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(71) Applicant: **Thales Australia Limited**
Sydney Olympic Park, NSW 2127 (AU)

(72) Inventors:
- **COETZEE, Deon**
  Bathurst, New South Wales 2795 (AU)
- **EYLES, Michael**
  Springwood, New South Wales 2777 (AU)

(74) Representative: **DREISS Patentanwälte PartG mbB**
Friedrichstrasse 6
70174 Stuttgart (DE)

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(54) A FIREARM

(57) A firearm comprising a barrel assembly mounted at one end to a butt group, the butt group including a firing mechanism and an ammunition entry point;
a gun lock group slidably mounted between the barrel assembly and butt group that slides to load ammunition from the ammunition entry port into a barrel of the barrel assembly upon cocking of the firearm; and
a rail for accessory attachment that is mounted on the barrel and in direct contact with a portion of the barrel.

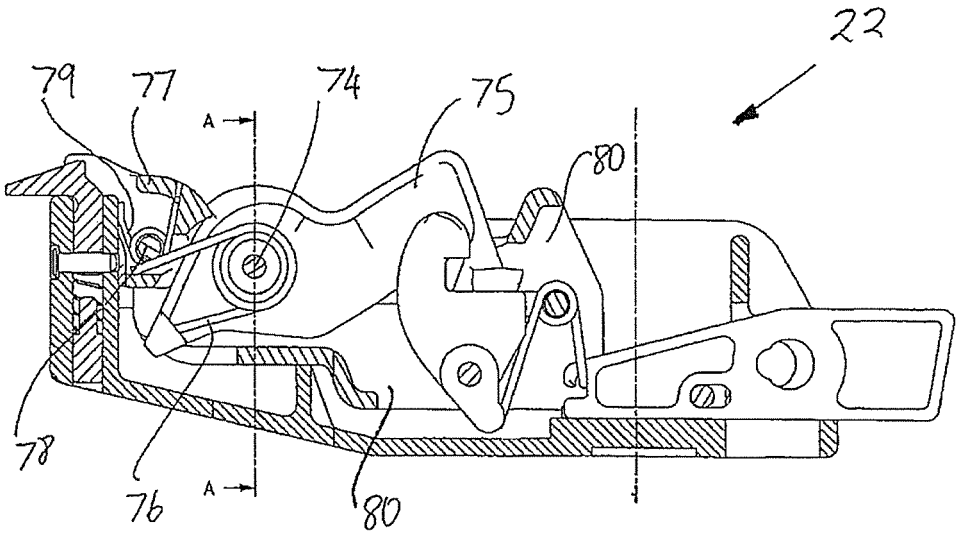

FIGURE 6a

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Description

[0001] The present invention relates to a firearm, and more specifically to a rifle.

Background

[0002] The development of firearms has rapidly progressed with advancements in materials, in munitions technologies and in response to requirements for greater weapon versatility and for improved performance. Firearms can be single shot firearms or 'repeating' firearms where multiple cartridges are loaded. In semi-automatic firearms the next cartridge round is automatically recocked and re-loaded and in fully automatic firearms the firing mechanisms enable rapid fire by automatically recocking, re-loading and firing so long as the firing trigger is depressed. Some firearms have a selective firing option that allows a user to switch between semi-automatic and fully automatic firing modes.

[0003] Referring specifically to rifles, these firearms use magazines of munitions loaded into the receiver of the rifle. The rifle's bolt and carrier feeds ammunition into the rifle's breech in preparation for propulsion down the barrel. There are various configurations of rifles, one of which is a so-called "bullpup" where the magazine is located behind the rifle's trigger group rather than in front of the trigger group as with conventional firearms. Positioning the magazine behind the trigger group saves space for the butt group, generally resulting in a 25% reduction in firearm length, which allows for better manoeuvrability and a lighter firearm.

[0004] Rifles and in particular assault rifles are commonly provided with an attachment rail, such as a NATO-standard Picatinny attachment rail, on the receiver for the attachment of accessories, the most common of which is a main optic sight. The main optic sight may itself carry an upper rail on which other accessories may be attached. With the increased sophistication of rifles and expectations for greater versatility a greater number of accessories may be mounted on the rifle either through the attachment rail or by bolt attachment onto the rifle body. Some examples of accessories for rifles include grenade launchers, grenade launcher sights, thermal weapons sights, laser pointers or torches. These accessories are interchangeably selected for mounting onto the rifle as required.

[0005] Owing to the configuration of the firearm and the availability of rail space on the attachment rail, the number of accessory attachments that are mountable on a rifle at the same time is limited. From a practical perspective, mounting of attachable accessories must be easy as fast changeover of accessories could be required during combat. Furthermore, the attachment and detachment of accessories should cause minimal interference with the accessory's alignment with the rifle barrel as interference could otherwise lead to inconsistent and imprecise firing accuracy.

[0006] An important issue overarching the above mentioned desirable features in a firearm, and in particular a rifle, is the pursuit of weight reduction. With common assault rifles weighing approximately 3-4 kilograms (without ancillary attachments) the weight of a rifle on military personnel required to carry the firearm for long periods can be taxing and will contribute to fatigue. It is therefore desirable to provide a firearm that is sufficiently versatile to support a number of different accessory attachments while preferably maintaining firing accuracy without compromising weight reduction.

Summary of the Invention

[0007] In accordance with the present invention there is provided a firearm comprising a barrel assembly mounted at one end to a butt group, the butt group including a firing mechanism and an ammunition entry port; a gun lock group slidably mounted between the barrel assembly and butt group that slides to load ammunition from the ammunition entry port into a barrel of the barrel assembly upon cocking of the firearm; and
a rail for accessory attachment that is mounted on the barrel and in direct contact with a portion of the barrel.

[0008] In a preferred embodiment the rail may be an upper rail mounted on an upper side of the barrel or a lower rail mounted on an underside of the barrel.

[0009] Preferably, the rail is a bracket having rail slots on one side of the bracket and a locating fin on an opposite side of the bracket. In this embodiment the barrel is fluted to present a fluted groove into which the rail, and in particular the rail's locating fin, locates. Where the rail is an upper rail, the fluted groove is an uppermost groove on the upper side of the barrel, and similarly with a lower rail the groove is a lowermost groove on an underside of the barrel. The barrel can be fluted all around its circumference.

[0010] Taking for example the embodiment of the upper rail, the fluted barrel assists in weight reduction, but also provides the upper rail with a point of reinforced direct and continuous contact between the upper rail and barrel as well as alignment in that the locating fin of the upper rail can locate into a fluted groove. Similar is true for the lower rail.

[0011] The rail may also be clamped around the barrel at two points along the length of the rail. In an embodiment, one of the rail mounts is a sliding mount on the barrel that can allow the rail to shift alignment with respect to the barrel in response to, for example, a differential in thermal expansion between the rail and barrel. The sliding mount may be provided toward a rear of the barrel where thermal expansion is greater. The other mount may be a fixed mount.

[0012] Preferably the barrel is made of steel and the rail is made of aluminium that may be steel reinforced. The rail may also include air holes to promote cooling of the upper rail, which acts as a heat sink for the heat generated by the combustion from a shot firing in the barrel.

[0013] In an exemplary embodiment only, approximately half of the length of an upper rail is in direct contact with the barrel and approximately one quarter to one half of the barrel length is in contact with the upper rail. It is understood that the proportion of contact between the upper rail and barrel may alter depending on design constrictions.

[0014] In the case of the lower rail for accessory attachment that is mounted in direct contact with an underside of the barrel, the lower rail can be shorter than the upper rail and could be in direct contact with the barrel along almost the entire length of the lower rail. As discussed, the lower rail may include a locating fin on an upperside thereof for locating in a corresponding fluted groove on the underside of the barrel. The lower rail may also be made of aluminium to act as a heat sink from the heat generated in the barrel from combustion.

[0015] The lower rail can be mounted directly in front of the hand guard to preferably attach a grenade launcher to the rifle. The juxtaposition of the lower rail to the hand guard means the trigger for the grenade launcher extends into the hand guard for ease of switching by an operator between rifle operation and grenade launching. In one embodiment the grenade launcher includes a linear operated trigger to support ease of switching by the operator.

[0016] Further components that could be attached to the barrel include a hand guard with a cocking handle and a gas block (or gas cylinder) for operating return of the gun lock group. These components may be clamped around the barrel where the clamps could be specifically mounted through the upper and/or lower rails. These components may be made of non-conductive materials, such as polymers, rather than metal.

[0017] In another embodiment a side rail attachment is mounted to one side of the barrel. The side rail attachment supports a side rail onto which further accessories can be attached to the firearm. The side rail attachment may be made of a non-conductive material such as a polymer.

[0018] Also mounted to the barrel in a preferred embodiment is a gas block for returning the gun lock group to a loading position and also provides an attachment point for a lower part of the side rail attachment.

[0019] In an embodiment the barrel with attachment components mounted thereon can still have a significant portion of the barrel exposed to airflow to promote cooling of the barrel. Furthermore, as mentioned above the barrel may be fluted in order to promote cooling and reduce material used and hence weight.

[0020] In a preferred embodiment the firearm is a rifle and in a specific embodiment the firearm is a bullpup-style rifle.

[0021] According to the present invention there is also provided a firearm comprising a barrel assembly mounted at one end to a butt group, the butt group including a firing mechanism and an ammunition entry point; and a gun lock group slidably mounted between the barrel and butt group that upon cocking of the fire arm slides to load ammunition from the ammunition entry point into the barrel, and

a hammer pack in the butt group that automatically resets the firing mechanism upon recoiling of the gun lock group during firing, wherein the hammer pack includes a hammer biased to pivot under the force of a hammer spring, and an autofire lever biased through an autofire lever spring to engage the hammer

[0022] In a preferred embodiment the stiffness of the autofire lever spring is less than the stiffness of the hammer spring.

Brief Description of the Drawings

[0023] An embodiment of the present invention will now be described by way of example with reference to the accompanying drawings, wherein:

Figure 1 is a rear isometric view of a firearm in accordance with an embodiment of the present invention;

Figures 2a, 2b, 2c, 2d, 2e, 2f, and 2g illustrate a firearm in accordance with an embodiment of the present invention and respectively show a first side view, a plan view, a front end view, a second side view, a rear end view and an under view;

Figure 3 is a forward isometric and exploded view of the firearm also showing accessories for attachment to the firearm;

Figure 4 is a rear isometric and exploded view of the firearm;

Figures 5a, 5b, 5c, 5d, 5e, and 5f illustrate the assembly of the barrel and attachment rails of the firearm and respectively show the assembly in plan view, front end view, side view, rear end view and under view; and

Figures 6a and 6b illustrate a hammer pack mechanism of the rifle in a cocked condition and respectively show a side sectional view and an end sectional view taken at A-A of Figure 6a; and

Figures 7a and 7b illustrate a hammer pack mechanism of the rifle in a released condition and respectively show a plan view and a side sectional view taken at B-B of Figure 7a.

Detailed description of preferred embodiment

[0024] Described and illustrated herein is a firearm, and specifically a rifle 10 that provides greater versatility over known rifles when used as an assault rifle in combat and in spite of the greater functional characteristics, the rifle firing accuracy is maintained and the weight of the firearm is lighter when compared to comparable firearms.

[0025] As illustrated in Figures 1 to 4, the rifle 10 includes features common to many rifles, in particular to bullpup rifles, including a butt group 12, a barrel assembly 14, and a gun lock group 16 that slides between the barrel

assembly 14 and butt group 12 so that upon cocking of the firearm the gun lock group slides into a barrel chamber 20 in the barrel assembly to load ammunition from an ammunition magazine 17 that is loaded in an ammunition entry port 18 in the butt group. In addition to the ammunition entry port 18, the butt group, supported by butt 13 and closed by an end butt plate 11, also has a hand guard 23, a firing mechanism including a firing trigger 21 and a hammer pack housed within the butt 13, and an ejection port 32 through which spent casings are ejected.

[0026] To fire a shot an operator pulls a firing trigger 21 that mechanically activates a firing sequence in a hammer pack 22 carried in the butt 13 in the butt group. The rifle illustrated is a closed bolt firearm which holds a cartridge in the barrel chamber 20 while the bolt and carrier is in a forward position. Upon firing the combustion gas in the barrel is harnessed through a gas block 25 to return the gun lock group rearward of the rifle to return the bolt carrier back to its cocking position.

[0027] The bolt carrier 19 in the gun lock group is guided to slide by two guide rods 26 attached to the bolt carrier. These guide rods 26 run inside bores carried on the barrel assembly 14 along opposite sides of the barrel 15. One of the two guide rods, typically the right-hand rod 26a, functions with the gas block operating as a gas driven piston for transmitting rearward motion to the bolt carrier. The other rod, typically the left-hand rod 26b is connected to a cocking handle 28 which is retracted to release the bolt group after a new magazine is inserted.

[0028] Also illustrated is a grenade launcher 30 with its own separate trigger mechanism 31, which is a linear trigger 31 that extends into the hand guard 23 just in front of firing trigger 21. Positioning linear trigger 31 close to firing trigger 21 allows ease of switching between firearm operation mode and grenade launching mode without having to reposition the firearm between modes. Ease of switching is facilitated by the linear pull action of the grenade launcher trigger, which is an improvement over known grenade launcher trigger mechanisms that use a pressing trigger similar to the firearm's firing trigger.

[0029] The barrel assembly is best illustrated in the exploded views of Figures 3 and 4 as well as Figures 5a - 5e. The rifle 10 includes an upper rail 40 onto which accessories, such as a main optic sight 41 and a grenade launcher quadrant 42. Upper rail 40 is mounted onto an upper side of the barrel 15 and a part of the upper rail is in direct contact with a portion of the barrel 15. In the embodiment illustrated, a significant portion of the rail 40 is in continuous contact with the barrel. As such, the upper rail can be firmly positioned for alignment with respect to the barrel 15.

[0030] Furthermore, the material of the upper rail is a heat transferring material, and typically a metal, such as aluminium, that will act as a heat sink dissipating the very high combustion temperatures in the barrel chamber 20 that occur on firing. Furthermore, and in contrast to known rail attachments that tend to avoid as much as possible direct contact with the barrel, direct contact of the upper rail with the barrel also reinforces and maintains stable alignment of the rail with respect to the barrel for accurate and precise firing. It has been found that placement of the upper rail as described herein on the barrel does not adversely interfere with the natural harmonics of the barrel during firing and correct and precise alignment is maintained.

[0031] The upper rail is a bracket having rail slots 44 on top of the bracket to receive accessories with correspondingly-matching rails. The rails preferably use a Picatinny rail system but could instead use a Weaver rail system, or any other known standard rail systems. The underside of the upper rail 40 has a locating fin 45 that is adapted to lie against the upper surface of the barrel 15 making direct contact thereto. The upper rail 40 also has two rail mounts 47, 48 that are spaced along the upper rail and clamp around the barrel 15 to secure the upper rail to the barrel.

[0032] In the rifle illustrated and described herein, the barrel 15 has a fluted profile and namely comprises a series of longitudinal ridges and grooves around its circumference. The barrel's fluted profile has several advantages including barrel weight reduction compared to smooth surfaced barrels and improved heat dissipation through an increased surface area deriving from the fluted profile.

[0033] Furthermore, and in relation to the interaction with the upper rail, the fluted profile of the barrel presents an uppermost fluted groove 35 on the upper side of the barrel which provides a location and contact point for the upper rail 40. Specifically, the locating fin 45 of the upper rail 40 locates into the uppermost groove 35 to provide a secure and stable engagement between the upper rail and barrel. The direct contact between the locating fin and uppermost groove also provides an effective heat transfer passage between the barrel and the upper rail so that the upper rail, being made of machined aluminium extrusion that may be steel reinforced acts as a heat sink for cooling the barrel from the heat generated in the barrel chamber during firing. The barrel is typically made of steel.

[0034] As illustrated in Figure 5c the upper rail 40 extends from a fixed mount 47 located at a middle to forward position on the barrel 15. Fixed mount 47 is also the gas block mount, which fixes the gas block 25 to the barrel 15. Upper rail 40 extends rearwardly of fixed mount 47 and is attached to fixed mount 47 by clamping a recessed section 49 at a forward end of the upper rail 40 inbetween two protruding flanges 50 of the fixed mount 47 and fixing a screw 51 through the recessed section 49 and flanges 50. The upper rail 40 extends rearward of the fixed mount over the top of the barrel to approximately end above the barrel chamber 20.

[0035] While the embodiment described herein shows the upper rail extending as far back to the barrel chamber it is understood that the rail can take any desired length as suited for the firearm's dimensions and characteris-

tics.

[0036] Approximately half of the upper rail 40 length in the version illustrated comprises the locating fin 45 that makes direct contact with the barrel. The other remaining third to half of the upper rail does not make contact with the barrel but is a suspended portion 53 that suspends or floats to be spaced above the barrel. In the embodiment illustrated in Figures 5a, 5c and 5e, and only by way of example, the length of the barrel that is in direct contact with the upper rail is approximately one quarter to one third. However, the length of contact can differ from one quarter to one half or anywhere in between, or even more than one half or less than one quarter. Conversely, approximately one third to one half to two thirds of the upper rail 40 is in direct contact with the barrel 15.

[0037] The locating fin 45 on the underside of the upper rail begins at approximately the fixed mount 47 and ends at approximately the other mount 48, which is a slidable mount 48. The suspended portion 53 of the upper rail begins at approximately the slidable mount 48 and extends rearwardly towards the barrel chamber 20.

[0038] Slidable mount 48 is designed to slidingly secure the upper rail 40 to the barrel but to allow relative sliding movement therebetween in response to differentials in thermal expansion between the barrel 15 and upper rail 40. In particular, as cartridge combustion occurs at the barrel chamber 20 the temperatures experienced inside the barrel at that end are very high and by way of approximation may reach 400°C. At the opposite exit end 34 of the barrel the temperature during firing is lower and may be around 200°C. With the upper rail 40 being in direct contact along the length of the barrel and acting as a heat sink, the upper rail will also experience high temperatures. There is therefore the possibility that through thermal expansion of the materials used to make the barrel and upper rail, which may be different materials, there could occur warping or twisting of the barrel assembly. Slidable mount 48 compensates for any expansion and movement between the upper rail 40 and barrel 15 by allowing a small degree of relative movement between the barrel and upper rail sufficient to allow expansion of the heated materials. Slidable mount 48 is fixed to the upper rail and clamps with a sliding fit around the barrel.

[0039] The narrow and elongated nature of the upper rail and its direct attachment to only the top of the barrel and through clamping mounts at two points along the barrel means that a substantial portion of the barrel periphery is exposed and not surrounded by the upper rail, or surrounded by any housing that may support the upper rail as occurs with some known rifle designs. Accordingly, and depending on the extent of barrel coverage by other components of the barrel assembly, the barrel is exposed to surrounding airflow which promotes cooling of the barrel.

[0040] The rifle 10 includes more than one attachment rail and specifically includes a lower rail 55 and a side rail 60.

[0041] Lower rail 55 is used to attach accessories to the underside of the barrel 50 and in the embodiment shown is substantially shorter than the upper rail and is located on the underside of the barrel 15 at approximately the fixed mount 47. The lower rail 55 could by way of example be used to support a grenade launcher 30 as illustrated in some of the drawings including Figure 4. Other accessories that could be attached to the lower rail include bipods or tripods for independent firearm support.

[0042] Lower rail 55 is conceptually similar in nature to the upper rail and shares many of the same advantages as the upper rail in that it also makes direct contact with the barrel 15 and it too has a locating fin 56 on an upper side thereof that locates in a corresponding fluted groove on the underside of the barrel. One end of the lower rail 55 is attached to the fixed mount 47 in a similar manner to the attachment of the upper rail at the fixed mount. The other end of the lower rail 55 is simply clamped to the barrel by way of screws and clamping brackets 57. It is envisaged that lower rail too comprises a heat transferring material, and typically aluminium that may be steel reinforced in order to act as an additional heat sink on the barrel 15.

[0043] The lower rail 55 is illustrated mounted directly in front of the hand guard 23. This juxtaposition means that when a grenade launcher is mounted on the lower rail the linear trigger 31 of the grenade launcher extends through a slot 37 in the hand guard for ease of switching by an operator between rifle operation and grenade launching.

[0044] Side rail attachment 60 is a bracket component that is mounted at two points to the upper rail 40 and at a lower end is mounted to the gas block 25 and to slidable mount 48 through tubular extension 64. The side rail 60 includes standard rail slots 62 at an outermost point for attachment of accessories. Accessories that could be useful for attaching to the side rail include a torch or laser pointer.

[0045] The side rail attachment 60 furthermore comprises a piston bore 65 for receiving the gas driven piston 26a of the bolt carrier necessary for returning the bolt carrier by operation of the gas reloading mechanism. The side rail attachment 60 can be, but not need be, in direct contact with the barrel and in the preferred embodiment is made of a non-conductive material such as polymers including engineering plastics suitable for metal replacement. Some non limiting examples of suitable polymers include polyether ether ketone (PEEK), polyphthalamide or high temperature nylon. These materials may also be glass fibre reinforced. The side rail attachment 60, being made of a non-conductive material, provides an insulated contact point for an operator to hold the firearm.

[0046] Gas block 25 forms part of the gas-operated reloading mechanism standard to many rifles. Gas block 25 includes a side hole 66 that is adapted to communicate with a grenade launcher 30, when attached, to direct the recoil from a fired grenade back via the gas block to the barrel.

[0047] On the opposite side to the side attachment is the cocking guide 70 which supports a cocking handle 28 and a second rod bore (not shown) for receiving the left-hand guide rod 26b, which on cocking the handle 28 releases the bolt carrier 19. Similar to the side rail attachment 60, the cocking guide 70 is also bolted at an upper end to the upper rail 40. At a lower end the cocking guide 70 is attached to the lower rail 55 and to slidable mount 48. The cocking guide is also made of a non-heat transferring material, typically of plastics such as those described above in relation to the side rail attachment, in order to allow an operator to handle that rail.

[0048] Cocking handle 28 has a folding feature that allows the cocking handle to be rotated upward from an active position as illustrated in Figure 1 to an upwardly folded position (not shown) in order to fold the cocking handle in a stowed position. Cocking handle 28 is rotated upwards at a pivot point (not shown) on left-hand guide rod 26b, to stow in a bay recessed in the cocking guide 70.

[0049] Figure 6a and 6b, and 7a and 7b illustrate in sectional views two modes of the hammer pack 22 that, as illustrated in Figure 3 is housed inside butt 13 of the rifle 10. Specifically, Figures 6a and 6b illustrate the hammer pack 22 with a hammer 75 in a cocked condition ready for firing, while Figures 7a and 7b illustrate the hammer in a released condition after striking a firing pin (not shown).

[0050] The hammer pack mechanism is a hammer firing mechanism that on pressing the firing trigger 21 releases the hammer 75 to strike a firing pin which in turn strikes a loaded cartridge igniting the primer to fire a shot. As the firing trigger is located at a distance from the hammer pack, (owing to the bullpup style of the particular rifle illustrate) the firing trigger transmits movement to the hammer pack through a sear lever which passes alongside the ammunition entry port 18.

[0051] During firing the recoiling gun lock group 16 travels rearwardly over the hammer pack 22 to re-set the hammer. Specifically, the hammer 75 pivots on hammer pin 74 under the bias of a hammer spring 76, which biases the hammer toward the release position, and is re-set by the recoiling gun lock group 16 from a fired/released position illustrated in Figures 7a and 7b to a cocked positioned as illustrated in Figures 6a and 6b.

[0052] An autofire lever (AFL) 77 adjacent the hammer 75 prevents the hammer 75 from rotating forward to a release position by engaging the hammer as illustrated in Figure 6a. The AFL 77 pivots on a pin 78 under the influence of an autofire lever spring 79 which biases the AFL toward hammer engagement (namely, in a clockwise direction in Figure 6a).

[0053] When loading a round of ammunition in a semi automatic firing operation, the gun lock group 16 travels forward over the AFL and rotates the AFL out of engagement with the hammer. This allows the hammer to rotate forward slightly and engage with a trigger slide 80 that captures the hammer in a standby condition until the trigger is pulled. On pulling the trigger 21, trigger slide 80 moves rearwardly of the hammer pack 22 (towards the right of Figure 6a) and disengages from the hammer to allow the hammer to rotate forward and strike the firing pin.

[0054] In an automatic firing operation, the hammer pack mechanism operates as above for a semi automatic operation except that the trigger slide 80 is retracted and maintained fully rearward to disengage from the hammer 75. Accordingly, when the gun lock group travels forward and disengages the AFL from the hammer, the hammer will freely rotate forward and strike the firing pin to fire a round, and will repeatedly continue to fire as long as the trigger slide 80 is retracted.

[0055] In the current embodiment the pivoting bias of the AFL is disconnected from that of the hammer by the provision of separate springs for the hammer and the AFL. In order to effectively disengage the AFL when travelling forward during loading, the gun lock group should experience minimal resistance by the AFL and should easily overcome the AFL spring 79 forces.

[0056] In known hammer pack mechanisms the AFL and hammer are connected through a single spring, which is selected with a high stiffness in order to be able to rotate the hammer with sufficient force to strike the firing pin. However, in these known hammer pack mechanisms the gun lock group can sometimes fail to overcome the spring force and hence fail to disengage the AFL from the hammer during loading. This will then lead to a miss fire.

[0057] Accordingly, in the present embodiment the biasing means of the AFL 77 and the hammer 75 are disconnected as separate springs. Furthermore, the spring stiffness of the AFL spring 79 is less than the spring stiffness of the hammer spring 76 to allow the gun lock group to reliably rotate the AFL 77 to thereby disengage from the hammer 75.

[0058] The specific form of the rifle illustrated in the preferred embodiment is a bullpup rifle whereby the magazine is loaded behind the hand guard 23 and firing trigger 21. While particular features and characteristics of the rifle have been described herein in relation to a bullpup rifle it is understood that the concept of the upper rail attachment onto the barrel, the attachment of other rails to the barrel and the operation of the hammer pack in relation to firing can apply not only to bullpup rifles but any other fire arm carrying the fundamental features of a butt group, barrel, trigger mechanism, bolt carrier, stock and magazine.

[0059] A number of desirable functional features and advantages are achieved through the fire arm described herein. Some of these advantages are performance related including reliable firing, consistent and true alignment and effective heat dissipation. Other advantages concern practicalities and convenience of use including ease of attachment of accessories, selection of multiple simultaneous attached accessories and reduced weight. All of these improvements in performance have significant effect on the performance of the operator during

combat and on the whole provide a superior firearm.

[0060] It will be understood to persons skilled in the art of the invention that many modifications may be made without departing from the spirit and scope of the invention.

Claims

1. A firearm comprising a barrel assembly mounted at one end to a butt group, the butt group including a firing mechanism and an ammunition entry point; and a gun lock group slidably mounted between the barrel and butt group that upon cocking of the fire arm slides to load ammunition from the ammunition entry point into the barrel, and
a hammer pack in the butt group that automatically resets the firing mechanism upon recoiling of the gun lock group during firing, wherein the hammer pack includes a hammer biased to pivot under the force of a hammer spring, and an autofire lever biased through an autofire lever spring to engage the hammer.

2. The firearm as claimed in claim 1, wherein the stiffness of the autofire lever spring is less than the stiffness of the hammer spring.

3. The firearm as claimed in claim 1 or 2, wherein the autofire lever rotates on a pin, especially a pivot pin.

4. The firearm as claimed in any one of the preceding claims, wherein the gun lock group slides or travels over the autofire lever to rotate the autofire lever and disengage from the hammer.

5. The firearm as claimed in any one of the preceding claims, wherein the autofire lever spring is a torsion spring.

6. The firearm as claimed in any one of the preceding claims, wherein the hammer spring is a torsion spring.

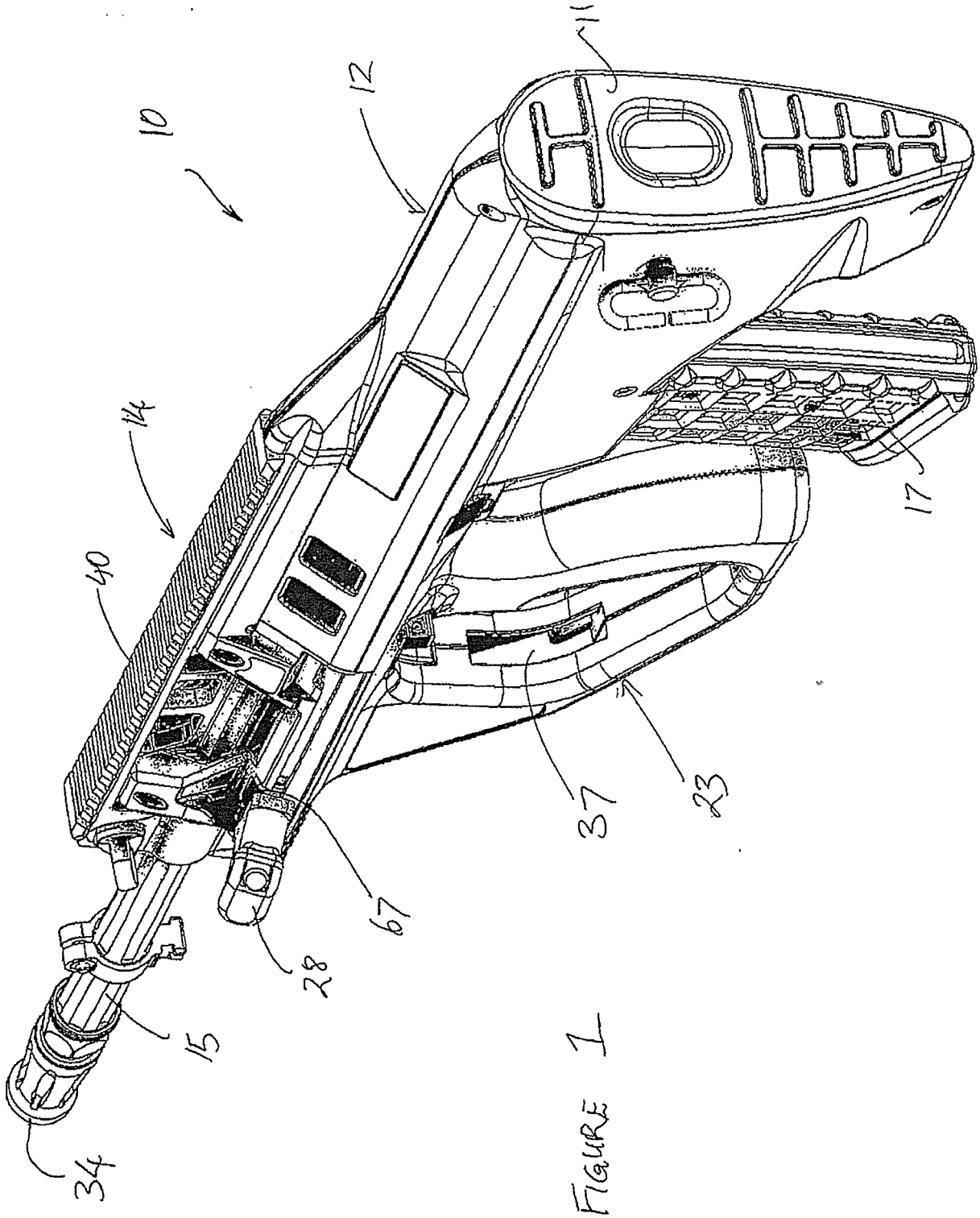

FIGURE 1

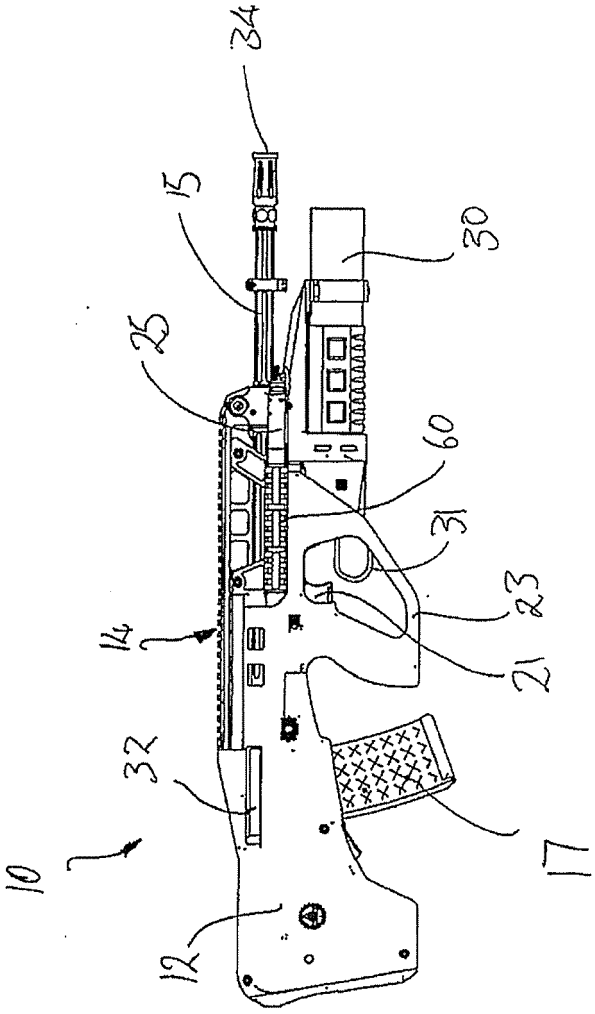

FIGURE 2a

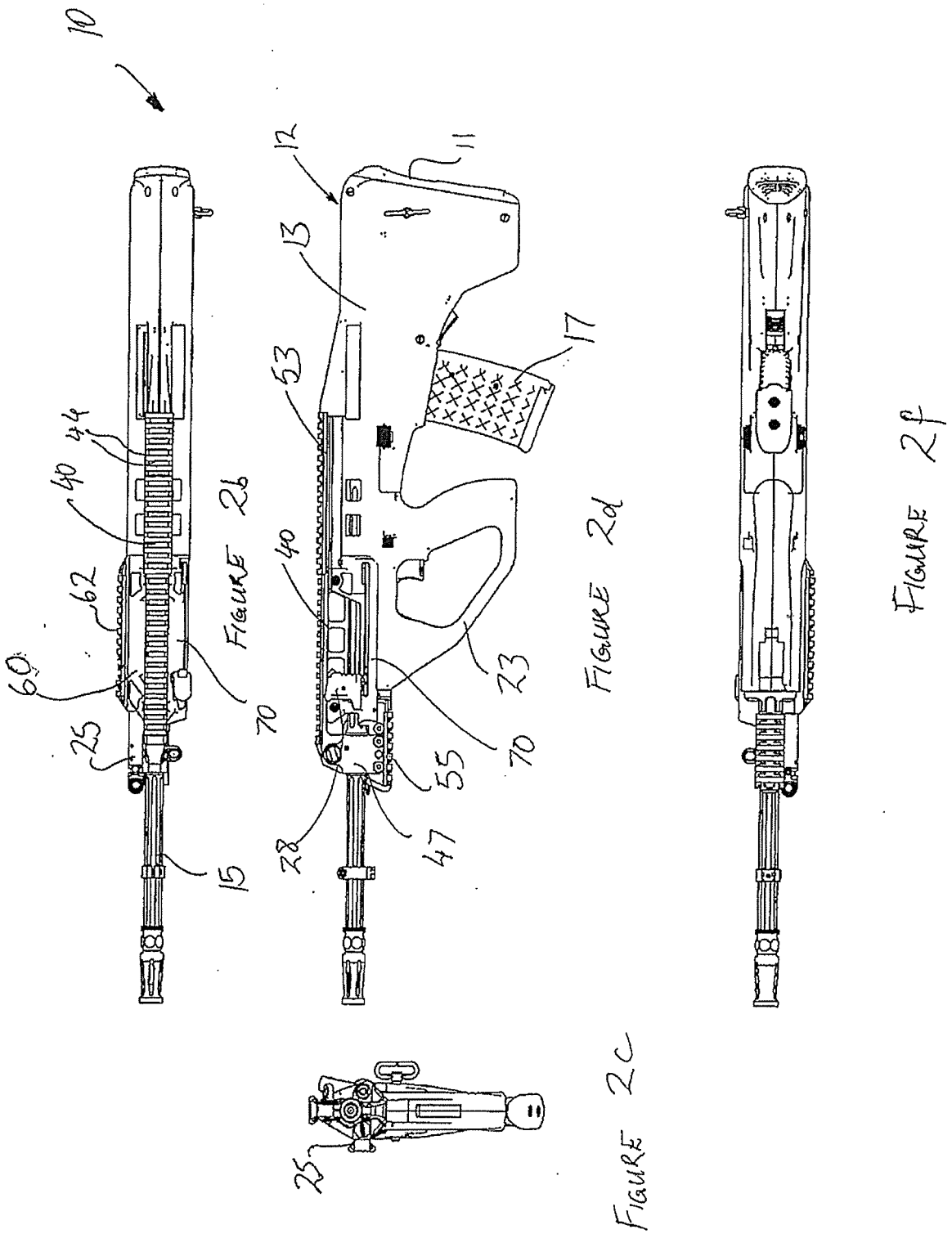

FIGURE 2b

FIGURE 2d

FIGURE 2f

FIGURE 2c

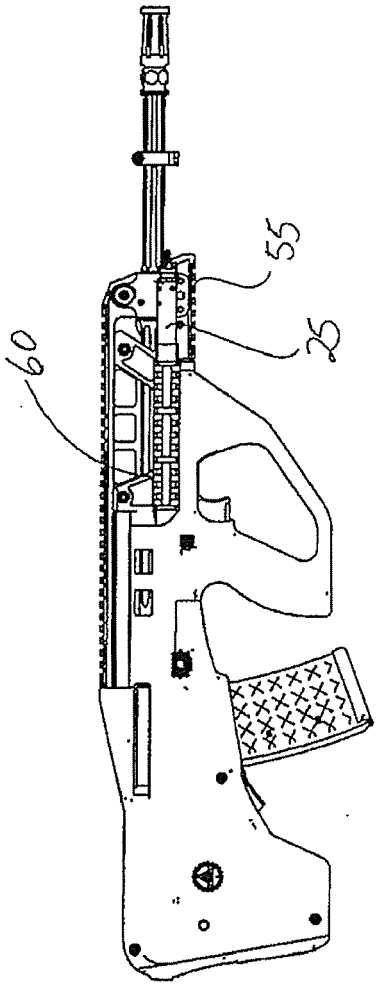

FIGURE 2g

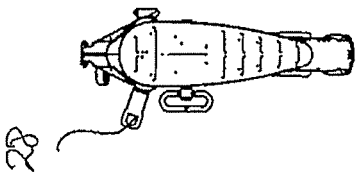

FIGURE 2e

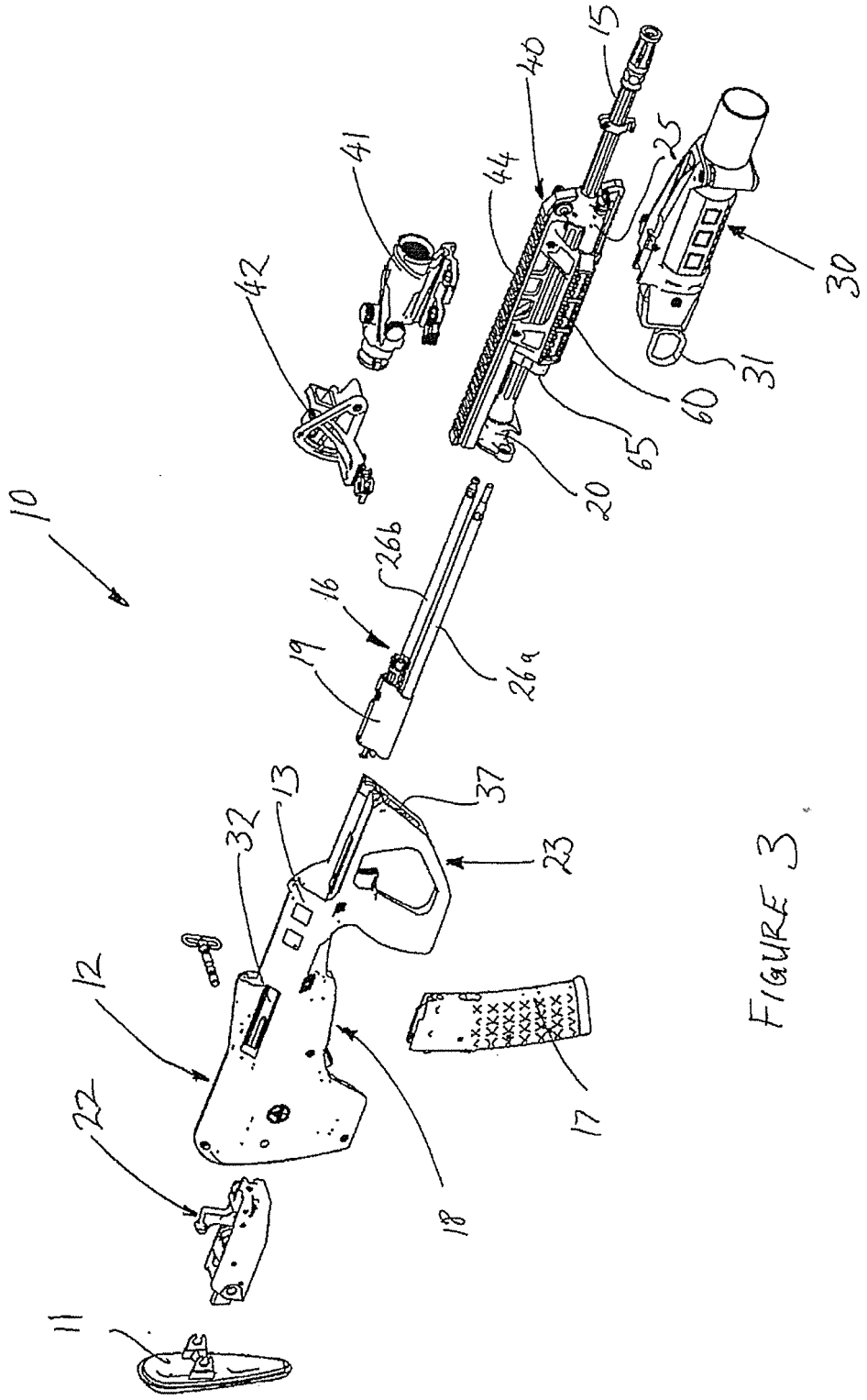
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FIGURE 3

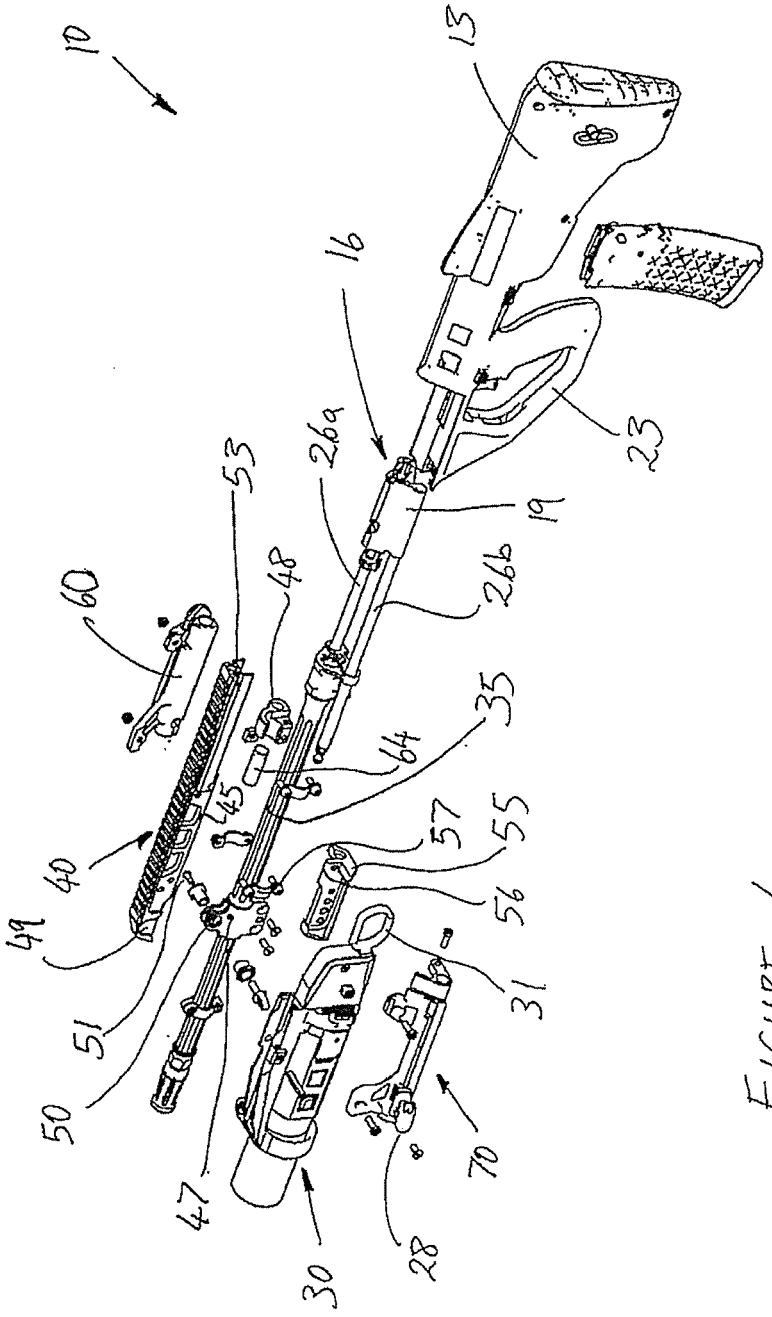
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FIGURE 4

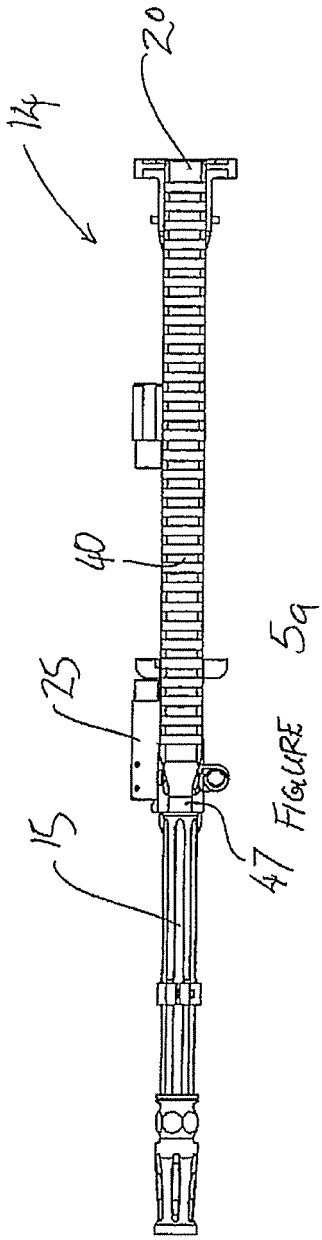


FIGURE 5a

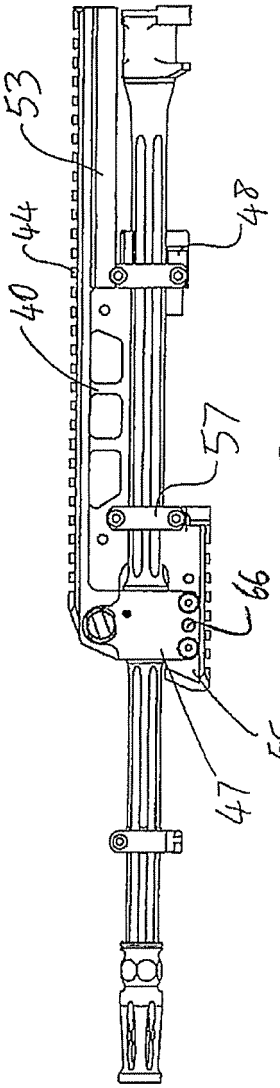


FIGURE 5c

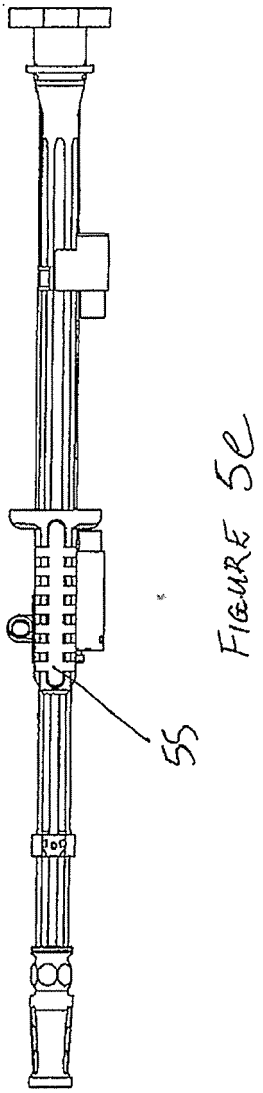


FIGURE 5e

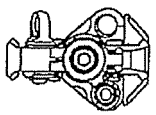


FIGURE 5b

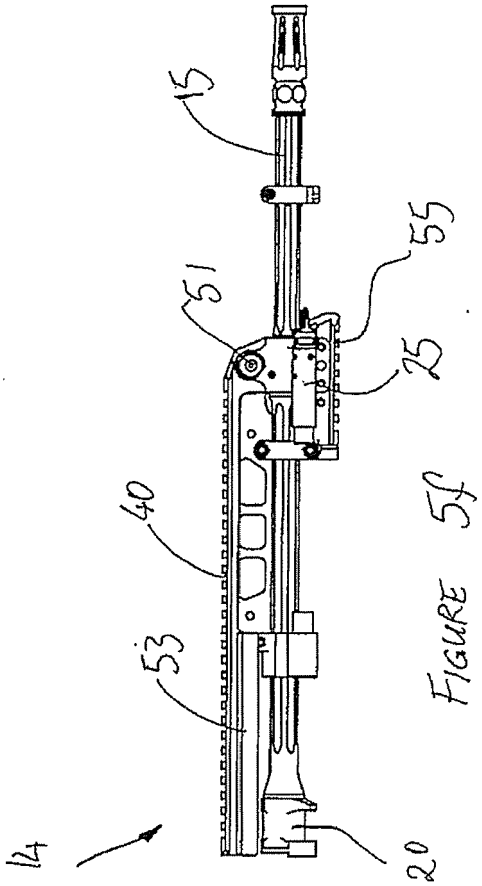


FIGURE 5f

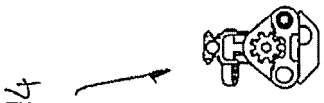


FIGURE 5d

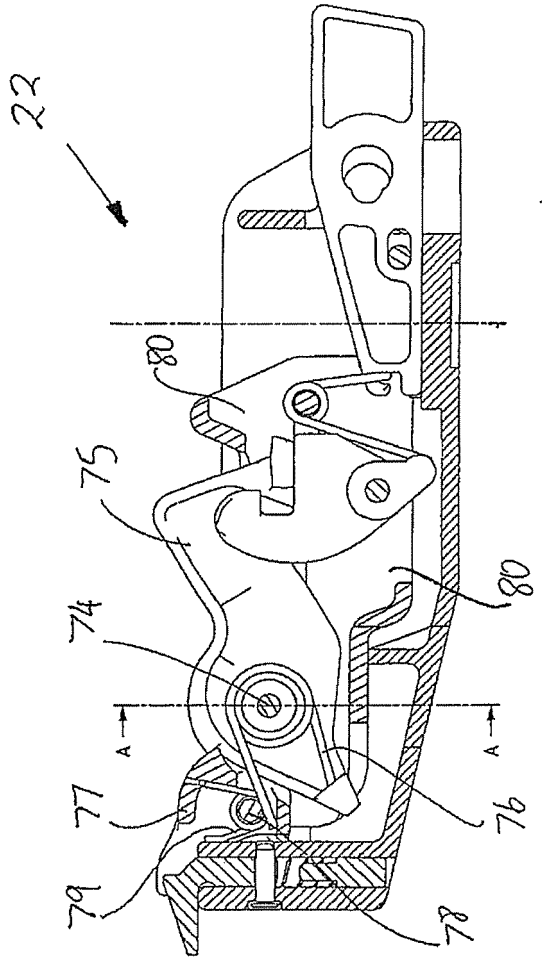


FIGURE 6a

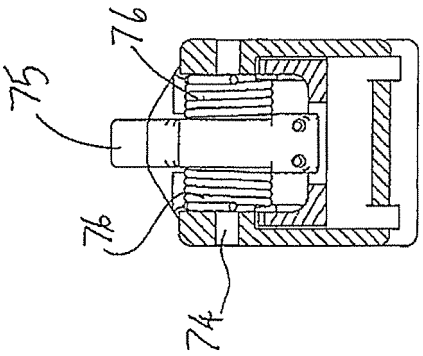
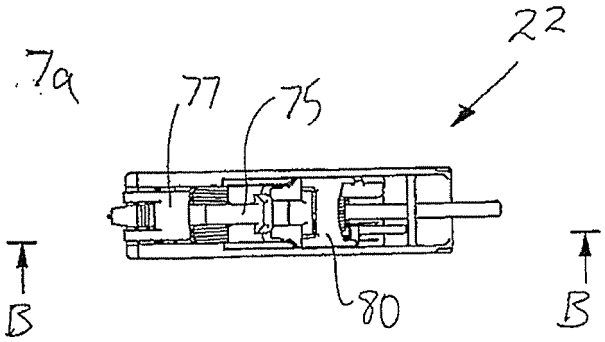


FIGURE 6b

FIGURE 7a



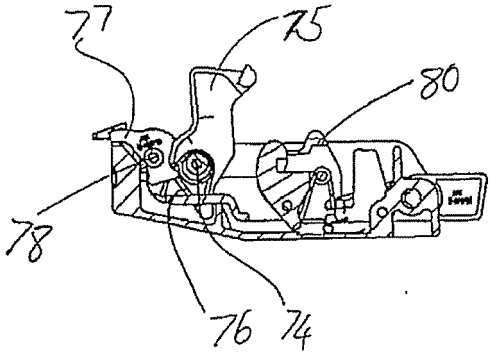


FIGURE 7b

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EUROPEAN SEARCH REPORT

Application Number
EP 17 19 8137

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	US 5 623 114 A (SOPER TERRY A [US]) 22 April 1997 (1997-04-22) * column 4, line 17 - line 28; figures 5-10 * * column 4, line 65 - column 5, line 10 * -----	1-6	INV. F41A19/14 F41G11/00 F41A21/24 ADD. F41A13/12
X	Anonymous: "Manual for AUG Para 24-35", steyr-aug.com , 5 May 2007 (2007-05-05), pages 25-35, XP002777747, Retrieved from the Internet: URL:http://www.steyr-aug.com/PARA25-35.JPG [retrieved on 2013-07-25]	1,3-6	
A	* page 34 - page 35 * -----	2	

TECHNICAL FIELDS SEARCHED (IPC)
F41A F41G F41C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	29 January 2018	Beaufumé, Cédric

CATEGORY OF CITED DOCUMENTS

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29-01-2018

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US 5623114 A	22-04-1997	NONE	

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82