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WO 2024/217609 A1

(54) **Title:** ASSEMBLY OF A BARREL, A CONTAINER/FRAME AND A BREECH BLOCK FOR SELF-LOADING PISTOLS

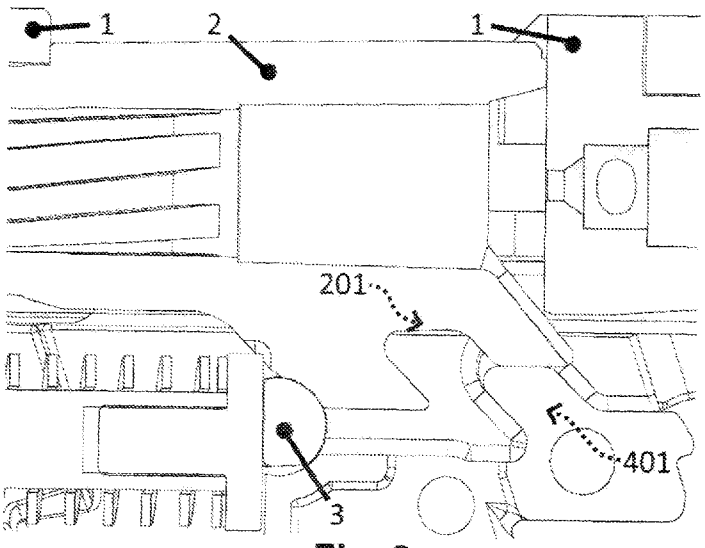

Fig. 9

(57) **Abstract:** An assembly of a barrel (2), a container/frame (4) and a breech block (1) for self- loading pistols with the breech block mechanism locked by barrel drop. The barrel (2) and the breech block (1) being movably accommodated in the container/frame (4). The barrel (2) has a front part (205) and a rear part (206). A control block (201) of the barrel is arranged under the rear part (206) and a hook (401) is arranged in the region of the control block (201) of the barrel on the container/frame (4). The control block (201) of the barrel is constituted by a recess that comprises a front inclined control surface (202) that passes into a locking brace (203) and at a distance, at least around a part of the locking brace (203), at least one bearing surface (204) is arranged to stop the movement of the barrel (2). The hook (401) comprises a blade (402) for cooperation with the control surface (202) of the control block (201) of the barrel. The blade (402) has an adjacent shapes surface (403) for cooperation with the locking brace (203) of the control block (201) of the barrel. Around at least a part of the shaped surface (403), at least one stop surface (404) is arranged to absorb the impact of the barrel (2). The stop surface (404) is oriented with respect to the shaped surface (403) in such a way that in the fully unlocked state of the barrel (2), the stop surface (404) of the hook (401) bears on the bearing surface (204) of the control block (201) of the barrel while between the

[Continued on next page]

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control surface (202) and locking brace (203) of the control block (201) of the barrel at one side and the front face of the blade (402) and the shaped surface (403) of the hook (401) at the other side, there is a play.

Assembly of a barrel, a container/frame and a breech block for self-loading pistols

Technical Field

The invention relates to an assembly of a barrel, a container/frame and a breech block for self-loading pistols with the breech block mechanism locked by barrel drop, the barrel and the breech block being movably accommodated in the container/frame wherein the barrel has a front part and a rear part, and a control block of the barrel is arranged under the rear part and a hook is arranged in the region of the control block of the barrel on the container/frame.

Background Art

Self-locking pistols locked by barrel drop (Browning-Colt) represent a proven and advanced solution. For applications of this mechanism for the purposes of high-performance cartridges as e.g. 9x19 NATO in their ballistically efficient modifications there is a problem of a great excess of recoil energy within the pistol mechanism, especially in the region of the barrel stop, i.e. in the location where the barrel stops its movement after its short recoil.

The breech block mechanism locked by barrel drop (Browning-Colt) is based on being driven by the recoil caused by a shot. After the shot, the barrel is locked to the breech block. Due to the recoil of the shot, the barrel together with the breech blocks performs a common, generally linear movement, referred to as a short rearward slide. The length of this movement is designed is such a manner to allow the projectile to leave the barrel in its course. Then, unlocking of the barrel is commenced. As soon as the barrel is unlocked, its movement is stopped and it is only the breech block that continues moving.

A technical problem occurs with ballistically efficient cartridges, namely a problem in the region of stopping the movement of the barrel. Such efficient cartridges impart such an amount of energy to the entire “barrel - breech block”

recoil system that at the moment it needs to be stopped, the barrel still has so much energy that in the case of the traditional solution (Browning-Colt) there is an excessive recoil. This recoil is so significant that it considerably decreases the achievable cyclic service life of both the barrel and its stop (generally the frame, or container or block inside the frame).

The documents DE4109777A1 (October 1, 1992), DE4341131C1 (February 2, 1995), US5309815A (May 10, 1994) and US5581046A (December 3,1996) describe the solution used for a Heckler & Koch pistol, model HK USP and P30. This solution reduces the impact caused by stopping the barrel movement by means of barrel braking via a sliding member of the return system. Braking is executed by springs of the return system. The end of braking is delimited by the impact of the axial member on a pin in the frame. Thus, this solution is substantially a spring buffer from the mechanical point of view.

The documents US5741996A (April 21, 1998) and CZ296116B6 (November 9, 2005) describe the solution used for the Ruger P95 and P97 pistol. In principle, this solution is similar to the above-mentioned design of the Heckler & Koch pistol, the difference being that the sliding member is not braked by springs, but the impact is absorbed by a plastic frame.

The document US7103998B2 (September 12, 2006) describes a modified solution for use with guiding the breech block in a plastic frame that is used for the Ruger P345 pistol.

The document US20220341687A1 (October 27, 2022) describes a solution of FN Herstal that is based on a closed control block of the barrel (type SIG P210 or type CZ 75). The impact energy of the barrel stop is absorbed via a transversal pin that is accommodated in the container (block), which is housed in a plastic frame. The transversal pin at the same time fulfils the function of the control pin for locking the unlocking of the barrel.

It is the object of the invention to propose such a mechanism that will, in a pistol

locked by barrel drop, reduce the impact caused by recoil of the barrel and the impact caused by the breech block stopping at the rear dead center so that the impact should not be concentrated on the same surfaces all the time, or on particular components of the barrel, frame, or container, block, respectively. At the same time, the solution must be simple to produce as well as to operate.

Summary of Invention

The said object is achieved by an assembly of a barrel, a container/frame and a breech block for self-loading pistols with the breech block mechanism locked by barrel drop, the barrel and the breech block being movably accommodated in the container/frame wherein the barrel has a front part and a rear part and a control block of the barrel is arranged under the rear part and a hook is arranged in the region of the control block of the barrel on the container/frame, according to the invention the principle of which is that the control block of the barrel is constituted by a recess that comprises a front inclined control surface that passes into a locking brace and at a distance, at least around a part of the locking brace, at least one bearing surface is arranged to stop the movement of the barrel. The hook comprises a blade for cooperation with the control surface of the control block of the barrel. The blade has an adjacent shapes surface for cooperation with the locking brace of the control block of the barrel. Around at least a part of the shaped surface, at least one stop surface is arranged to absorb the impact of the barrel. The stop surface is oriented with respect to the shaped surface in such a way that in the fully unlocked state of the barrel, the stop surface of the hook bears on the bearing surface of the control block of the barrel while between the control surface and locking brace of the control block of the barrel at one side and the front face of the blade and the shaped surface of the hook at the other side, there is a play.

An advantage of the solution according to the invention is that the recoil is distributed and is not concentrated onto the same surfaces as in prior-art solutions. This is achieved by separation of the barrel unlocking/locking function from the barrel stop function to the container/frame. This way, a considerable increase of

cyclic service life of parts is achieved, especially of the barrel and container/frame of the pistol.

In a preferred embodiment, there are two stop surfaces, arranged at both the sides of the shaped surface, and there are also two corresponding bearing surfaces, arranged at both the sides of the locking brace.

Brief Description of Drawings

The invention will be described in detail with reference to a particular embodiment of the assembly according to the invention, shown in attached drawings wherein individual figures show:

fig. 1 – the barrel of the assembly according to the invention with the control block of the barrel
fig. 2 – a detail of the control block of the barrel with the control surface and locking brace (in a rectangular projection)
fig. 3 – a detail of the control block of the barrel with the bearing surface (in a rectangular projection)
fig. 4 – a detail of the control block of the barrel in a 3D view
fig. 5 – a detail of the control block of the barrel in a 3D view
fig. 6 – frame/container of the assembly according to the invention with a hook
fig. 7 – a detail of the hook in the frame/container (in a rectangular projection)
fig. 8 – a detail of the hook with a blade, shaped surface and stop surfaces in a 3D view
fig. 9 – a cross-section of the assembly according to the invention through the plane of the control surface and blade of a weapon ready to shoot
fig. 10 – a cross-section of the assembly according to the invention through the plane of the bearing surface and stop surface of a weapon ready to shoot
fig. 11 – a cross-section of the assembly according to fig. 9 at the moment of a shot and rearward movement of the barrel and breech block
fig. 12 – a cross-section of the assembly according to fig. 10 at the moment of a shot and rearward movement of the barrel and breech block

fig. 13 – a cross-section of the assembly of fig. 9 at the beginning of barrel unlocking

fig. 14 – a cross-section of the assembly of fig. 10 at the beginning of barrel unlocking

fig. 15 – a cross-section of the assembly of fig. 9 on stopping of the barrel

fig. 16 – a cross-section of the assembly of fig. 10 on stopping of the barrel

fig. 17 – a cross-section of the assembly of fig. 9 on stopping of the breech block at the rear dead center

fig. 18 – a cross-section of the assembly of fig. 10 on stopping of the breech block at the rear dead center

fig. 19 – detail D of fig. 15, or 17, respectively

fig. 20 – detail D of fig. 16, or 18, respectively

Description of Embodiments

The assembly according to the invention is suitable for self-locking pistols with a breech block mechanism locked by barrel drop that may have a plastic frame and a container (block), or an all-metal frame, and thus not having a container/block. Hereinafter, this part is thus referred to as the container/frame 4.

The barrel 2 and the breech block 1 are movably accommodated in the container/frame 4.

The barrel 2 has the front part 205 and rear part 206 under which the control block 201 of the barrel is arranged (see fig. 1). In the region of the control block 201 of the barrel, a hook 401 is arranged on the container/frame 4 (see fig. 6).

The control block 201 of the barrel is constituted by a recess that comprises the front inclined control surface 202 that passes into a locking brace 203 (see figs. 2, 4 and 5), and at a distance, at least around a part of the locking brace 203, at least one bearing surface 204 for stopping the movement of the barrel 2 is arranged (see fig. 3). In the embodiment example shown, there are two bearing

surfaces 204, which are arranged symmetrically around the locking brace 203 (see fig. 4).

The hook 401 on the container/frame 4 comprises a blade 402 for cooperation with the control surface 202 of the control block 201 of the barrel, and the blade 402 has an adjacent shaped surface 403 for cooperation with the locking brace 203 of the control block 201 wherein around at least a part of the shaped surface 403, at least one stop surface 404 is arranged to absorb the impact of the barrel 2. In the embodiment example shown, there are two stop surfaces 404, which are arranged symmetrically around the shaped surface 403 (see fig. 8).

The stop surfaces 404 are oriented with respect to the shaped surface 403 in such a way that in the fully unlocked condition of the barrel 2, the stop surfaces 404 of the hook 401 bear on the bearing surfaces 204 of the control block 201 of the barrel while between the control surface 202 and locking brace 203 of the control block 201 of the barrel at one side and the front face of the blade 402 and the shaped surface 403 of the hook 401 at the other side, there is a play.

In the pairs of the figures described below, the first one always presents a weapon with the inventive assembly shown in a cross-section through the control surface 202 a blade 402 while in the other one, this assembly is in the same position, but shown in a cross-section through the bearing surface 204 and stop surface 404.

Thus, figs. 9 and 10 show the assembly according to the invention in the state the weapon is ready to shoot. The barrel 2 is locked to the breech block 1.

Figs. 11 and 12 show the weapon during shooting when due to the shot, the breech block 1 with the barrel 2 starts to move rearwards by action/reaction from the acceleration of the projectile in the barrel 2. The breech block 1 with the barrel 2 gain considerable kinetic energy.

Figs. 13 and 14 show the weapon at the start of unlocking the barrel 2. The control surface 202 gets in contact with the blade 402, initiating controlled unlocking of the barrel 2.

Figs. 15 and 16 show the weapon on stopping the barrel 2. Kinetic energy of the barrel 2 is consumed by stoppage of its movement. The breech block 1 continues moving and performs its further well-known tasks. This abrupt and quick stop of the barrel 2 causes considerable stressing by impact in the regions of the control block 201 of the barrel and in the region of the hook 401, which may even lead to undesired premature destructions. This is the first predominant source of load for the entire region of the control block 201 of the barrel and hook 401. The solution according to the invention reduces this loading by distributing the load to more areas. The barrel 2 achieves this by a division in the region of the control block 201 of the barrel to the control part, which is constituted by the control surface 202 and the locking brace 203, and which controls locking/unlocking of the barrel 2, and to the bearing surface 204, which absorbs the impact. As regards the container/frame 4, this is also achieved by the division of the region of the hook 401 to the control part, which is constituted by the blade 402 and shaped surface 403, and the stop part, which is constituted by the stop surface 404. Detail D of figs 15 and 16 is shown in figs. 19, 20.

Figs. 17 and 18 show the weapon on stopping the barrel 1 at the rear dead center. Kinetic energy of the breech block 1 is released by its stop at the rear functional dead center. This is the second source of load for the entire region of the control block 201 of the barrel and hook 401. This abrupt and quick stop of the breech block 1 causes stressing by impact in the regions of the control block 201 of the barrel and in the region of the hook 401, which may even lead to undesired destructions. The solution according to the invention reduces this loading by distribution to more areas. The limitation and reduction of the influence of this load works identically as in the case of the barrel 2 stop described with reference to figs. 15 and 16.

The solution according to the invention (see fig. 19 and 20) makes sure that the control surface 202, the locking brace 203, the blade 402 and the shaped surface 403 are only loaded by the control contact controlling locking/unlocking of the barrel 2 and are not loaded either by impacts from the stop arresting the movement od the barrel 2 (first predominant source of load), or by impacts from the stop arresting the movement of the breech block 1 (second source of load). This is, according to the invention, achieved in such a way that at the time of stopping the barrel 2 (see fig. 15, 16), or stopping the breech block 1 (see fig. 17, 18) the sizing of the dimensions and tolerances guarantees contact between the bearing surface 204 and the stop surface 404. Simultaneously, at the same time points, the sizing of the dimensions and tolerances again guarantees a play between the remaining control parts, i.e between the control surface 202, the blade 402 and the locking brace 203, and the shaped surface 403.

In the fully unlocked condition of the barrel 2, the stop surface 404 of the hook 401 bears on the bearing surface 204 of the control block 201 of the barrel while between the control surface 202 and locking brace 302 of the control block 201 of the barrel at one side and the front face of the blade 402 and the shaped surface 403 of the hook 401 at the other side, there is a play.

List of reference signs

1 breech block
2 barrel
201 control block of the barrel
202 control surface
203 locking brace
204 bearing surface
205 front part of the barrel
206 rear part of the barrel
3 disassembly lever
4 container/frame
401 hook
402 blade

403 shaped surface

404 stop surface

CLAIMS

1. An assembly of a barrel (2), a container/frame (4) and a breech block (1) for self-loading pistols with the breech block mechanism locked by barrel drop, the barrel (2) and the breech block (1) being movably accommodated in the container/frame (4) wherein the barrel (2) has a front part (205) and a rear part (206), and a control block (201) of the barrel is arranged under the rear part (206) and a hook (401) is arranged in the region of the control block (201) of the barrel on the container/frame (4), **characterized in that** the control block (201) of the barrel is constituted by a recess that comprises a front inclined control surface (202) that passes into a locking brace (203) and at a distance, at least around a part of the locking brace (203), at least one bearing surface (204) is arranged to stop the movement of the barrel (2) wherein the hook (401) comprises a blade (402) for cooperation with the control surface (202) of the control block (201) of the barrel and the blade (402) has an adjacent shapes surface (403) for cooperation with the locking brace (203) of the control block (201) of the barrel, wherein around at least a part of the shaped surface (403), at least one stop surface (404) is arranged to absorb the impact of the barrel (2) wherein the stop surface (404) is oriented with respect to the shaped surface (403) in such a way that in the fully unlocked state of the barrel (2), the stop surface (404) of the hook (401) bears on the bearing surface (204) of the control block (201) of the barrel while between the control surface (202) and locking brace (203) of the control block (201) of the barrel at one side and the front face of the blade (402) and the shaped surface (403) of the hook (401) at the other side, there is a play.

2. The assembly according the claim 1, **characterized in that** there are two stop surfaces (404), arranged at both the sides of the shaped surface (403), and there are also two corresponding bearing surfaces (204), arranged at both the sides of the locking brace (203).

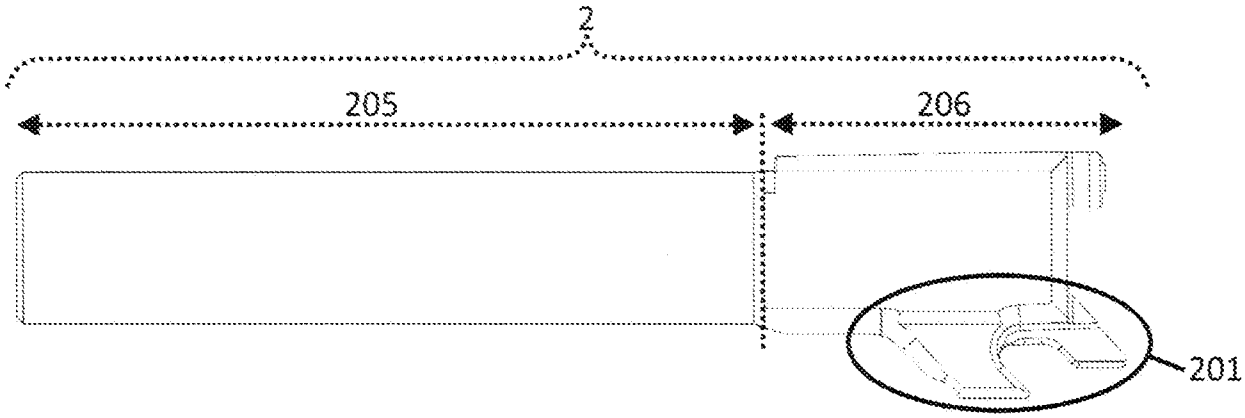


Fig. 1

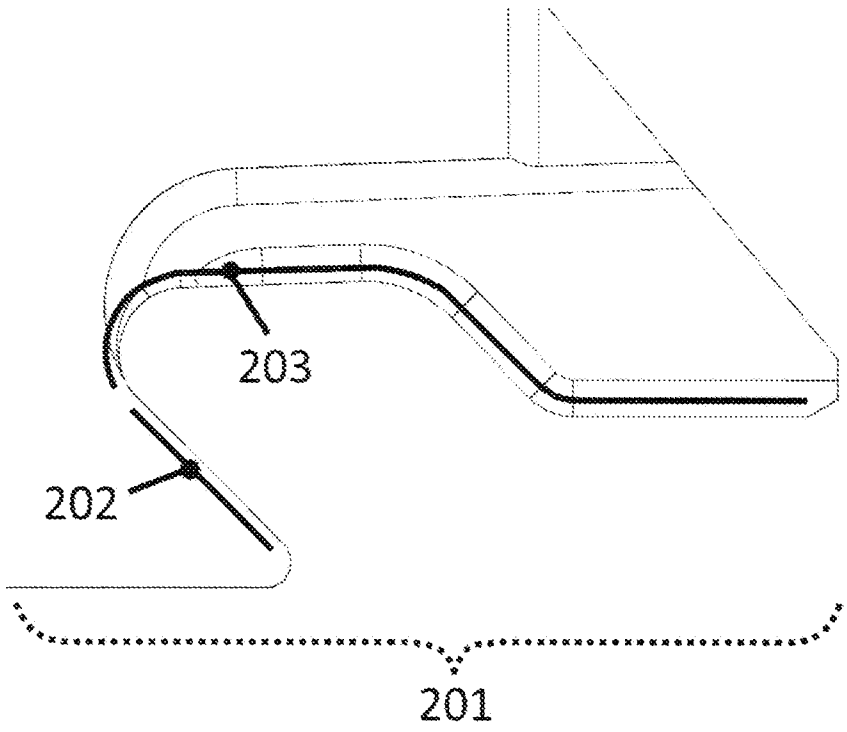


Fig. 2

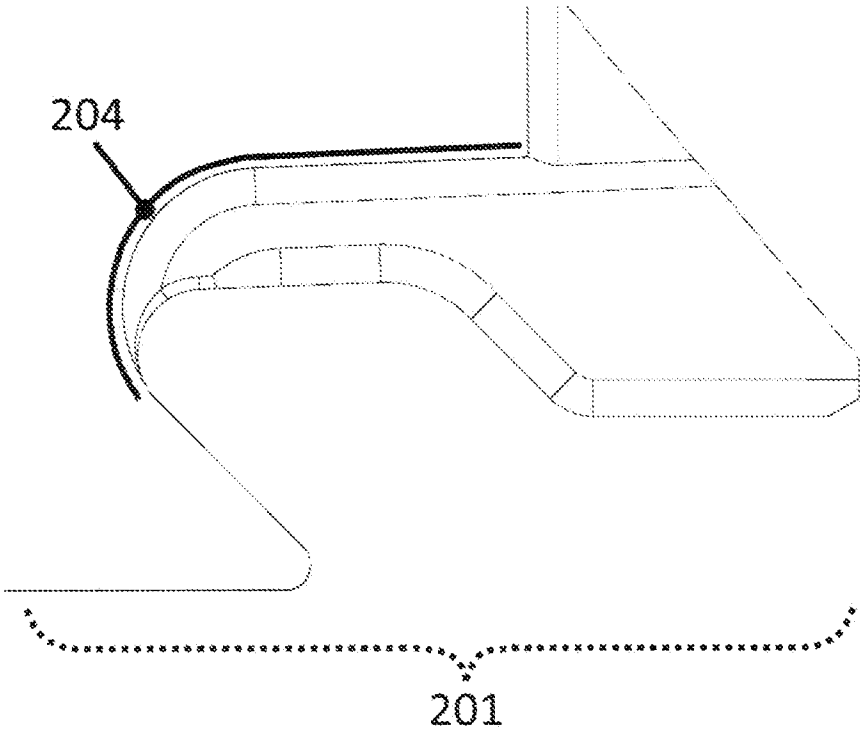


Fig. 3

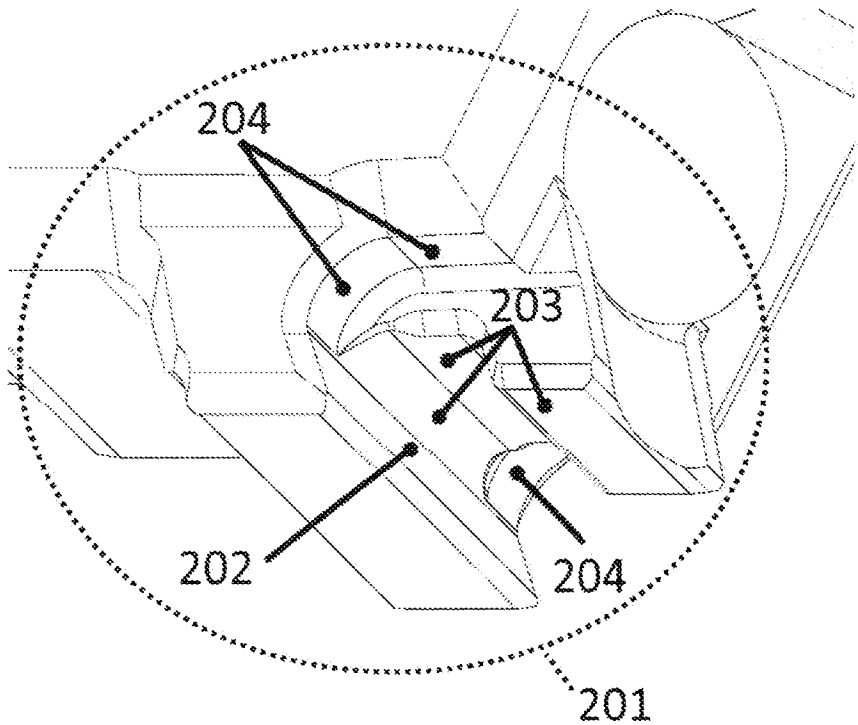
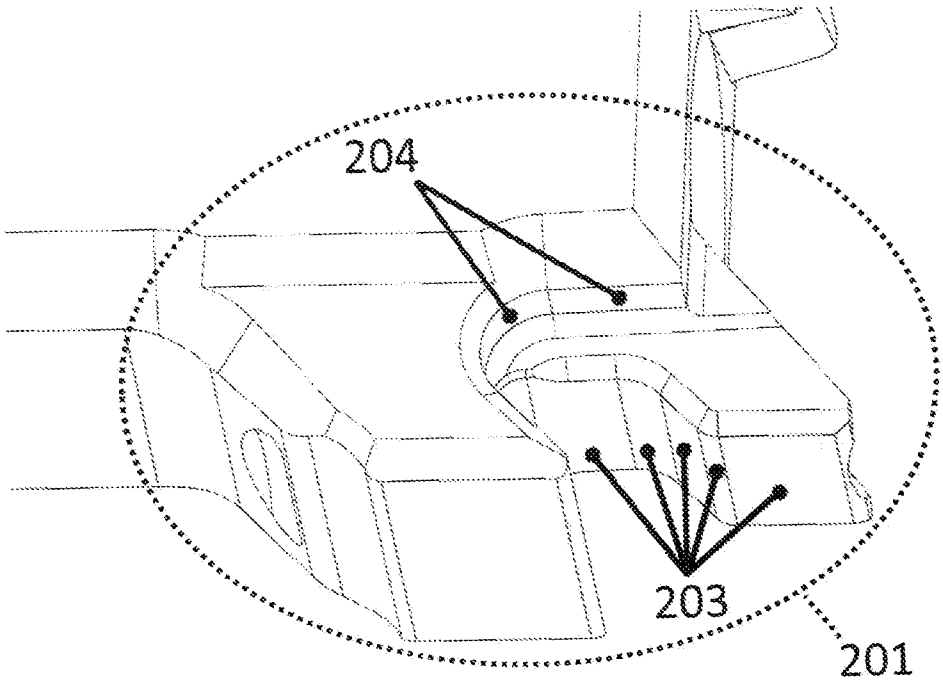


Fig. 4



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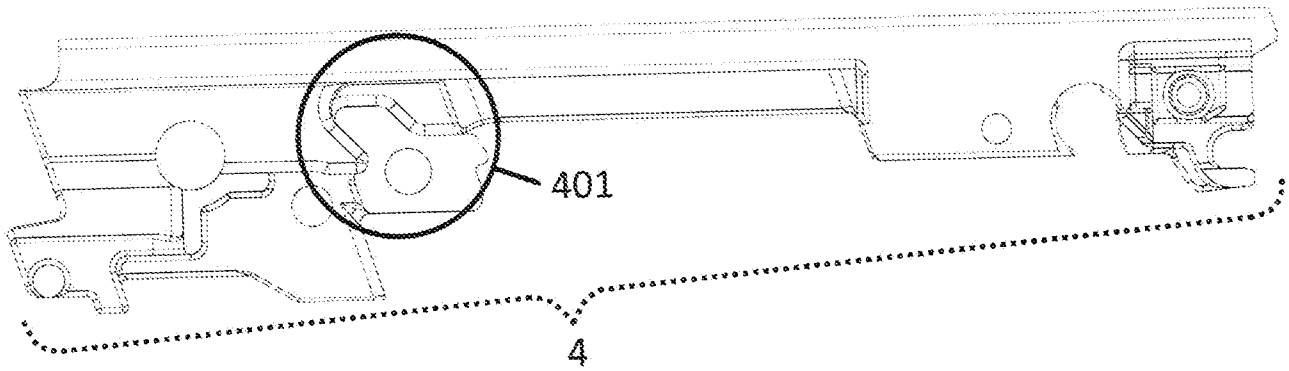

Fig. 6

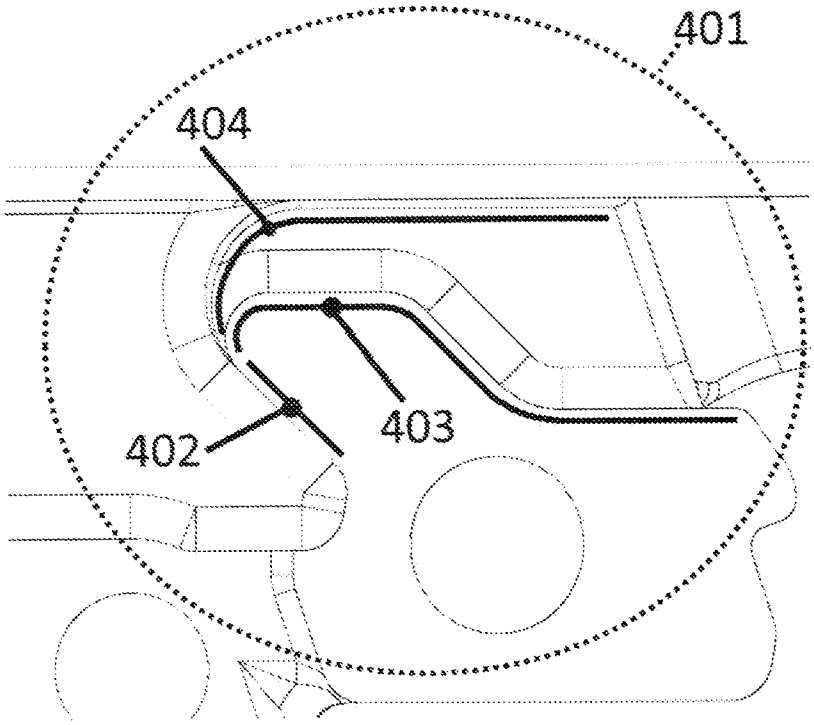

Fig. 7

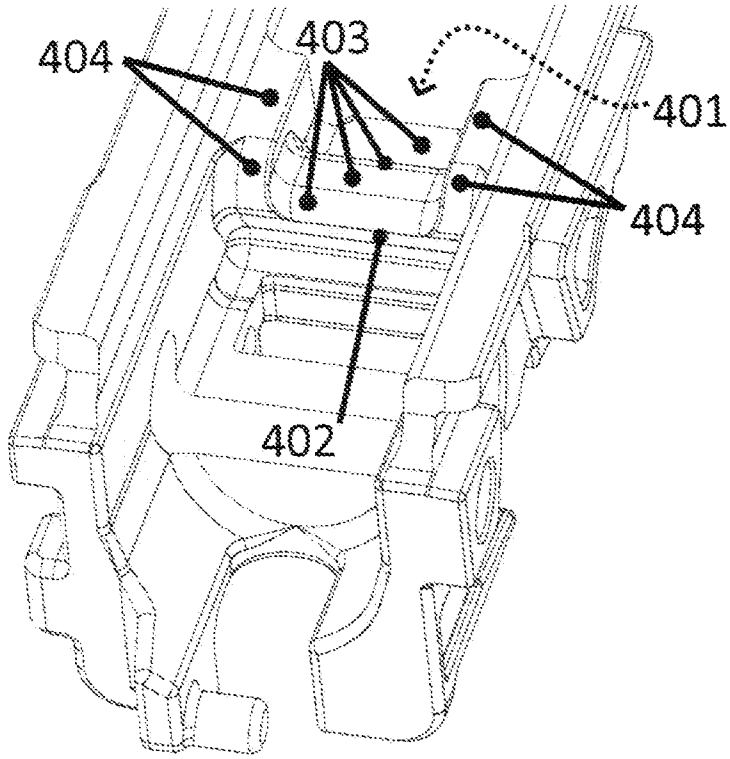

Fig. 8

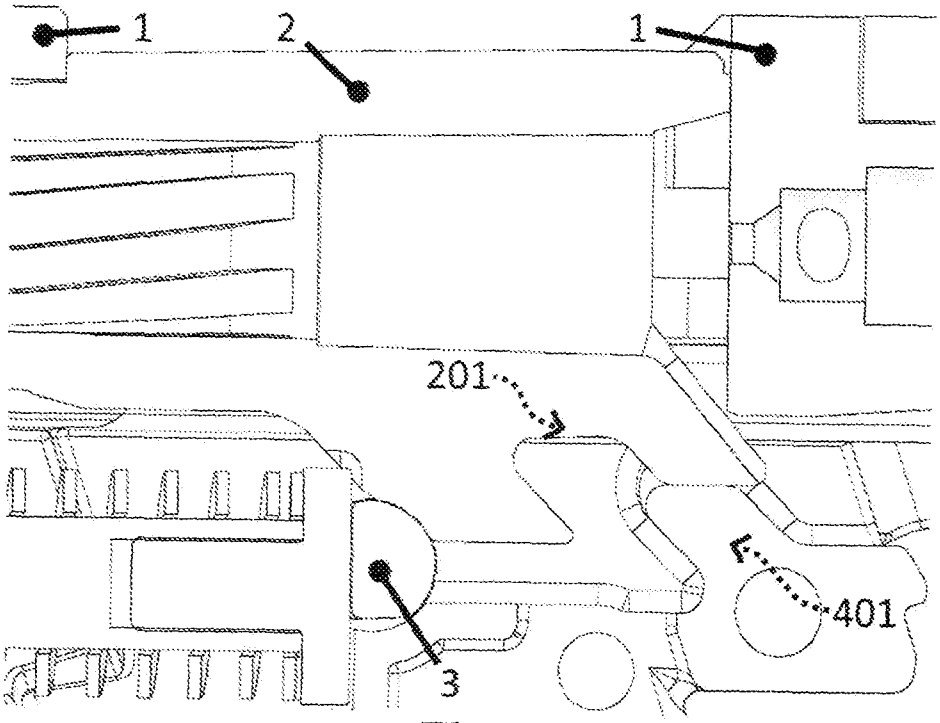

Fig. 9

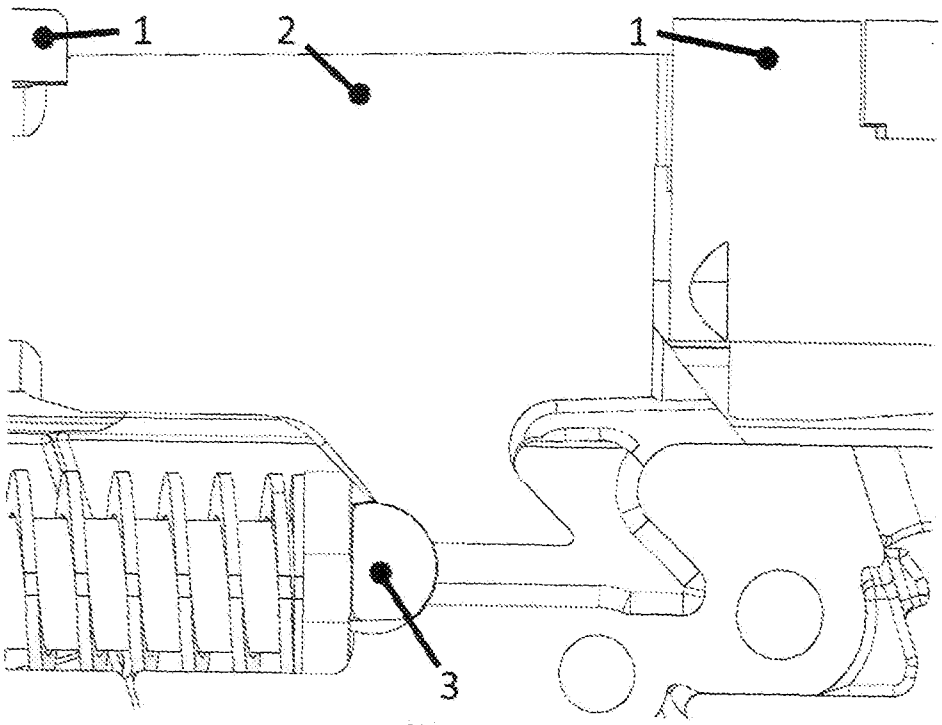

Fig. 10

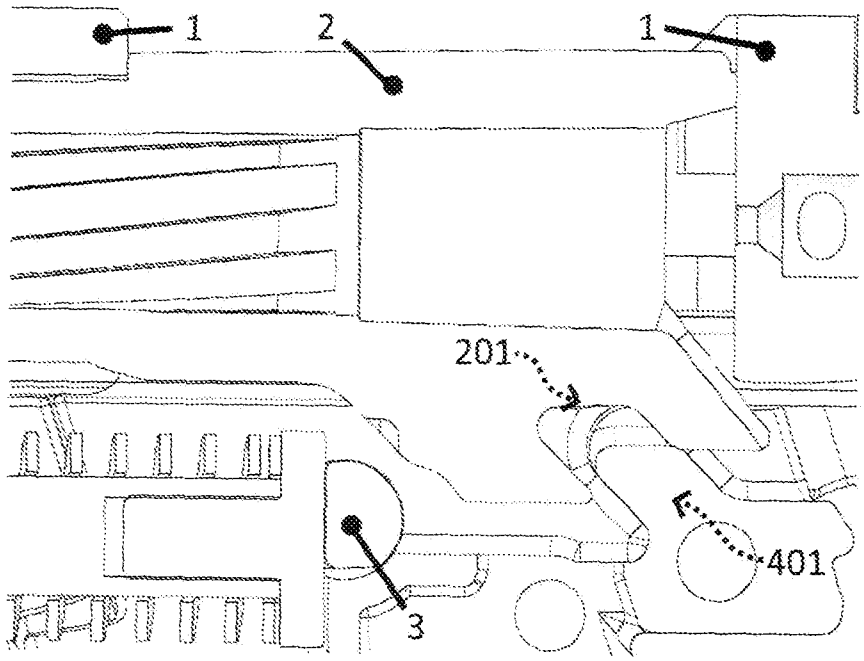

Fig. 11

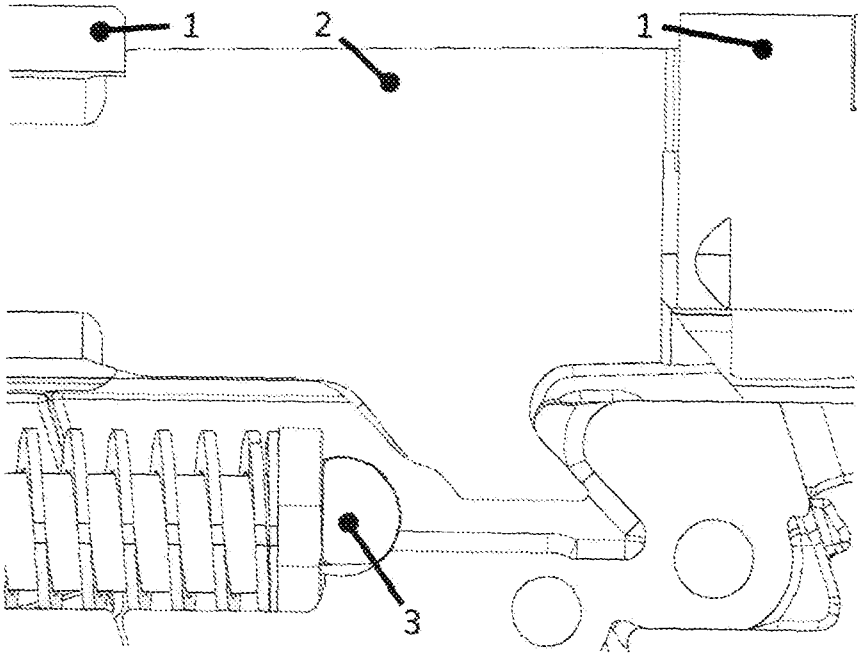

Fig. 12

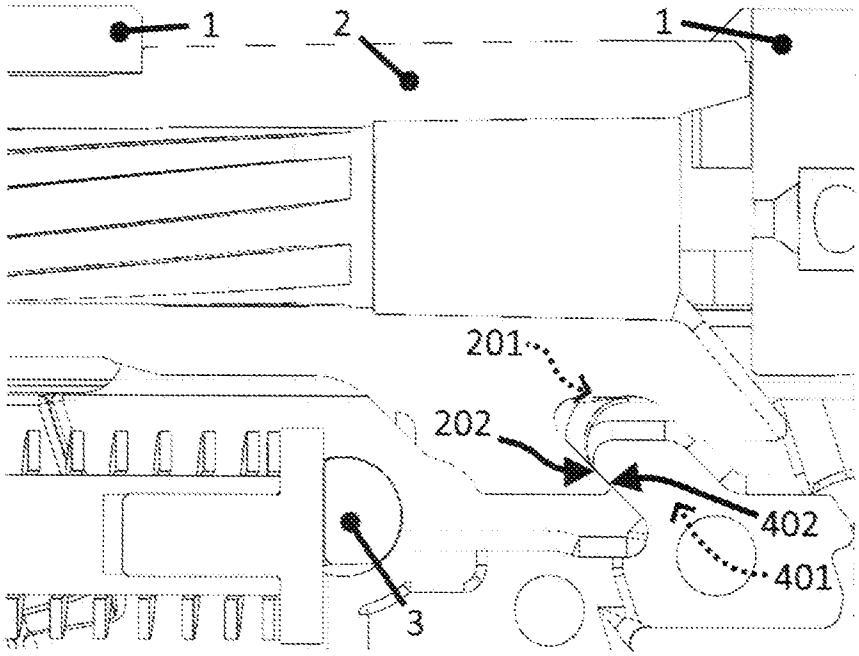

Fig. 13

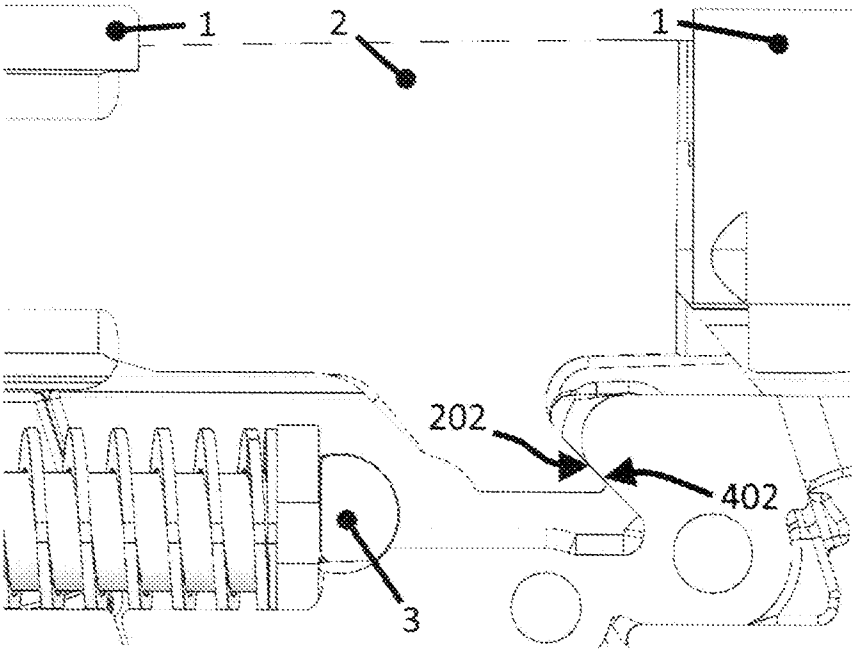

Fig. 14

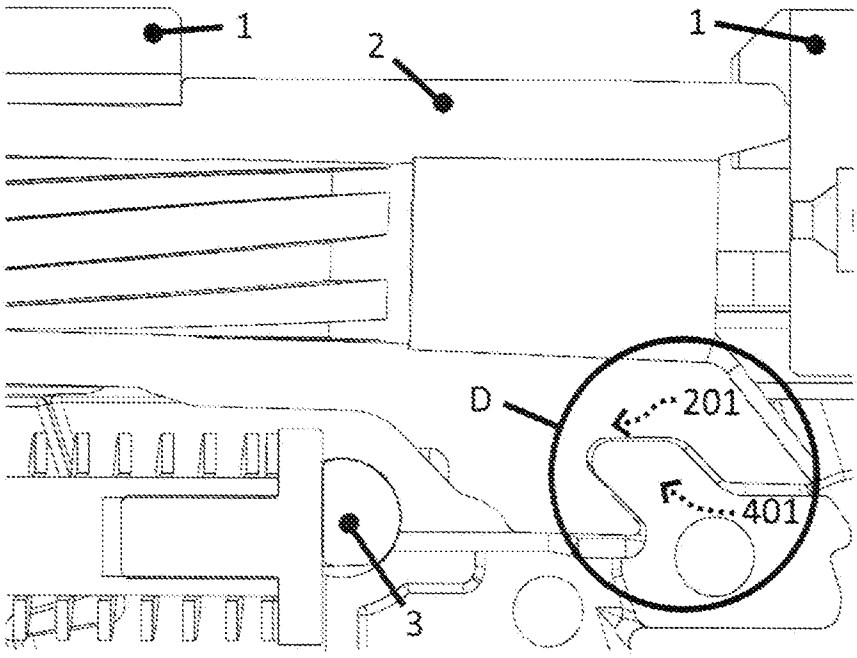

Fig. 15

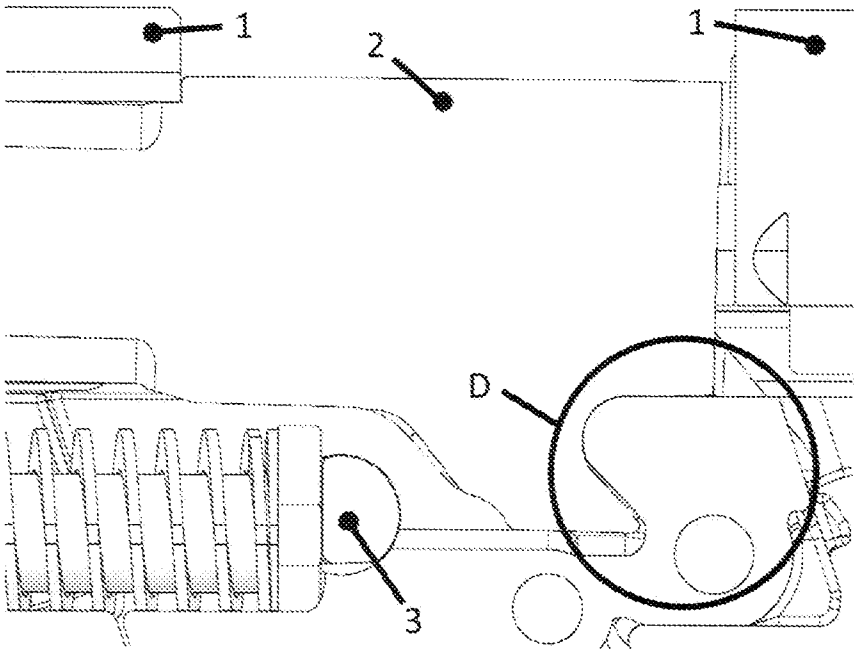

Fig. 16

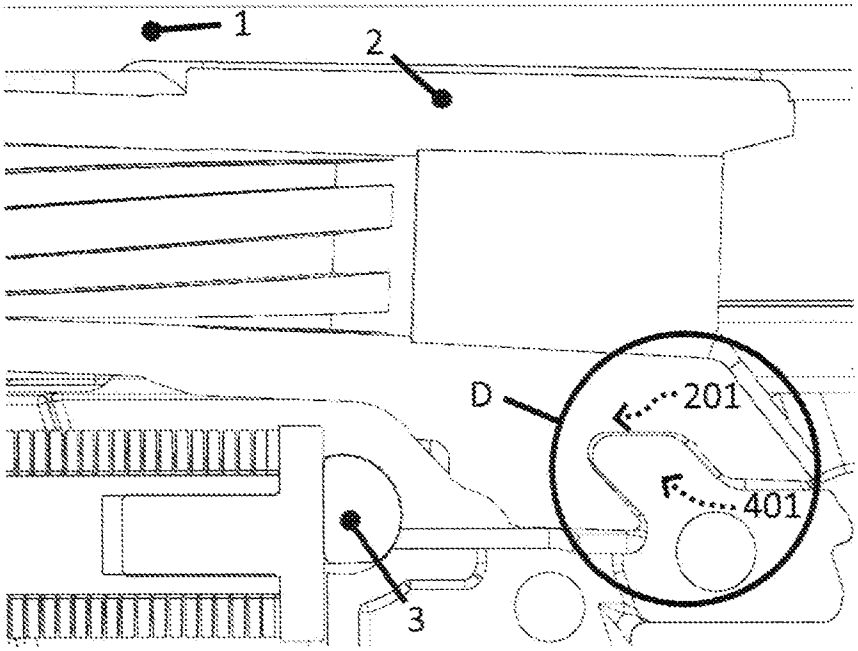

Fig. 17

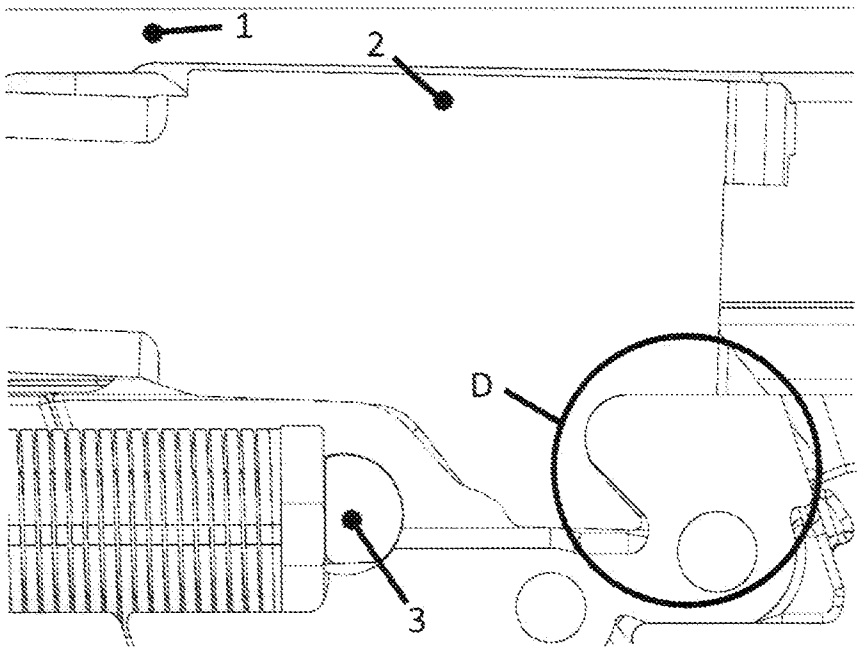

Fig. 18

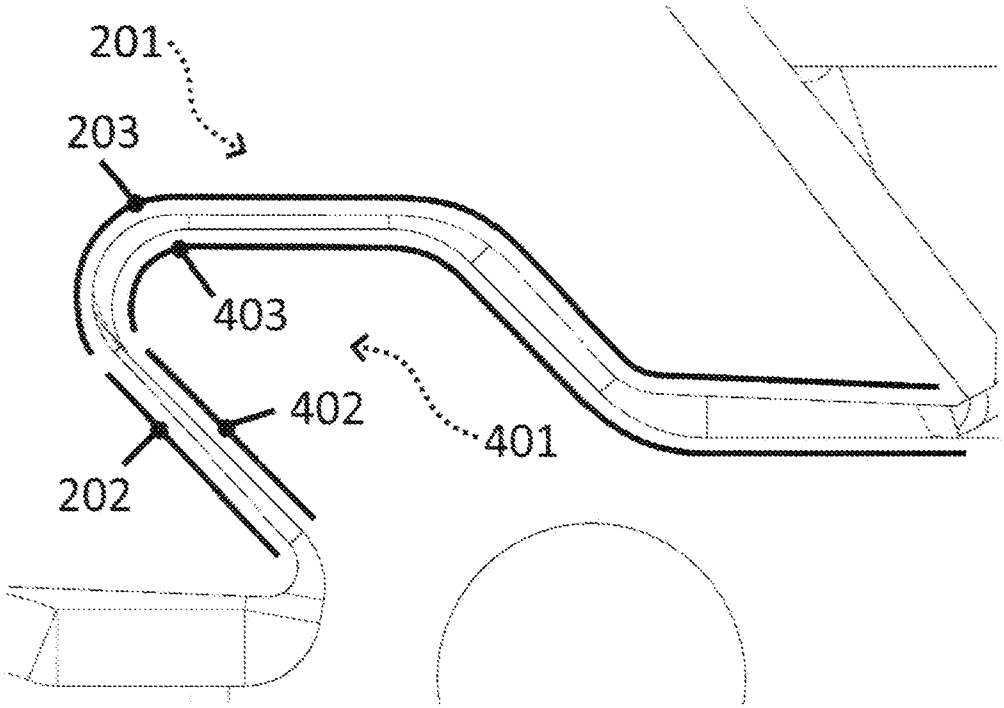

Fig. 19

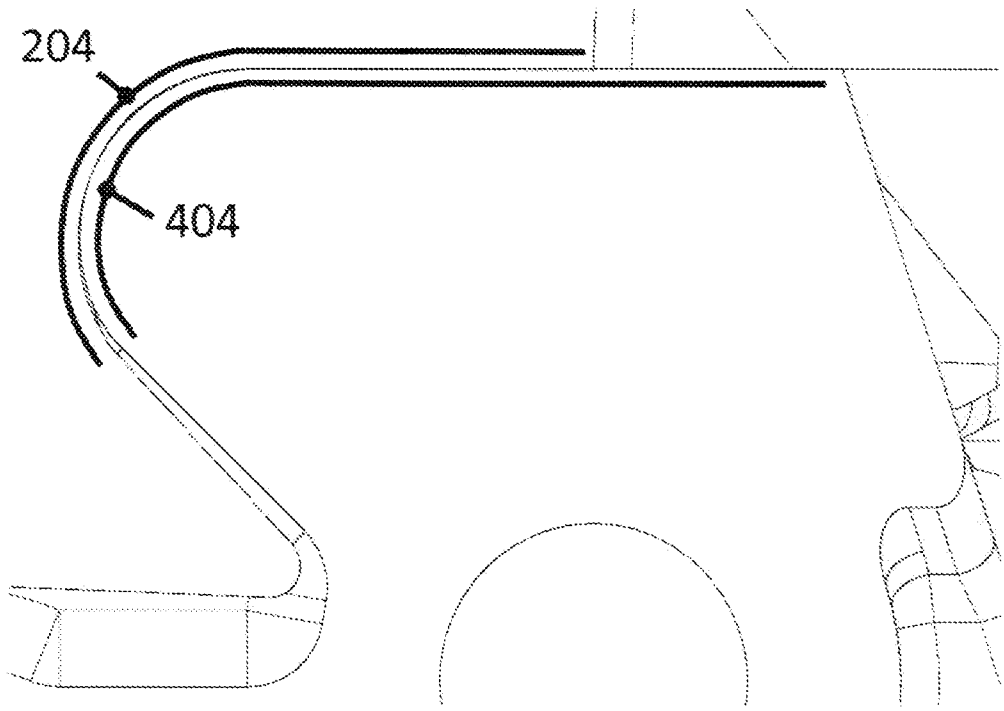

Fig. 20

INTERNATIONAL SEARCH REPORT

International application No
PCT/CZ2024/000011

A. CLASSIFICATION OF SUBJECT MATTER
INV. F41A5/04
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

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	US 5 741 996 A (RUGER WILLIAM B [US] ET AL) 21 April 1998 (1998-04-21) cited in the application figures 1-5,8,9 column 2, lines 17-57 column 3, lines 18-43	1,2
A	US 3 504 594 A (GREELEY THOMAS A) 7 April 1970 (1970-04-07) figures 1,2 column 2, line 59 - column 3, line 74	1,2
A	US 2005/229772 A1 (MAYERL MICHAEL W [DE]) 20 October 2005 (2005-10-20) figures 1-3,6 paragraphs [0004], [0007] paragraphs [0018], [0019]	1,2

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

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
5 June 2024	14/06/2024

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Schwingel, Dirk

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/CZ2024/000011

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5741996 A	21-04-1998	AT E267995 T1	15-06-2004
		AU 2119197 A	28-08-1997
		BR 9702082 A	26-05-1998
		CN 1190459 A	12-08-1998
		CZ 296116 B6	11-01-2006
		DE 69729251 T2	07-07-2005
		EP 0836699 A1	22-04-1998
		IL 121943 A	31-12-1999
		JP 2000500854 A	25-01-2000
		KR 19980703831 A	05-12-1998
		RU 2181187 C2	10-04-2002
		SK 137997 A3	04-03-1998
		US 5741996 A	21-04-1998
		WO 9729337 A1	14-08-1997
US 3504594 A	07-04-1970	NONE	
US 2005229772 A1	20-10-2005	AT E393370 T1	15-05-2008
		EP 1559984 A1	03-08-2005
		US 2005229772 A1	20-10-2005