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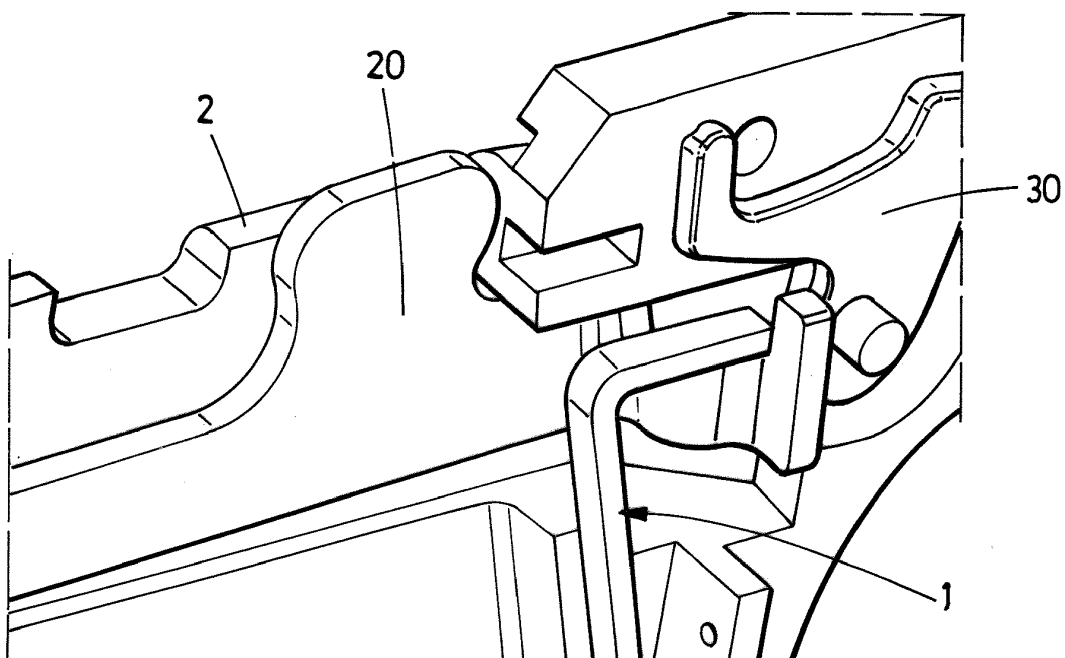
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(54) **SAFETY DEVICE FOR WEAPONS, DRIVE MECHANISM AND CONTROL SYSTEM FOR SAID SAFETY DEVICE**

(57) It is provided a reliable and robust electromechanical safety device that maximises the security of a weapon, while preventing accidental firing situations. Said safety device (1) comprises a safety element (100) for connect or disconnect the kinematic shooting chain; wherein said safety element (100) is located inside the

weapon at its rear part, communicating with the trigger bar (20) and the backstrap (4) of the weapon. Therefore, by controlling the position of the trigger bar (20), it is possible to control the safe and firing position of the weapon, in addition to, and independent of, the other original weapon safeties.



**FIG.2**

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**Description****OBJECT OF THE INVENTION**

**[0001]** The present invention refers to the technical field of weapons, and more specifically to safety arrangements for firing weapons.

**[0002]** The object of the present invention is to provide a reliable safety device for weapons, a drive mechanism and a control system for the same, said safety device being able to be controlled by the shooter, by a third user, by another transmitting device like a bracelet or by an emitter located in a region surrounding a target and a receiving device located in the weapon.

**BACKGROUND OF THE INVENTION**

**[0003]** At present, electromechanical security systems for firearms are widely known. These systems allow the user/shooter to ensure that his weapon will not fire accidentally, which can have fatal consequences.

**[0004]** Transition from the firing position to safe position is commonly made by disconnection of the kinematic shooting chain. As can be clearly appreciated in figures 1A, 1B, corresponding to the state of the art, said kinematic shooting chain comprises basically the following pieces: the trigger (10), the trigger bar (20), the striker safety lever (30), the striker safety (40), the sear (50) and the striker (60) or firing pin. More specifically, the operation of the main parts involved in the weapon's shooting mechanism is as follows: when the trigger (10) is pulled, it moves the trigger bar (20) by means of a spring (6), as represented in figure 1A, wherein the trigger bar (20) in turn moves (through an upper protrusion) the striker safety lever (30). Said striker safety lever (30) has two functions, its upper front zone releases the striker safety (40) and its lower rear zone acts on the sear (50), which is the one that finally releases the striker (60), producing the shot.

**[0005]** In this sense, some examples of shooting mechanisms can be observed in US patents US8371058B2 and US8495832B2, which relate, in particular, to safety mechanisms for the disassembly of a handgun without triggering.

**[0006]** Generally, it is known that the upper protrusion of the trigger bar (20) drops/lows whenever the weapon slide is not completely closed, said closed position being the natural position of the slide, in which it is aligned with the frame. This downward movement of the trigger bar (20) is carried out to avoid that shots can be fired without the slide being completely closed. This occurs in weapons because the slide has an area or footprint that houses the upper protrusion of the trigger bar (20). Thus, as soon as the slide is opened, its displacement is what causes the trigger bar (20) to be in its lowest position and cannot interact with the rest of the kinematic shooting chain, so regardless of whether the trigger is pulled, a shot is not produced.

**[0007]** However, fatal accidents still occur today as a result of defective safety mechanisms, which are clearly susceptible to improvement. For this reason, additional safety mechanisms, which are truly effective and infallible, are always desirable in firearms, in order to reduce as much as possible, the situations of accidental firing by mistake.

**DESCRIPTION OF THE INVENTION**

**[0008]** The present invention solves the above-mentioned drawbacks, providing a reliable and robust electromechanical safety device that maximises the security of the weapon while preventing accidental firing situations. Furthermore, a drive mechanism and a control system for the safety device is also provided, the latter being able to be controlled by the shooter or by a third user.

**[0009]** In the context of this application, by weapon it is meant any small arm or light weapon, such as a firearm, gun, shotgun, air gun, machine gun, pistol, rifle, revolver, etc. and non-lethal weapon or archery weapon as well. In some embodiments, the weapon is a weapon with a striker fired system, e.g., a pistol with a striker fired system.

**[0010]** Besides, just for clarifying, when the term "safe position" is mentioned in this application, it means that the weapon is disabled, and even if the shooter pulls the trigger there is no shot. On the other hand, when "firing position" is mentioned, it means that the weapon is enabled, that is, in the case that the rest of the original weapon locks are enabled, if the shooter pulls the trigger a shot is produced.

**[0011]** The safety device of the invention is applicable for weapons having a frame, a slide, a backstrap and a magazine or grip, wherein the transition from a firing position to a safe position is made by disconnection of the kinematic shooting chain, said kinematic shooting chain comprising a trigger, a trigger bar operated by the trigger and displaceable between a high position and a low position, a striker safety lever, a striker safety, a sear and a striker.

**[0012]** More specifically, the safety device of the invention comprises a safety element for connect or disconnect the kinematic shooting chain; wherein said safety element is located inside the weapon at its rear part, communicating with the trigger bar and the backstrap of the weapon.

**[0013]** In this way, when the weapon is in the firing position and the safety element is operated, the safety element acts on the trigger bar, causing said trigger bar to move downwardly to its low position, so the trigger bar does not contact with the rest of the kinematic shooting chain, so regardless of whether the trigger is pulled, a shot is not produced.

**[0014]** On the other hand, when the weapon is in the safe position and the safety element is operated, the safety element acts on the trigger bar, causing said trigger bar to move upwardly to its high position, so the trigger

bar does contact with the rest of the kinematic shooting chain, so a shot can be produced when the trigger is pulled.

**[0015]** Therefore, by controlling the position of the trigger bar, it is possible to control the safe or firing position of the weapon, in addition to, and independent of, the other original weapon safeties.

**[0016]** Preferably, the safety element is a rod comprising an upper protruding section located inside the weapon, preferably in contact with the trigger bar; a lower protruding section located in the backstrap of the weapon, projecting outwards from said backstrap, for operation by the user; and a central section located between both protruding sections.

**[0017]** More preferably, said safety element is made from steel, especially indicated for its tenacity and hardness. The steel can be a stainless or with some later treatment. However, it is foreseen that the safety element can also be made by a different metallic material or even in plastic.

**[0018]** According to a preferably embodiment of the invention the upper protruding section of the safety element is longer than the lower protruding section. This is not a trivial or random feature, but it pursues a well-identified objective. More specifically, the length of the upper protruding section must allow the trigger bar to move (forward and backward) when the trigger is at rest position (not pulled) or when the trigger is pulled, in both, the safe and firing positions. This feature is critical in the firing position, since, if the upper protruding section is not long enough, when the trigger is pulled, the trigger bar would be released from the safety element, transmitting its movement to the rest of the kinematic shooting chain and possibly producing a shot, while the shooter thinks the gun is in a safe position, resulting in a serious safety problem.

**[0019]** However, in accordance with another preferred embodiment, it is foreseen that the safety element can incorporate an elastic piece, or even that the safety element itself is flexible, to allow the trigger bar to descend, move downwards, independently from the safety element.

**[0020]** The positions of the safety element and the trigger bar in the fire position and the safe position will be explained in detail later on and shown in the figures. Furthermore, the lower protruding section of the safety element is controlled from the backstrap as explained also later.

**[0021]** According to a second object of the invention a drive mechanism of the safety device is described, said drive mechanism comprising a motor; a spindle attached to the motor; a pusher coupled to the spindle, configured for raising (firing position) or lowering (safe position) the safety element; and a housing in which the motor and the spindle are mounted, said housing being coupled to the weapon's backstrap.

**[0022]** Preferably, the drive mechanism also comprises at least a magnet and a magnetic sensor, both at-

tached to the pusher. Said elements, magnet and magnetic sensor allow to know the position of the pusher, which is relevant for many reasons explained below.

**[0023]** More preferably, the drive mechanism further comprises an elastic element, located between the pusher and the housing, to counteract the force exerted by the original spring of the trigger bar of the weapon, which makes by default the trigger bar position in its highest position. This feature allows that the passage from firing to safe position is less abrupt.

**[0024]** On the other hand, according to a third object of the invention a control system of the safety device is described.

**[0025]** Said control system comprises at least one flexible PCB (Printed Circuit Board) that allows adapting to the limited spaces available and the shapes of the weapon; a LED status indicator, connected to the flexible PCB; a battery; a main communication circuit attached to the battery; and an electrical connection, between the main communication circuit and the flexible PCB.

**[0026]** The advantage of introducing electronics in weapon safeties is that it allows the weapon to be controlled in different ways, to avoid accidental firing.

**[0027]** Preferably, the battery is located under the front area of the weapon's frame. However, according to another embodiment, it is also envisaged that the battery can be housed on the backstrap of the weapon.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0028]** For a better understanding the above explanation and for the sole purpose of providing an example, some non-limiting drawings are included that schematically depict a practical embodiment.

Figures 1A - 1B show a conventional weapon's shooting mechanism and the main elements of the kinematic shooting chain.

Figure 2 shows a detailed view of a weapon including the safety device of the present invention, in particular showing the interaction between the safety element and the trigger bar.

Figures 3A - 3C show the positions of the safety element and the trigger bar in the firing and the safe positions of the weapon. A detail view of both overlapping positions is shown in figure 3C.

Figures 4A - 4D show the positions of the safety element and the trigger bar during the weapon's shooting sequence.

Figure 5 shows a side view of a weapon including the safety device of the invention, wherein the different areas of the safety element can be appreciated, according to a preferred embodiment of the invention.

Figure 6 shows a perspective view of the safety element of figure 5.

Figure 7 shows a detail view of the upper protruding section of the safety element, showing its length with respect the trigger bar.

Figures 8A - 8I show the drive mechanism of the safety device from the weapon's backstrap, according to a preferred embodiment of the invention.

Figures 9A - 9C show the electronic control system of the safety device according to a preferred embodiment of the invention.

## PREFERRED EMBODIMENT OF THE INVENTION

**[0029]** An example of a preferred embodiment is described below, mentioning the figures above, without limiting or reducing the scope of protection of the present invention.

**[0030]** As shown in the detailed view of figure 2, the proposed safety device (1) comprises a safety element (100) for connect or disconnect the kinematic shooting chain; wherein said safety element (100) is located inside the weapon in its rear part, communicating with the trigger bar (20) and the backstrap (4) of the weapon, as can be appreciated in figures 3A and 3B.

**[0031]** Thus, when the weapon is in the firing position, see figures 3A and 4A, and the safety element (100) is operated, the safety element (100) acts on the trigger bar (20), causing said trigger bar (20) to move downwardly to its low position, as shown in figure 4C. Consequently, the trigger bar (20) does not contact with the rest of the kinematic shooting chain, so regardless of whether the trigger (10) is pulled, see figure 4D, a shot is not produced.

**[0032]** On the other hand, when the weapon is in the safe position, see figures 3B and 4C, and the safety element (100) is operated, the safety element (100) acts on the trigger bar (20), causing said trigger bar (20) to move upwardly to its high position, as shown in figure 4A. In this situation, the trigger bar (20) does contact with the rest of the kinematic shooting chain, so a shot can be produced when the trigger (10) is pulled, as can be observed in figure 4B.

**[0033]** Figure 3C shows a detail view of the overlapping positions of the trigger bar (20) and the upper protruding section (101) of the safety element (100), both in the firing position and in the safe position of the weapon, see movement as indicated by the arrows.

**[0034]** By default, as can be observed in figure 4A, the trigger bar (20) is in its rearmost and highest position possible, due to a weapon's spring (6) shown in figure 1A. This is its position when the safety element (100) is at rest (firing position) and the trigger (10) is not pulled. If the trigger (10) is pulled from this position, a shot is fired, as appreciated in figure 4B, omitting the rest of the

weapon's safeties for simplicity.

**[0035]** Therefore, in both figures 4A,4B, the position of the weapon is firing position, the weapon is enabled, it depends on whether one pull the trigger (10) that a shot occurs. In both positions shown in figures 4A, 4B, the safety element (100) is in its highest position, which corresponds to the firing position of the weapon.

**[0036]** On the other hand, in figures 4C, 4D, the weapon is in a safe position, i.e. disabled, so even if the shooter pulls the trigger (10), no shot is fired. This is because the safety element (100) is in its lowest position, which corresponds to the safe position of the weapon.

**[0037]** More in particular, in figure 4C the trigger (10) has not been pulled and is therefore in its most rearward position. For its part, figure 4D shows the situation when the trigger (10) is being pulled and is therefore, temporarily, in its most forward position.

**[0038]** Notwithstanding the above, the weapon must continue to function as the original, so the trigger bar (20) must be allowed to drop whenever the slide (3) is open. Furthermore, it is foreseen that the safety element (100) does not require to be always in contact with the trigger bar (20), to allow the original operation of the weapon.

**[0039]** As represented in figures 5 and 6, both the upper and lower protruding sections (101, 102) of the safety element (100) are oriented towards the rear part of the weapon, in the opposite direction to the direction of the shot. In this sense, it should be noted that the location of the sections (101, 102, 103) of the safety element (100) has been specifically designed to adapt to the particular morphology of the weapon, taking into account the small dimensions of a weapon (gun in particular) and the limited spaces in it.

**[0040]** More specifically, according to a preferred embodiment of the invention, the upper protruding section (101) of the safety element (100) forms an angle of less than 90° with the central section (103), preferably 75° as shown in figures 5 and 6. This feature is relevant, since it takes into account both that the main axis of the safety element (100) is parallel to the magazine or grip (5) axis and that the upper protruding section (101) axis takes into account the position of the trigger bar (20).

**[0041]** For its part, the lower protruding section (102) of the safety element (100) forms an angle of 90° with the central section (103). This is also relevant because it contributes to facilitate the assembly of the drive mechanism (200), as will be explained.

**[0042]** As mentioned above and shown in figure 6, the upper protruding section (101) of the safety element (100) is longer than the lower protruding section (102), such that the trigger bar (20) is able to move (forward and backward), see figure 7, when the trigger (10) is at rest position, not pulled, figures 4A, 4C, as well as when the trigger (10) is pulled, in both the safe and firing positions, figures 4B, 4D.

**[0043]** Figures 8A - 8I show the drive mechanism (200) of the safety device (1) from the weapon's backstrap (4). According to a preferred embodiment of the invention,

said drive mechanism (200) is based on a motor-spindle-pusher assembly, in particular comprising:

- a motor (201);
- a spindle (202) attached to the motor (201);
- a pusher (203) coupled to the spindle (202), as shown in figures 8D and 8E, configured for raising (firing position) or lowering (safe position) the safety element (100); and
- a housing (204) in which the motor (201) and the spindle (202) are mounted, said housing being coupled to the weapon's backstrap (4).

**[0044]** As explained above, the firing position means that the weapon is ready to fire, with a shot being fired only if the shooter pulls the trigger (10). Taking advantage of the geometry of the original backstrap (4) of a weapon, preferably the motor (201) is housed in the central axis of the backstrap (4), since this is the area where there is more space to house the motor (201), as shown in figures 8F, 8G and 8H.

**[0045]** In this sense, provided that the trigger bar (20) is usually not located on the axis of the backstrap (4), see figure 8H, a change of axis is required, which in this case is done through the pusher (203) in the backstrap (4) area, as shown in figure 8B. However, it is foreseen that said change of axis is done in other areas depending on the available spaces and morphology of each weapon. For example, the axis can be changed by the safety element itself.

**[0046]** Furthermore, it is envisaged that the drive mechanism (200) also comprises at least a magnet (205) and a magnetic sensor (206) as a Hall sensor in figure 8H, both being coupled on a fixed PCB. Said magnet (205) and magnetic sensor (206) allow to know the position of the pusher (203), which is important for the following reasons:

- By knowing the position of the pusher (203) in the assembly process of the safety device (1), it allows to align it with the safety element (100), since the latter must be mounted in the safe position. It is required to know where the pusher (203) is so that both elements are in the same position, managing to carry out a safe assembly, avoiding accidental shooting.
- In addition, it allows to know the position of the weapon's safety and to warn in case of failure of the mechanical part of the safety. For example, if the motor-spindle-pusher assembly fails (it does not move enough, battery failure, and so on), the sensor reading allows to anticipate and send a failure alert to the weapon user (for example, by means of a LED visible from the shooting position).

**[0047]** According to another embodiment, it is foreseen that a second magnetic sensor is placed, so that if someone, knowing that the state of the safety device is mag-

netically detected, wants to cause a malfunction of the status indication and brings a magnet closer to the safety device, that external magnetic field that can interfere with the status indication can be detected, and therefore it is possible to place the weapon in a safe position.

**[0048]** Other embodiments to know the position of the safety device are through mechanical stops, infrared sensors, and so on.

**[0049]** Finally, it is foreseen that the drive mechanism (200) further comprises an elastic element (207), which is a compression spring in figures 8H, 8I. Said elastic element (207) is located between the pusher (203) and the housing (204) of the drive mechanism (200) to counteract the force exerted by the original spring (6) of the trigger bar (20) of the weapon, which makes by default the trigger bar (20) position in its highest position. Said original spring (6) is shown in figure 1A.

**[0050]** Regarding the above, as the trigger bar (20) is by default in its highest position (firing position), see figure 4A, the passage from safe position to firing position is smoother than the opposite movement (passage from firing to safe position). This conventional situation makes the shooter feel insecure because when the order to move from firing to safe position is given, the motor (201) has to make a bigger effort than when moving from safe to firing position. Therefore, the elastic element (207) mentioned above is able to counteract the original spring (6) force of the trigger bar (20), said elastic element (207) making force in the opposite direction to the original spring (6), so that the passage from firing to safe position is less abrupt.

**[0051]** Figure 8C shows a cross-section of the rear area of a weapon including the safety device (1) of the invention, wherein the particular location and dimension of the safety element (100) can be appreciated.

**[0052]** According to a preferred embodiment of the invention, not shown in figures, a battery is housed in the backstrap (4) of the weapon, so that both the drive mechanism (200) and the battery are housed in said backstrap (4). Furthermore, it is foreseen that the backstrap (4) can also include control or identification electronics.

**[0053]** Optionally, as shown in figures 9A-9C, referring to the electronic control system (300) of the safety device (1), the battery and other electronic control components can be housed in other parts of the weapon. More in particular, according to the preferred embodiment of figure 9A, said control system (300) comprises:

- at least one flexible PCB (301) (Printed Circuit Board) that allows adapting to the limited spaces available and the shapes of the weapon;
- a LED status indicator (302), connected to the flexible PCB (301);
- a battery (303), shown in figure 9C, which in this embodiment is located under the front area of the weapon's frame (2);
- a main communication circuit (304) attached to the battery (303); and

- an electrical connection (305), shown in figure 9B, between the main communication circuit (304) and the flexible PCB (301).

**[0054]** As mentioned above, introducing electronics in weapon safeties allows the weapon to be controlled in different ways, to avoid accidental firing. More specifically, the weapon can be controlled:

- By a controlling user other than the weapon user. For example, the controlling user has a controller (or even a mobile phone) that communicates wirelessly via RF with the electronics embedded in the weapon. The controller sends the order to change to safe position or firing position to the device embedded in the weapon and it acts on the safety device to place it in the corresponding position.
- By another transmitting device (for example, located in a bracelet that carries the user of the weapon) that communicates with the device embedded in the weapon. In this way, the weapon only moves from safe position to firing position when the user of the weapon carries the bracelet. This implementation prevents the weapon from being used against the authorized user.
- By an emitter located in a region surrounding a target and a receiving device located in the weapon, so that it can only be fired when pointing at the target area. This is important in shooting galleries, for training purposes to prevent unexperienced users from having accidents or to avoid misuse (e.g. a shooter shoots at the target of the other lanes).

**[0055]** Even though reference has been made to a specific embodiment of the invention, it is obvious for a person skilled in the art that the safety devices described herein are susceptible to numerous variations and modifications, and that all the details mentioned can be substituted for other technically equivalent ones without departing from the scope of protection defined by the attached claims.

## Claims

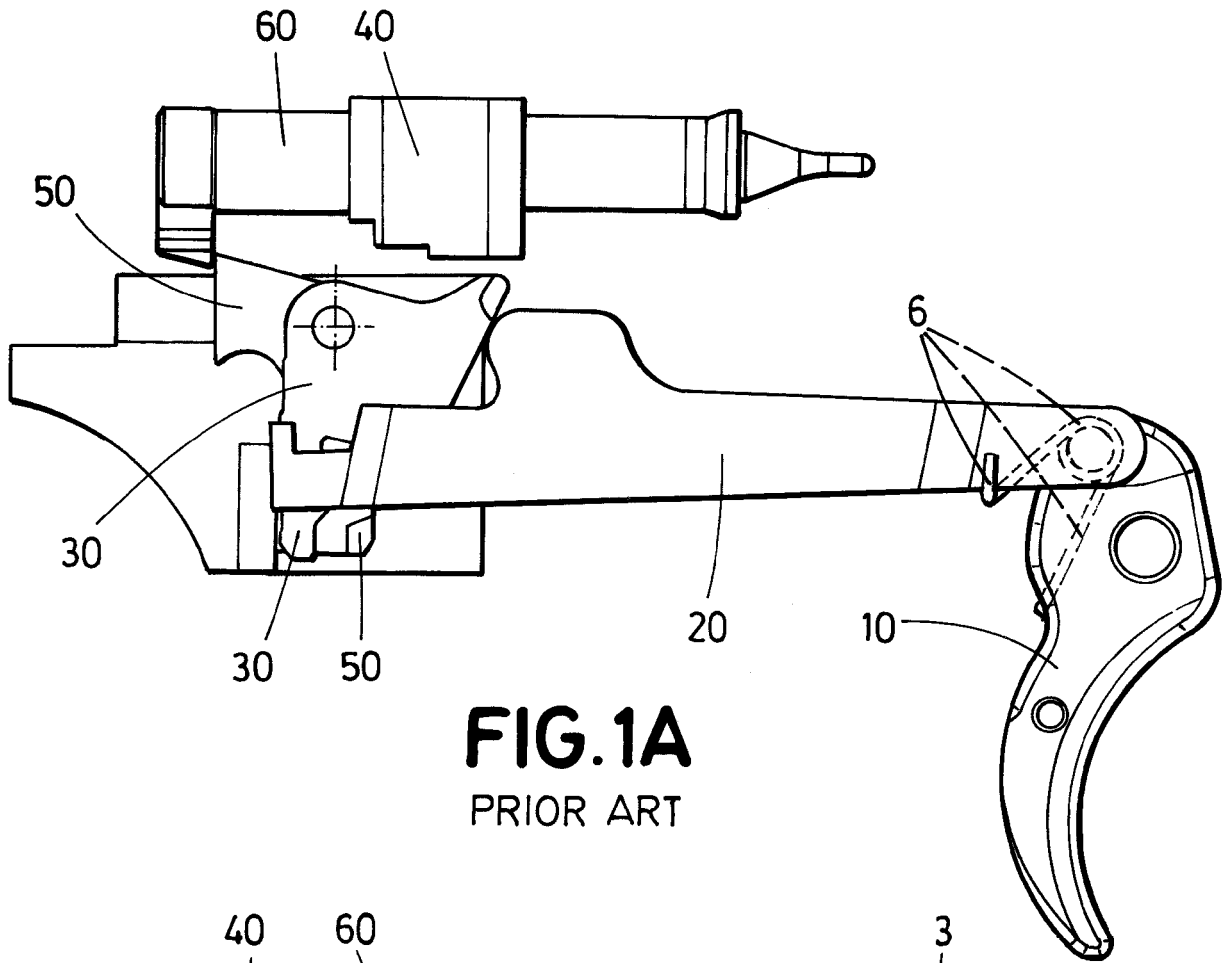
1. Safety device (1) for weapons, in particular for weapons having a frame (2), a slide (3), a backstrap (4) and a magazine or grip (5), wherein the transition from a firing position to a safe position of the weapon is made by disconnection of the kinematic shooting chain, said kinematic shooting chain comprising a trigger (10), a trigger bar (20) operated by the trigger (10) and displaceable between a high position and a low position, a striker safety lever (30), a striker safety (40), a sear (50) and a striker (60), **characterized in that** the safety device (1) comprises a

safety element (100) for connect or disconnect the kinematic shooting chain; wherein said safety element (100) is located inside the weapon at its rear part, communicating with the trigger bar (20) and the backstrap (4) of the weapon, such that when the weapon is in the firing position and the safety element (100) is operated, the safety element (100) acts on the trigger bar (20), causing said trigger bar (20) to move downwardly to its low position, so the trigger bar (20) does not contact with the rest of the kinematic shooting chain, so regardless of whether the trigger (10) is pulled, a shot is not produced; and when the weapon is in the safe position and the safety element (100) is operated, the safety element (100) acts on the trigger bar (20), causing said trigger bar (20) to move upwardly to its high position, so the trigger bar (200) does contact with the rest of the kinematic shooting chain, so a shot can be produced when the trigger (10) is pulled.

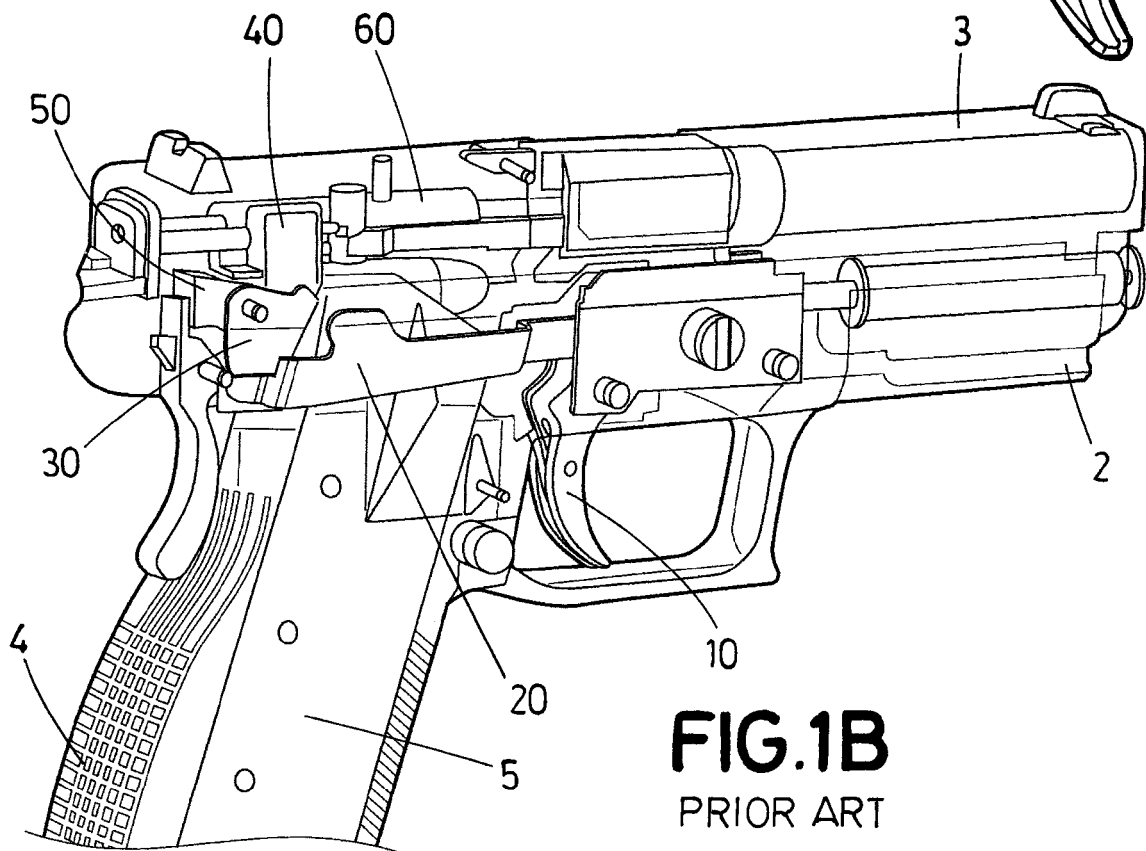
2. Safety device (1) for weapons, according to claim 1, wherein the safety element (100) is a rod comprising:
  - an upper protruding section (101) located inside the weapon;
  - a lower protruding section (102) located in the backstrap (4) of the weapon, projecting outwards from said backstrap (4), for operation by the user; and
  - a central section (103) located between both protruding sections (101, 102).
3. Safety device (1) for weapons, according to claim 2, wherein the upper protruding section (101) of the safety element (100) is longer than the lower protruding section (102), such that the trigger bar (20) is able to move when the trigger (10) is at rest position, not pulled, as well as when the trigger is pulled, in both the safe and firing positions.
4. Safety device (1) for weapons, according to claim 2, wherein the safety element (100) incorporates an elastic piece, to allow the trigger bar to descend independently from the safety element.
5. Safety device (1) for weapons, according to claim 2, wherein the safety element (100) itself is flexible, to allow the trigger bar to descend independently from the safety element.
6. Safety device (1) for weapons, according to claim 2, wherein the central section (103) of the safety element (100) is located in a parallel axis with respect to the central axis of the weapon's magazine or grip (5).
7. Safety device (1) for weapons, according to claim 2, wherein both the upper and lower protruding sec-

tions (101, 102) of the safety element (100) are oriented towards the rear part of the weapon, in the opposite direction to the direction of the shot.

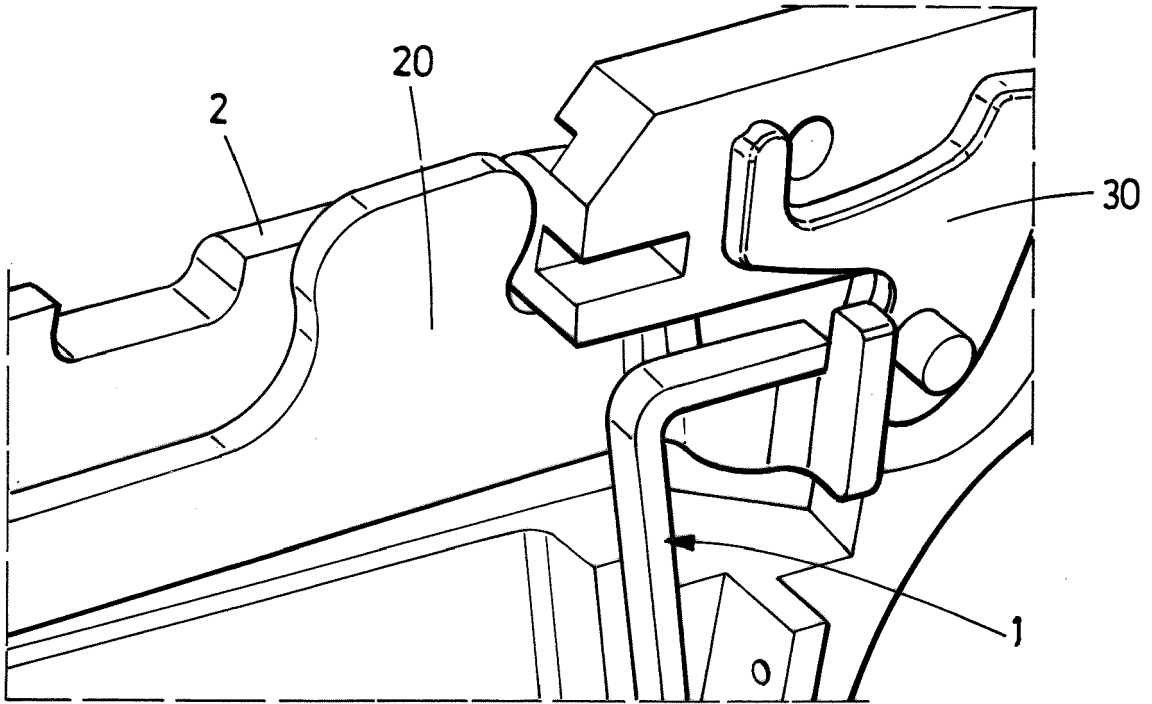
8. Safety device (1) for weapons, according to claim 7, wherein the upper protruding section (101) of the safety element (100) forms an angle of less than 90° with the central section (103). 5
9. Safety device (1) for weapons, according to claim 7, wherein the lower protruding section (102) of the safety element (100) forms an angle of 90° with the central section (103). 10
10. Drive mechanism (200) of the safety device (1), **characterized in that** it comprises: 15
- a motor (201);
  - a spindle (202) attached to the motor (201);
  - a pusher (203) coupled to the spindle (202), configured for raising (firing position) or lowering (safe position) the safety element (100); and 20
  - a housing (204) in which the motor (201) and the spindle (202) are mounted, said housing being coupled to the weapon's backstrap (4). 25
11. Drive mechanism (200) according to claim 10, further comprising at least a magnet (205) and a magnetic sensor (206), both coupled on a fixed PCB. 30
12. Drive mechanism (200) according to claim 10, further comprising an elastic element (207) located between the pusher (203) and the housing (204).
13. Drive mechanism (200) according to claim 12, wherein the elastic element (207) is a compression spring. 35
14. Control system (300) of the safety device (1), **characterized in that** it comprises: 40
- at least one flexible PCB (301) (Printed Circuit Board) that allows adapting to the limited spaces available and the shapes of the weapon;
  - a LED status indicator (302), connected to the flexible PCB (301); 45
  - a battery (303),
  - a main communication circuit (304) attached to the battery (303); and
  - an electrical connection (305), between the main communication circuit (304) and the flexible PCB (301). 50
15. A weapon comprising the safety device (1) according to claims 1 to 9 or the drive mechanism (200) according to claims 10 to 13. 55



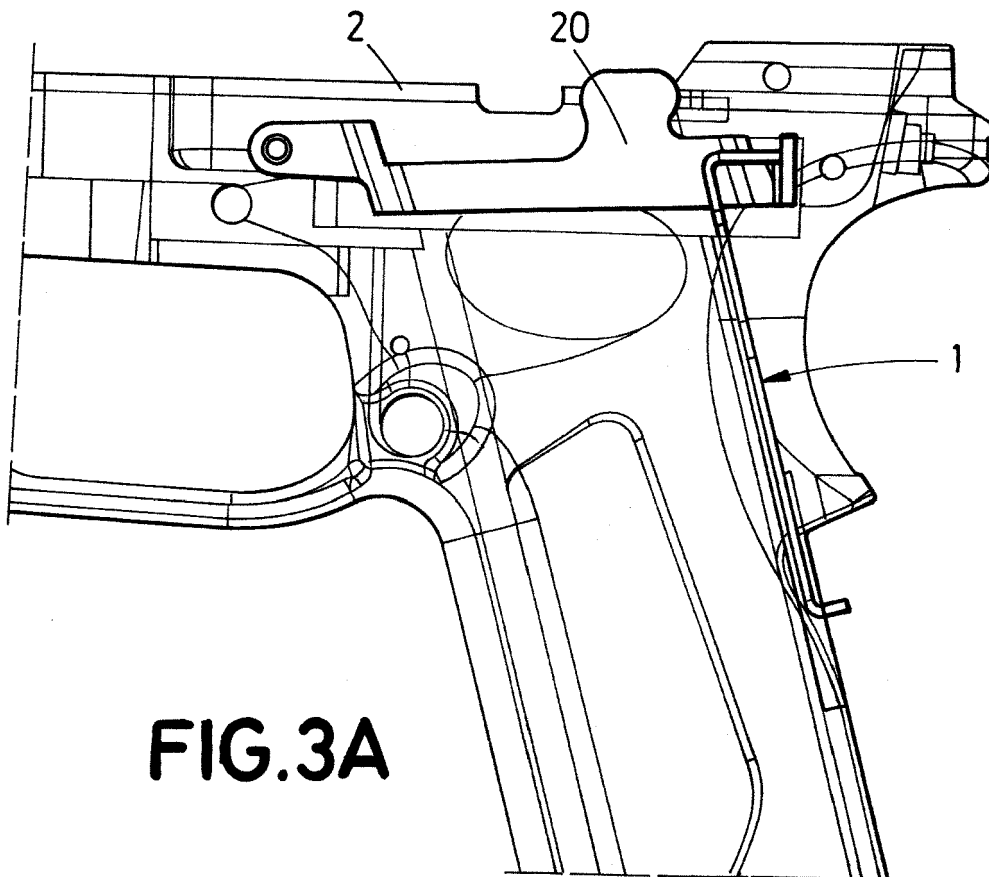
**FIG. 1A**  
PRIOR ART



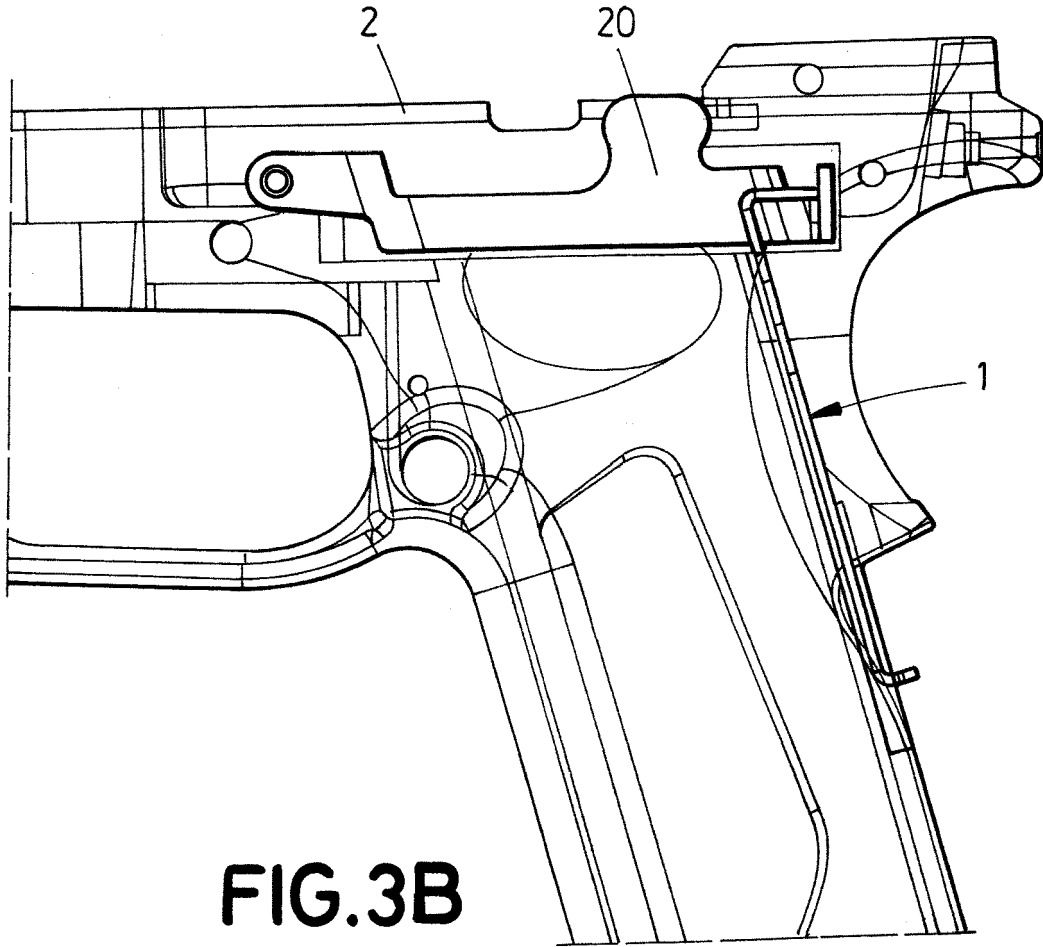
**FIG. 1B**  
PRIOR ART



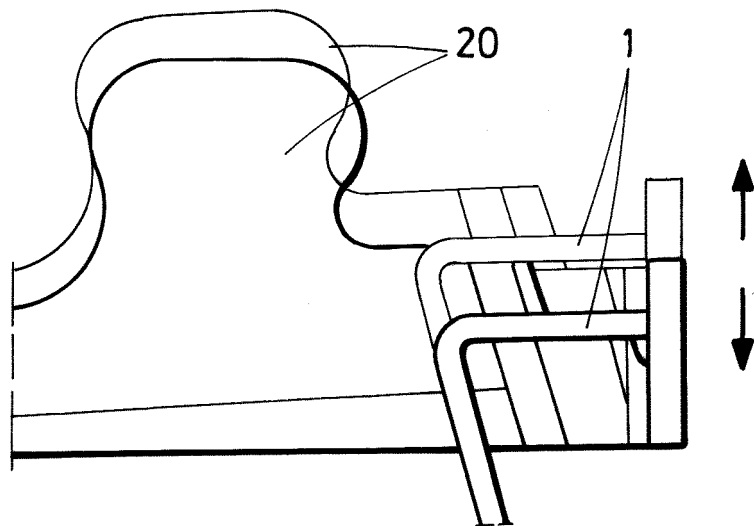
**FIG. 2**



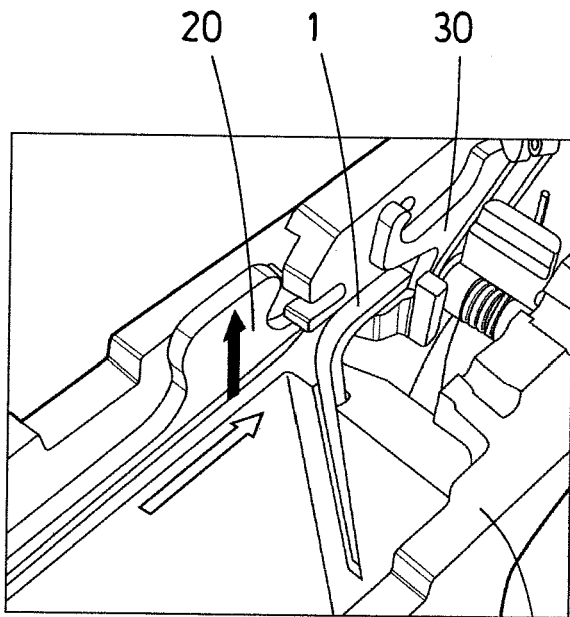
**FIG. 3A**



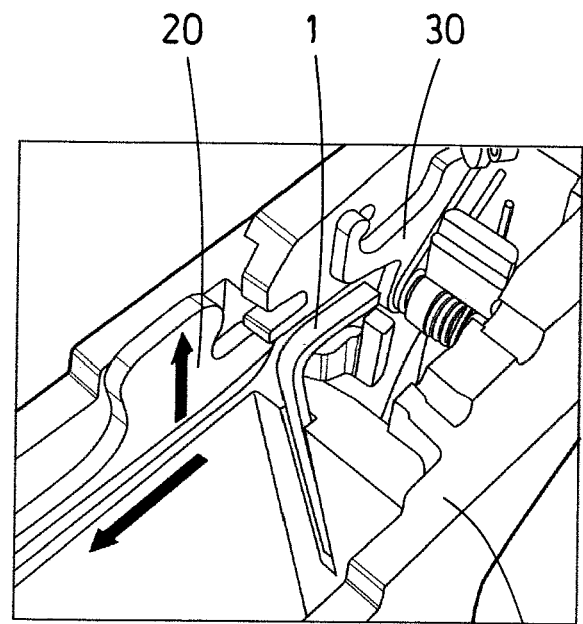
**FIG. 3B**



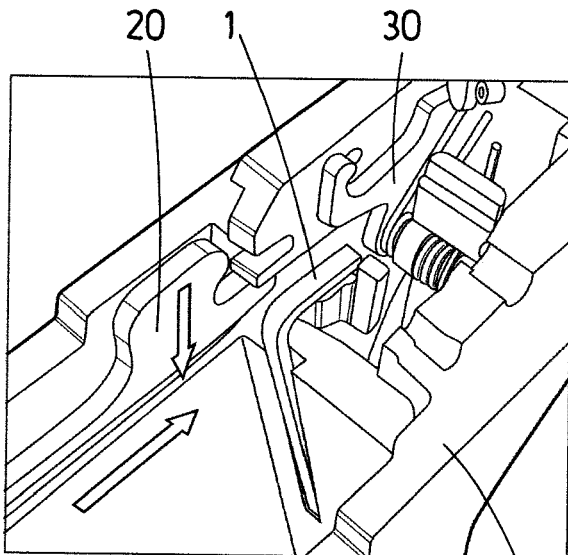
**FIG. 3C**



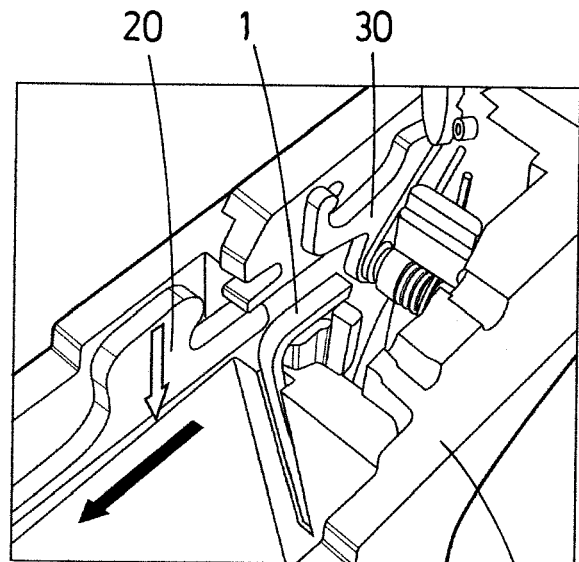
**FIG. 4A**



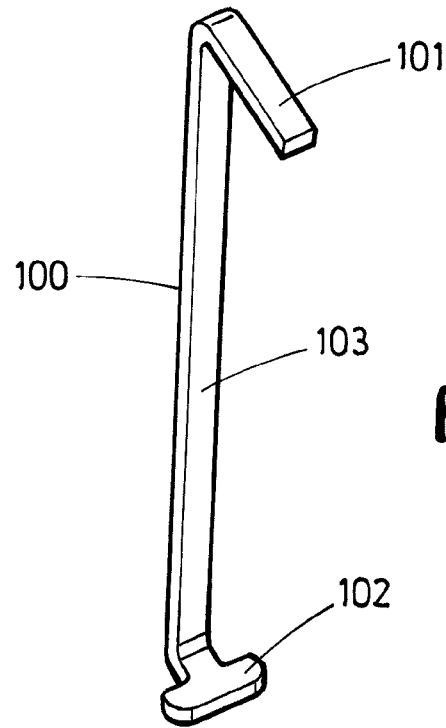
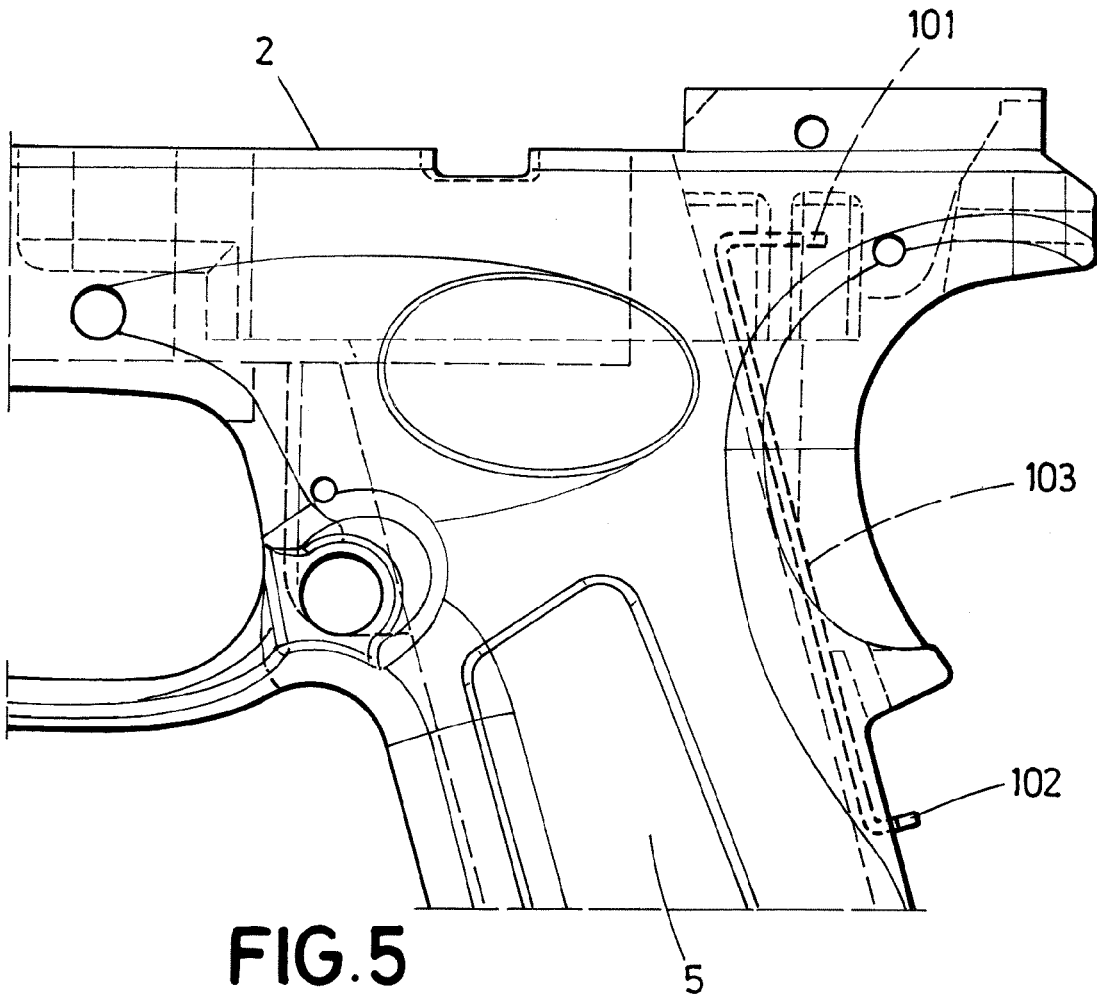
**FIG. 4B**

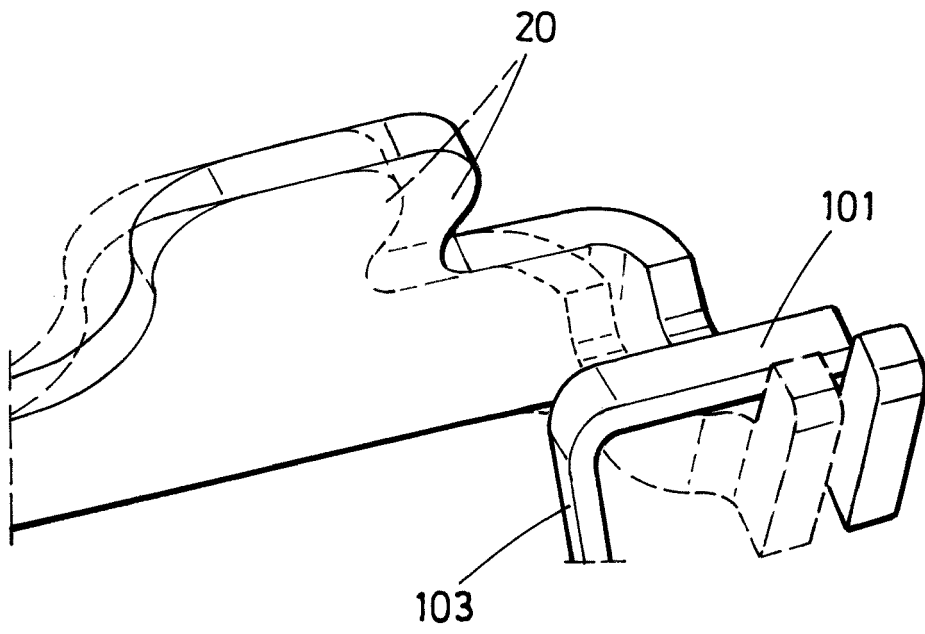


**FIG. 4C**

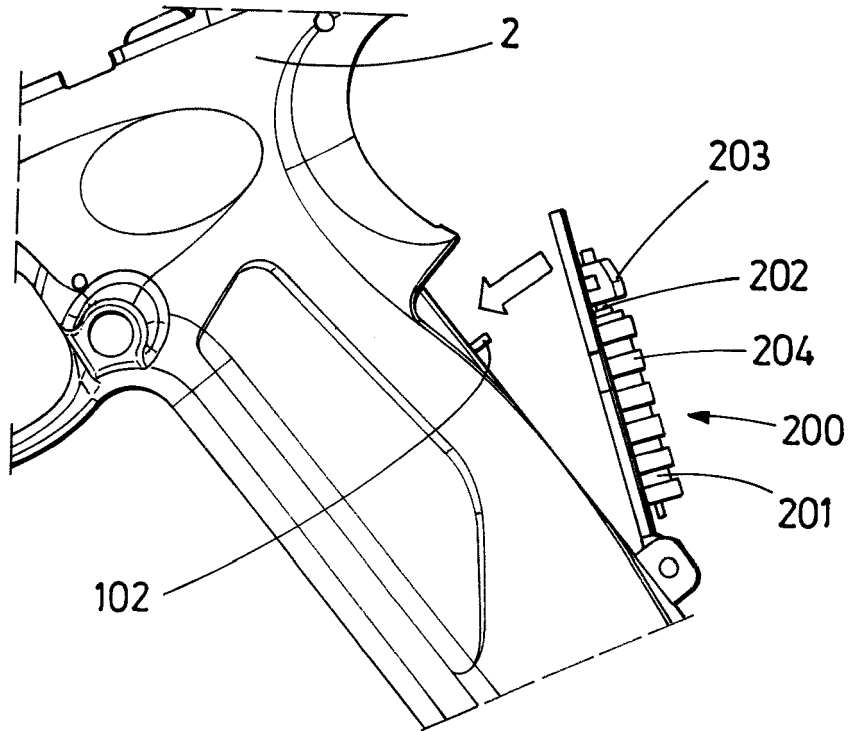


**FIG. 4D**

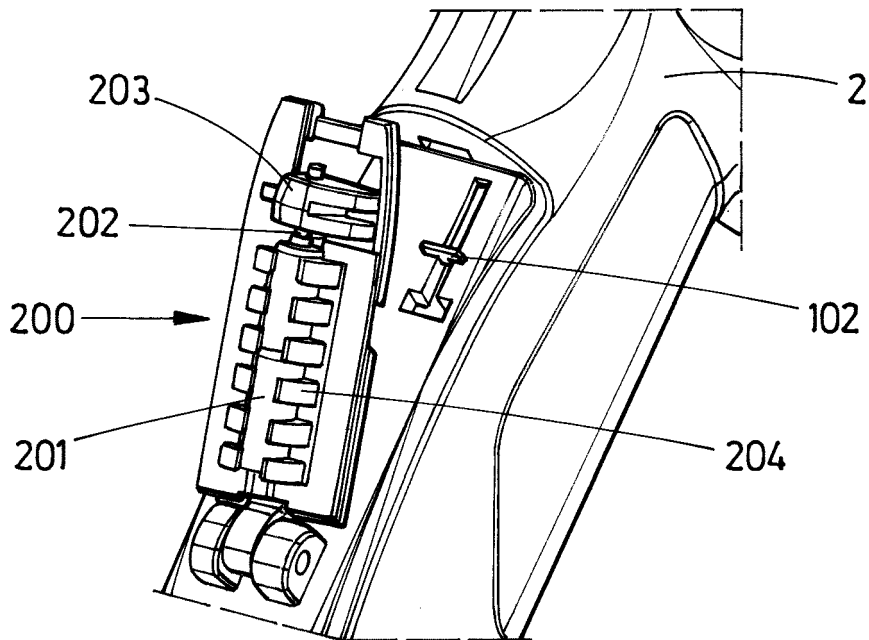




**FIG. 7**



**FIG. 8A**



**FIG. 8B**

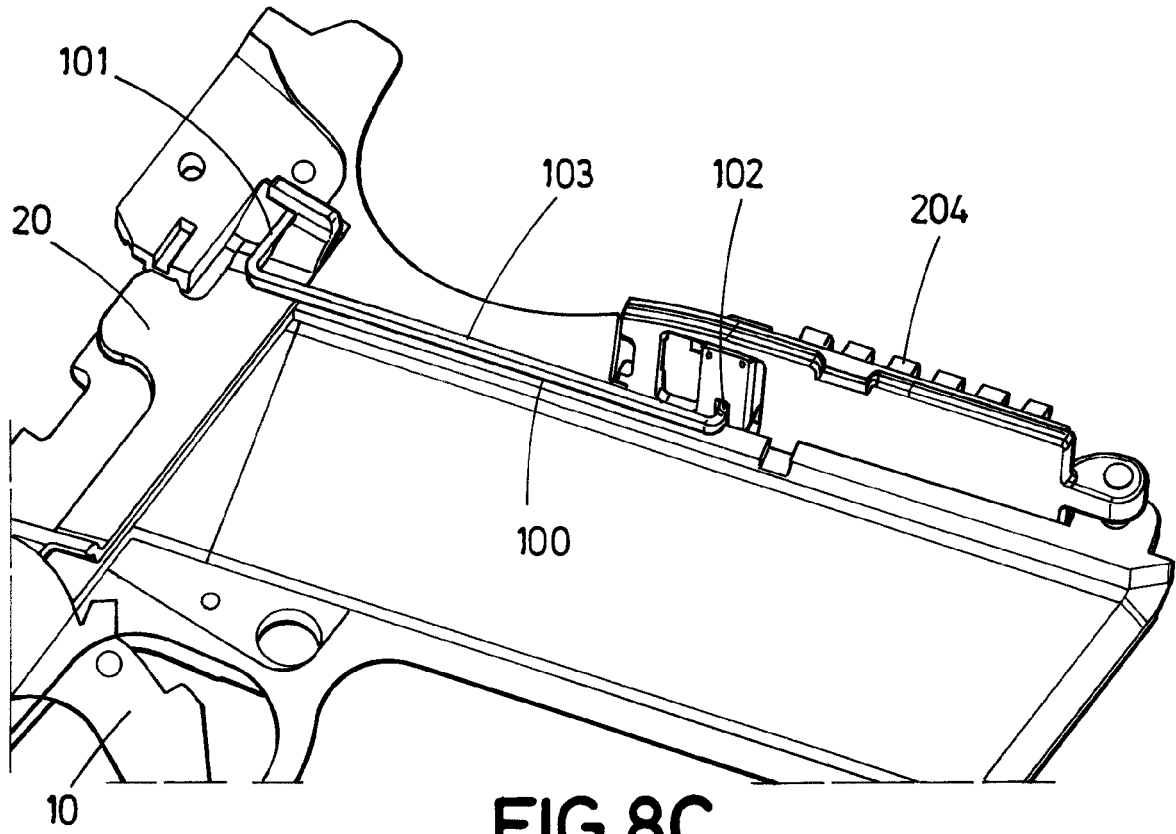


FIG. 8C

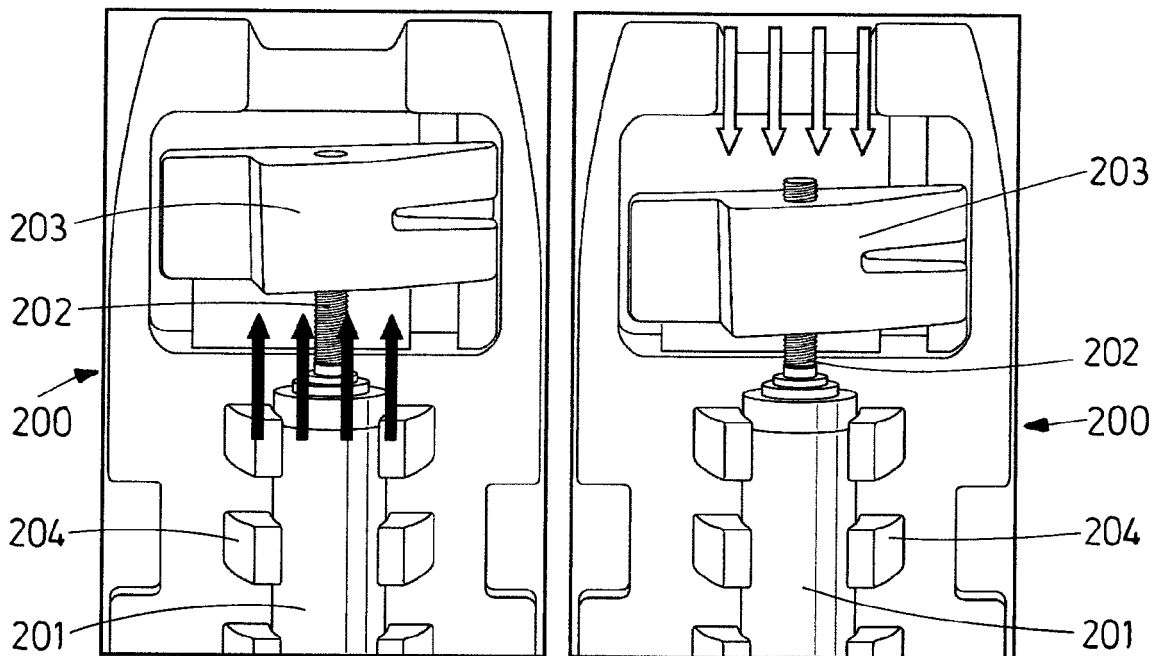
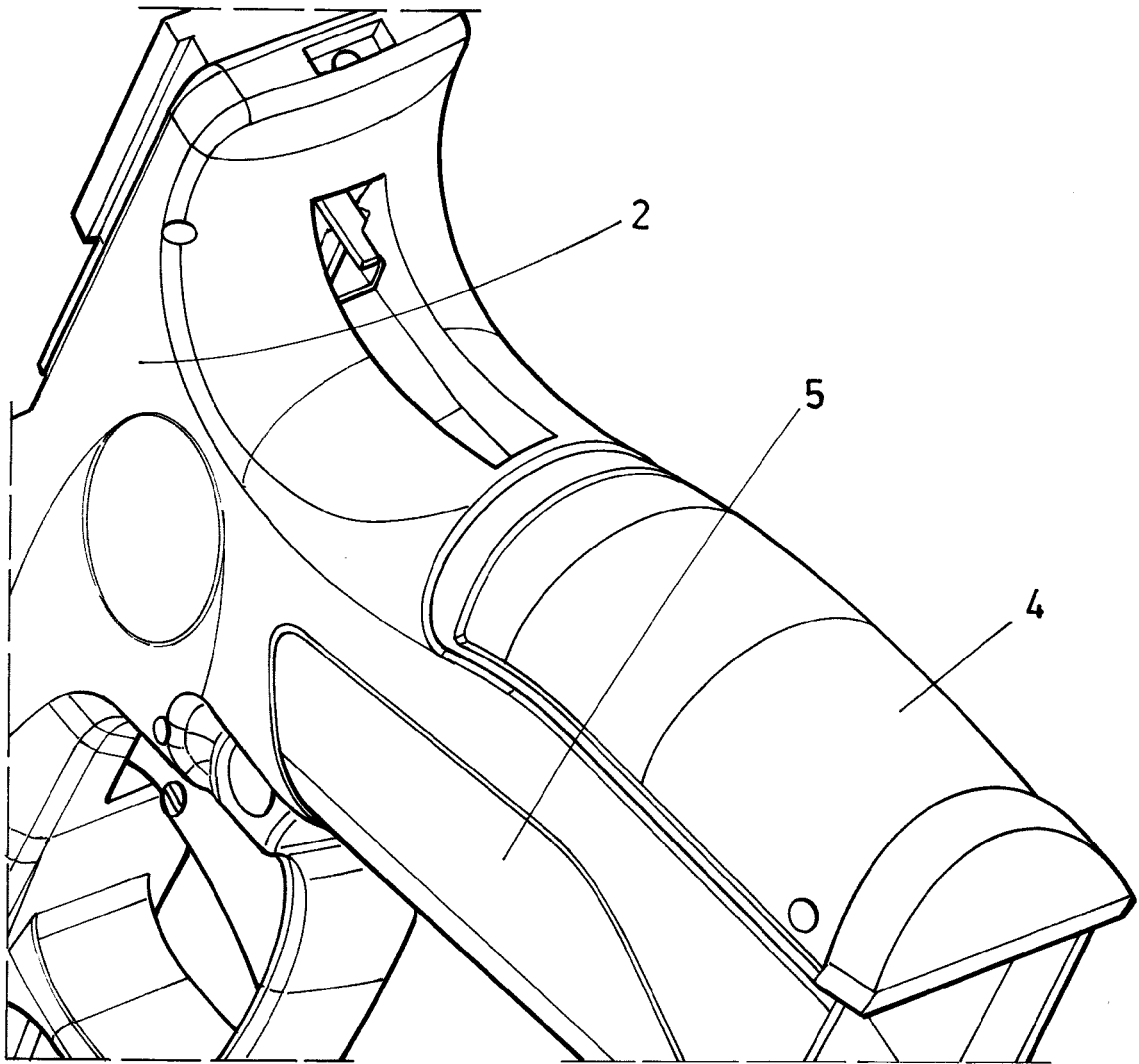
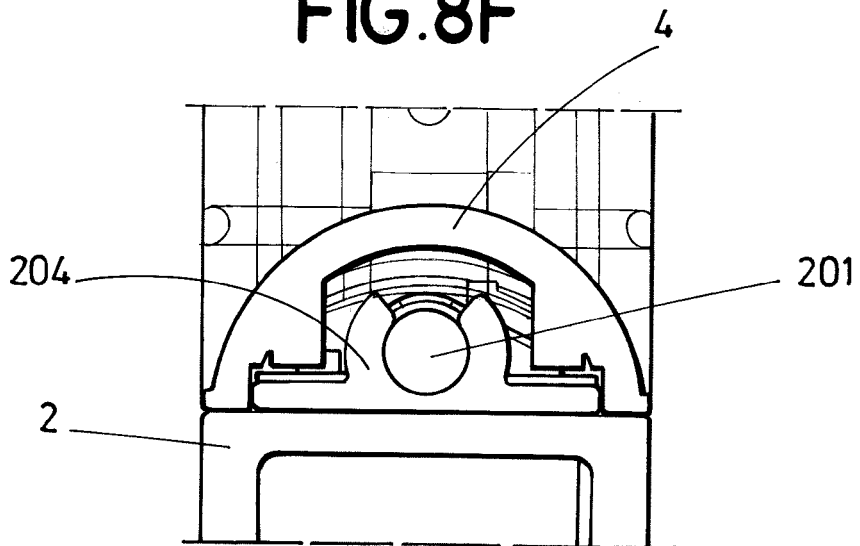


FIG. 8D

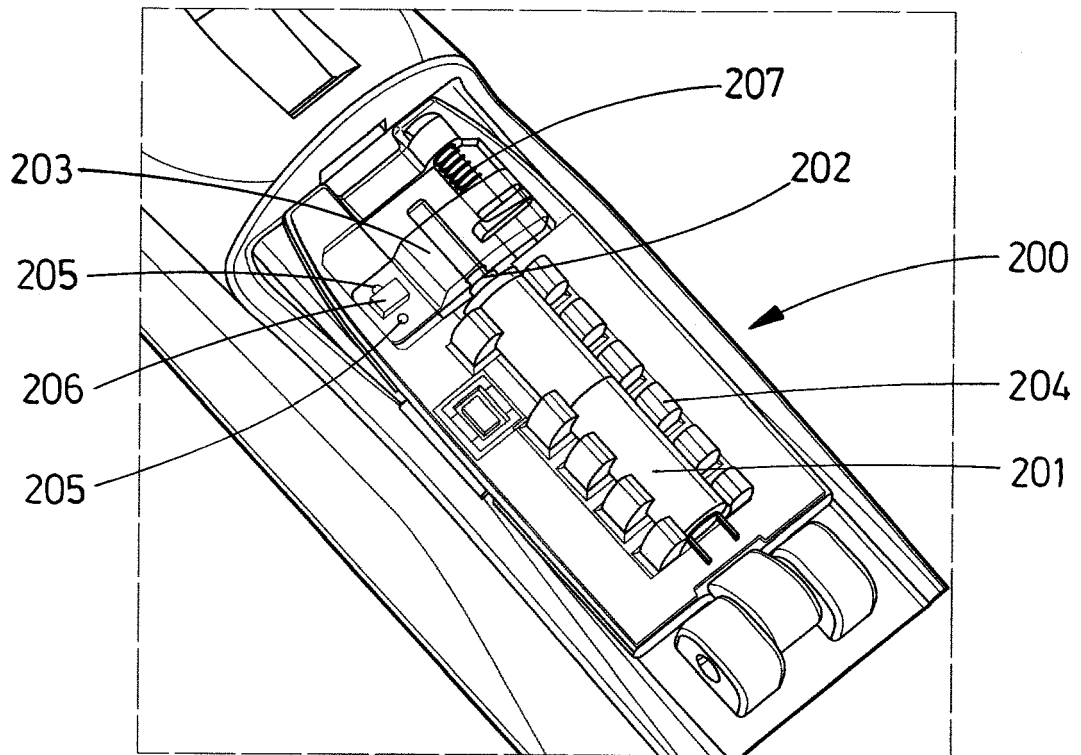
FIG. 8E



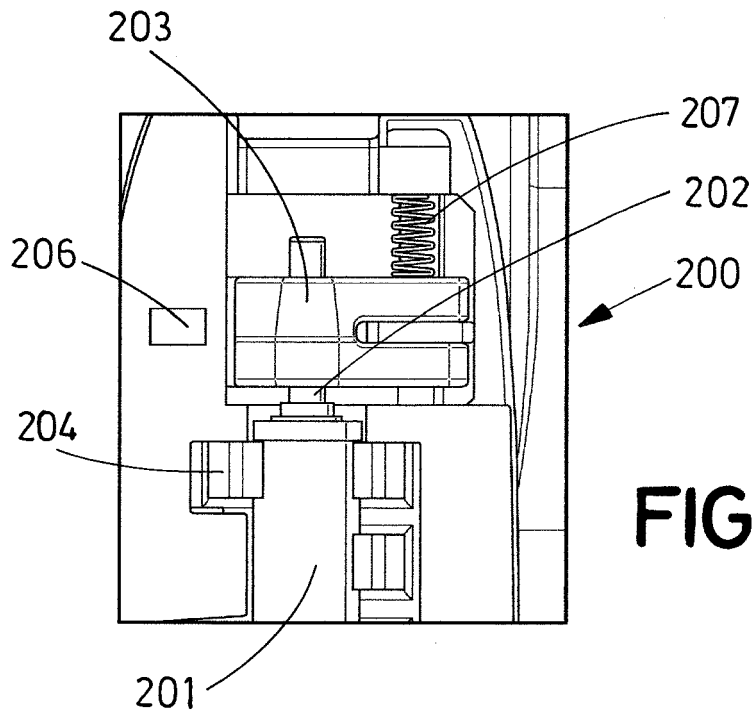
**FIG. 8F**



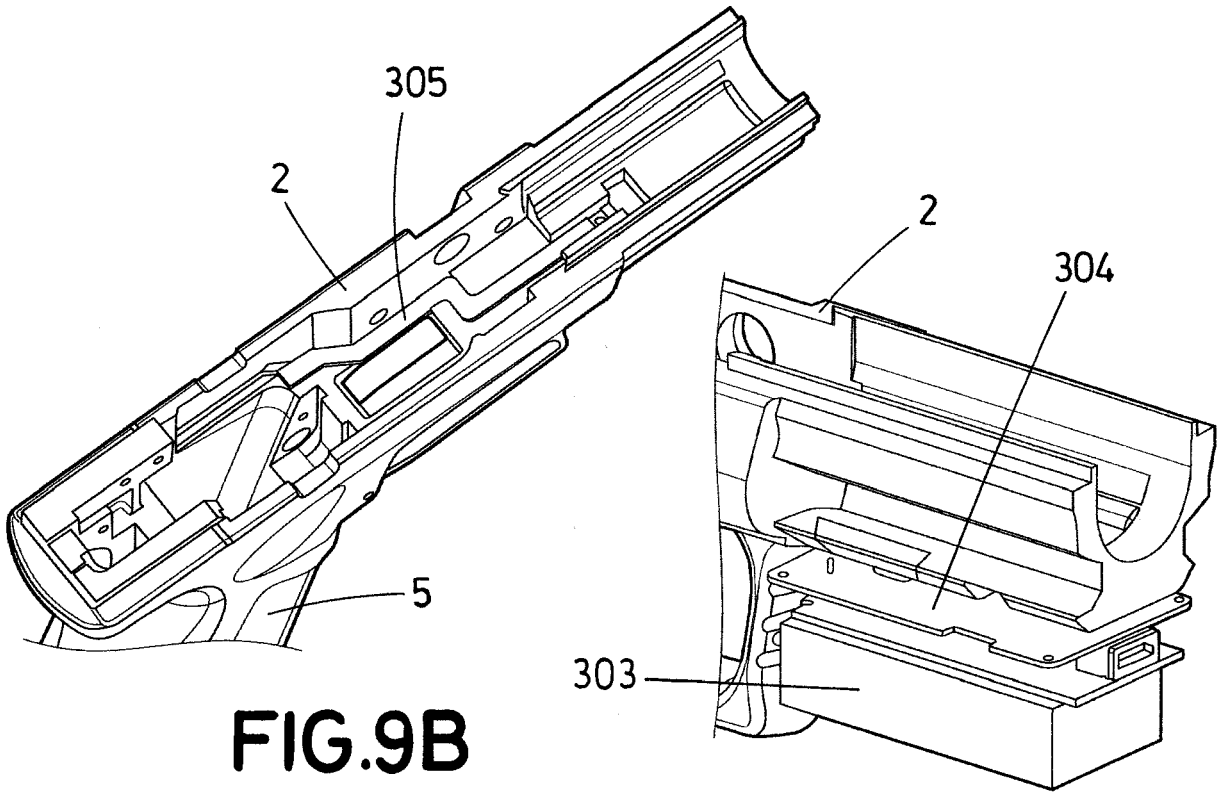
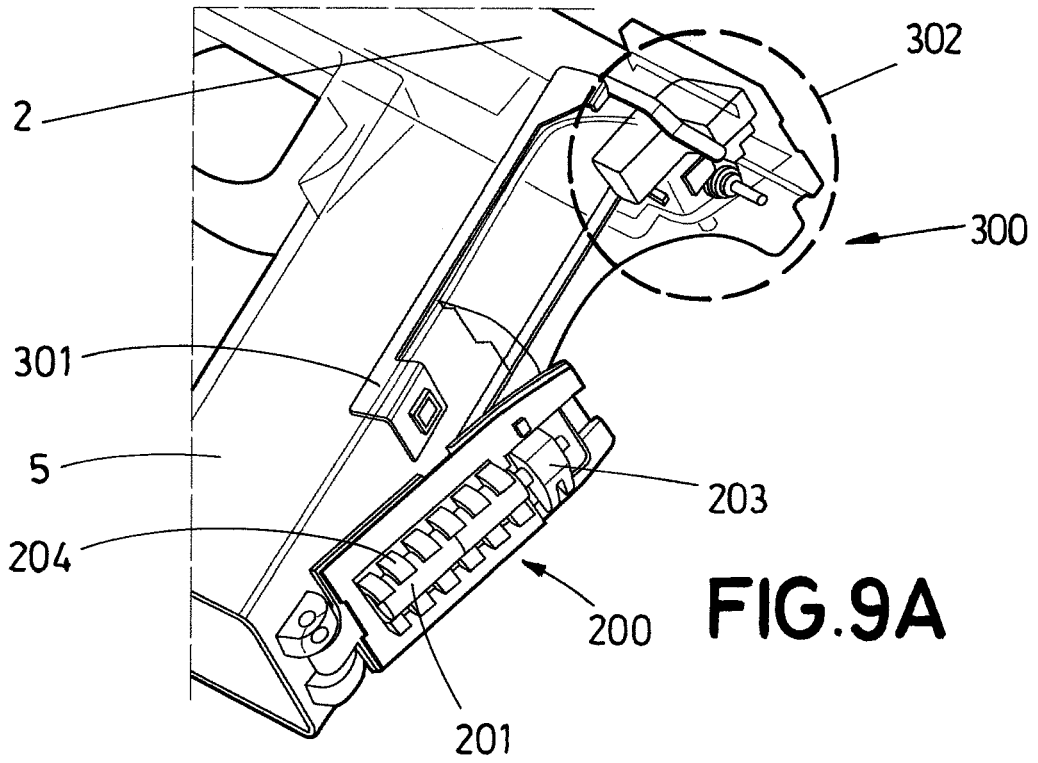
**FIG. 8G**



**FIG. 8H**



**FIG. 8I**





EUROPEAN SEARCH REPORT

Application Number  
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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2009/112244 A1 (ARMATIX GMBH [DE]; GERMAN SPORT GUNS GMBH [DE] ET AL.) 17 September 2009 (2009-09-17) * page 10, line 22 - page 13, line 9; claim 1; figures 1-7 *	1-3, 6-9, 15	INV. F41A17/56 F41A17/06 F41A17/08
X	WO 2005/005908 A2 (FN HERSTAL SA [BE]; SCHMITTER EDWARD P [US] ET AL.) 20 January 2005 (2005-01-20)	1-3, 15	
A	* paragraph [0030] - paragraph [0038]; claim 1; figures 1-4b *	4, 5	
A	US 9 310 150 B1 (GEISSELE WILLIAM H [US]) 12 April 2016 (2016-04-12) * column 8, line 33 - line 41 *	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			F41A
1 The present search report has been drawn up for all claims			
Place of search <b>The Hague</b>		Date of completion of the search <b>15 November 2021</b>	Examiner <b>Beaufumé, Cédric</b>
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			

EPO FORM 1503 03/82 (P04C01)



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**CLAIMS INCURRING FEES**

The present European patent application comprised at the time of filing claims for which payment was due.

10

Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

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No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

20

**LACK OF UNITY OF INVENTION**

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

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**see sheet B**

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All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

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As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

40

Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

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None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

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**1-9, 15**

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The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).



**LACK OF UNITY OF INVENTION  
SHEET B**

Application Number  
**EP 21 38 2559**

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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

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**1. claims: 1-9, 15**

**safety device for weapons**

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**2. claims: 10-13**

**drive mechanism**

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**3. claim: 14**

**control system**

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ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.

EP 21 38 2559

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

15-11-2021

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
<b>WO 2009112244 A1</b>	<b>17-09-2009</b>	<b>EP 2252852 A1</b>	<b>24-11-2010</b>
		<b>US 2011061280 A1</b>	<b>17-03-2011</b>
		<b>WO 2009112244 A1</b>	<b>17-09-2009</b>
<b>WO 2005005908 A2</b>	<b>20-01-2005</b>	<b>AT 342482 T</b>	<b>15-11-2006</b>
		<b>CA 2527963 A1</b>	<b>20-01-2005</b>
		<b>DE 602004002780 T2</b>	<b>16-08-2007</b>
		<b>EP 1636536 A2</b>	<b>22-03-2006</b>
		<b>ES 2274486 T3</b>	<b>16-05-2007</b>
		<b>JP 4255973 B2</b>	<b>22-04-2009</b>
		<b>JP 2006526759 A</b>	<b>24-11-2006</b>
		<b>US 2006242879 A1</b>	<b>02-11-2006</b>
		<b>WO 2005005908 A2</b>	<b>20-01-2005</b>
<b>US 9310150 B1</b>	<b>12-04-2016</b>	<b>NONE</b>	

**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

- US 8371058 B2 [0005]
- US 8495832 B2 [0005]