291 B1 (BUBITS WILHELM [AT]) 15 March 2012 (2012-03-15) the whole document -----	1
A	US 8 807 010 B2 (BUBITS WILHELM [AT]; MERKEL JAGD UND SPORTWAFFEN GMBH [DE]) 19 August 2014 (2014-08-19) the whole document -----	1

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

☒ See patent family annex.

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Date of the actual completion of the international search

10 May 2023

Date of mailing of the international search report

19/05/2023

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/CZ2023/000007

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