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(54) **Fire arms.**

(57) A firearm, especially a target rifle, is built on a stiff chassis beam (11) which carries the butt (14), the action (12) which includes a receiver (23) into which the barrel (24) is fitted, and an adjustable pistol grip (16), and which extends to the fore-end (21) where the beam has a channel section into which the barrel is recessed. The chassis is formed from an extruded light alloy beam of **H** section whose lower flanges (43) are removed at the fore-end, whose upper flanges (43) are partially removed at the butt, and whose central web (41) is apertured (47) below the action to allow the trigger mechanism to be removed without disturbing the bedding of the receiver on to the beam. A composite cheekpiece (32) is hinged to allow the bolt (26) to be worked between slots.

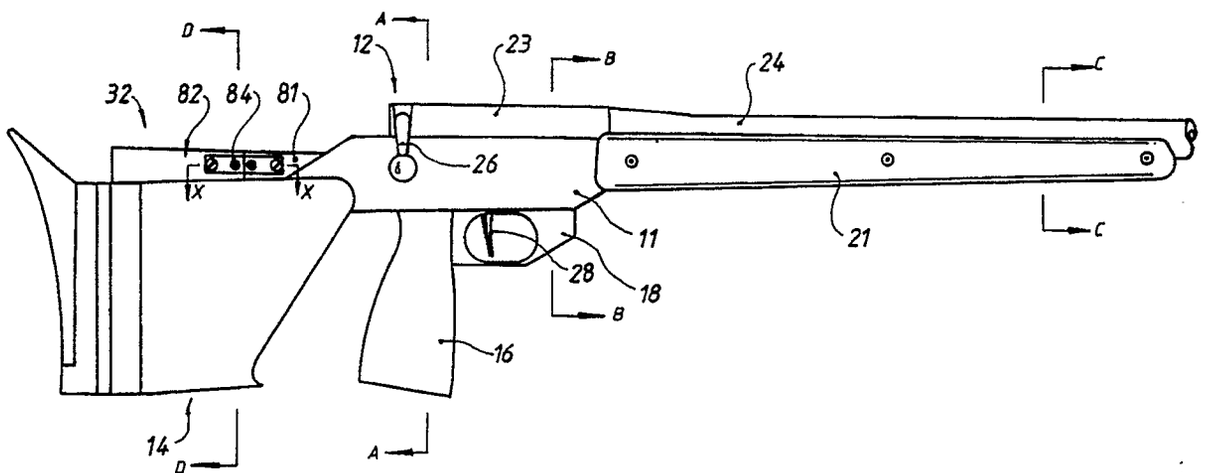

Fig 1.

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FIREARMS

This invention is concerned with firearms. It particularly relates to firearms intended to be held and fired two-handed, such as shotguns and rifles, and especially the latter.

In general terms, the firearms to which this invention relates have an action, that is to say a loading and firing mechanism, which includes a receiver to which the breech end of a barrel is attached, a bolt, block or other means in the receiver for opening and closing the breech, and a trigger mechanism. Conventionally, the action is mounted in a stock, which includes a butt to be fitted to the firer's shoulder, a pistol grip (normally integral with the front of the butt) to be held by the trigger hand of the firer, and a fore-end to be supported by the other hand of the firer below the barrel.

It can be seen that the stock is the means by which the action and barrel of the firearm, which are the actual shooting parts, are held, controlled and aimed by the firer. For a firearm to be capable of the most accurate shooting, the performance of the stock has to be taken into account, as well as the performance of the action, barrel and ammunition.

The stock should meet all necessary mechanical requirements, as well as being adaptable to the personal needs of the individual shooter, and to the theory of marksmanship, in terms of shape, dimensions, comfort, balance, weight and so on. The mechanical requirements include such matters as strength, rigidity, durability and the like.

Stocks have traditionally been made from one or two pieces of wood, especially tight-grained woods such as walnut in the best quality firearms, but modern materials such as plastics have also been used.

This invention is concerned with a firearm stock which includes a chassis member, in the form of a beam, on which the action and butt are mounted, and which extends to the fore-end of the stock. The beam is profiled and at the fore-end has a channel portion into which the barrel of the firearm is recessed.

The chassis is made as stiff as is needed. Preferably, the chassis is adapted from a beam of substantially uniform **H** section, or possibly channel section, by removing surplus material or material as required to accommodate the action (including the trigger), butt, pistol grip if separate, any additional fittings for the fore-end, and other furniture and accessories.

Target rifles conventionally have an accessory rail, with a **T**, dovetail or other re-entrant profiled slot, along the underside of the fore-end. The chassis beam preferably has a similar slot along its underside.

A suitable original beam may be made by extrusion techniques, although clearly alternatives such as hot or cold rolling, casting or machining from a block would be possible. The material of the beam is preferably a light alloy, or a plastics material such as epoxy resin with fibre reinforcement.

The preferred beam section comprises a more or less horizontal web between two upstanding side flanges. In an **H** section beam, the dependent portions of the side flanges may be partially or entirely removed at the fore-end, so that the shooter's hand can give comfortable support to the stock as close to the barrel line as possible, but may be retained behind the fore-end, to stiffen the chassis in the region of the action and the butt.

The invention also includes a method of manufacturing a firearm, which includes the steps of providing a beam of substantially uniform profiled cross-section; adapting the beam, by removing material as necessary, to form a firearm chassis with a channelled fore-end, preferably having a bottom web and side flanges; and mounting an action on the chassis with a barrel recessed into the channelled fore-end.

By providing a firearm built on a stiff profiled chassis in the manner contemplated, a wide variety of stock characteristics can be made available to the shooter, without unnecessarily compromising accuracy.

It is accordingly another aspect of the invention to provide a firearm having a pistol grip, and optionally a trigger guard, adjustably mounted so as to be longitudinally slidable under the stock, means being provided for locking the same in selected positions.

In providing a firearm, and especially a target rifle, with the ability to adapt to a wide variety of dimensions to meet the shooter's needs, it has been found possible to set the action particularly close to the shooter's shoulder. However, in a bolt actioned firearm, clearance behind the bolt is needed for the action to be worked. Yet there is a need for the butt to support the shooter's head in alignment with the sights, while the barrel is set as low as possible.

It is accordingly a further aspect of the invention to provide a butt cheekpiece which is readily movable from a shooting position behind the bolt, into a non-interfering position to enable the bolt to be worked; and the cheekpiece will be moved back to the shooting position before the next shot. The movements here referred to are of course distinct from the adjustments that may be provided on a

cheekpiece to enable it to be set up for the shooter at the start of a shoot.

One factor that is well known to have a very appreciable effect on the accuracy of a firearm is the bedding of the action in the stock. The normal bedding method includes bedding screws extending through the stock from below into the receiver, and this permits ready disassembly of the firearm for maintenance, adjustment and repair. A more invariant bedding method is to set the receiver in the stock in a cement, such as epoxy resin, but this has corresponding disadvantages if disassembly is needed.

It is a still further aspect of this invention to provide a firearm having an aperture in the stock below the action through which the trigger mechanism can be removed without disturbing the bedding of the action in the stock.

The invention is illustrated, by way of example only, in the accompanying drawings, which show one embodiment of the invention applied to a target rifle. In the drawings:

Figure 1 is a side elevation of the target rifle (the conventional muzzle of the barrel being omitted for reasons of space);

Figure 2 is a side elevation of the rifle chassis;

Figure 3 is a plan of the chassis;

Figure 4 is an underneath plan of the chassis;

Figure 5 is a section of the chassis taken on line **B-B** in Figure 2;

Figure 6 is a section of the chassis taken on line **C-C** in Figure 2;

Figure 7 is a section of the chassis taken on line **D-D** in Figure 2;

Figure 8 is a section of the rifle taken on line **A-A** in Figure 1;

Figure 9 is a section of the rifle taken on line **B-B** in Figure 1;

Figure 10 is a section of the rifle fore-end taken on line **C-C** in Figure 1;

Figure 11 is a section of the rifle butt taken on line **D-D** in Figure 1; and

Figure 12 is a partial section of the rifle butt cheekpiece taken on line **X-X** in Figure 1.

The rifle illustrated in Figure 1 has a right-handed stock built upon a chassis 11 which is more fully shown in Figures 2 to 7. In Figure 1, the chassis can be seen to carry the action designated generally at 12, the butt 14 and separate pistol grip 16 and trigger guard 18. The chassis extends through the fore-end of the stock where it carries side stocking pieces 21.

The action 12 includes a receiver 23 into which is screwed the barrel 24, a bolt having a bolt handle 26, and a trigger mechanism having a trigger 28 within the trigger guard in front of the pistol grip.

The butt 14 includes a cheekpiece 32.

Turning now to Figures 2 to 7, the chassis 11 is formed from a stiff aluminium alloy beam extruded in a generally uniform **H** section. The original section is substantially as shown in Figure 5, with a more or less horizontal web 41 between two upstanding side flanges 43. The internal corners at the transitions from web to side flange are smoothly radiused, giving a beam that is very stiff in bending and in torsion. The web 41 includes a re-entrant longitudinal **T** slot 45 located centrally along its underside between the dependent portions of the side flanges.

The original beam is adapted to form the chassis 11 by removing material as necessary, both to form screw or bolt holes and to shape or profile the web and flanges.

The web 41 is adapted by providing an aperture 47, at a position corresponding to the rifle action, for the trigger to pass through, and large enough to permit complete removal of the trigger group from the action through the aperture without disturbing the bedding of the action. Bedding screw holes 49 are also provided in the web, as are butt fixing screw holes 50. At the rear (butt end) left hand side of the beam, part of both the web and the left flange are removed by an oblique cut 51, to allow the rifle butt to be slightly offset towards the shooter's right shoulder.

Further adaptations to the side flanges are made by removing the depending portions entirely at the fore-end, by selectively removing metal from the upper edges to conform to the upper profile of the fore-end and butt as shown in Figure 1, and to provide screw holes 55 for fixing the side stocking pieces 21 to the fore-end.

Figures 2 to 7 taken together show the overall adaptation of the beam to form the chassis 11. Figure 10 in particular shows the effect at the fore-end. As a result of the removal of the depending parts of the flanges 43, the fore-end of the chassis comprises a channel 57 having a bottom web and side flanges, with a generally flat underside interrupted only by the slot 45. The sharp outer corners between web and flanges are masked by the side stocking pieces 21, which for mainly cosmetic reasons are typically of wood, and which have rounded lower edges so that the whole fore-end can rest comfortably on a shooter's left hand.

The profiling of the chassis is also carried out such that the fore-end is slightly sloping, being deeper towards the action and shallower towards the muzzle, as is commonly found in target rifles.

The rifle barrel 24, which is fully floating, being in contact only with the receiver 23, is recessed into the fore-end channel, so that the centre line of the barrel is kept very low in the stock.

At the fore-end, slot 45 functions as an accessory rail, to which a hand stop, bipod stand, bal-

ance weight mount and other accessories may be fastened in the positions preferred by the shooter.

Figures 1, 8 and 9 illustrate the mounting of the pistol grip 16 (typically of wood) and the trigger guard 18 (typically of light alloy). These are longitudinally slidable under the stock, and lockable in any position selected, in the same way that accessories are adjustable on the accessory rail.

This is achieved in the case of the pistol grip 16 (Figure 8) by means of a clamping screw in a bore 62 in the grip. The screw engages a **T**-shaped captive slide 63 in slot 45, and the screw head abuts a shoulder 64 in the bore 62. then the screw is slack, the pistol grip can be slid along slot 43 under the chassis, and it can be clamped in any chosen position by tightening screw 61.

The lateral angle of the, pistol grip can be adjusted within limits by set screws 66 in the top of the grip. These bear against the underside of chassis web 41 when screw 61 is tightened, and the angle taken up by the grip when clamped is dependent upon the relative projection of these set screws.

In the case of the trigger guard 18 (Figure 9) a similar arrangement obtains. Clamping screw 71 engages captive slide 73 in slot 45. No lateral angular adjustment is provided, although it would be possible as on the pistol grip, and in this case the upper face of the trigger guard bears directly against the underside of chassis web 41 when screw 71 is tightened. Trigger 28 is itself adjustably mounted on a trigger rail in a conventional manner, so it too can be relocated as necessary upon movement of the pistol grip and/or trigger guard.

Figures 8 and 9 also illustrate the use of a light alloy **V** bedding block 19 to locate the receiver 12 on the chassis 11. Bedding block 19 is mounted directly on the chassis web 41 between side flanges 43. Bedding is achieved by means of screws passing through holes 49 in the chassis and through corresponding holes in the bedding block, into the underside of the receiver, and/or by setting the receiver on the chassis using a suitable cement, such as epoxy resin.

The trigger mechanism can be removed from the action without disturbing the bedding after moving, or removing, the pistol grip and trigger guard, by withdrawing the trigger group through aperture 47 (Figure 3) in the chassis.

The butt cheekpiece 32 is shown in Figures 1, 11 and 12, and is in two parts, namely a front cheekpiece 81 and a rear cheekpiece 82. The rear part 82 is fixed, and forms the mounting for the front part 81, by means of a hinge 84 firmly screwed to both parts. The drawings show the front cheekpiece in the shooting position, aligned with the rear cheekpiece. In order to work the action, the shooter can raise the front cheekpiece on its hinge 84 with his right hand, swivelling it to a position in which it is clear of the bolt, before he lifts and draws back the bolt handle 26. After reloading and closing the bolt, the shooter can reclose the front cheekpiece to the shooting position, which is positively defined by virtue of the cheekpiece resting against the chassis at this point (Figure 11).

The rear cheekpiece 82 can be fixedly or adjustably mounted on the butt, in a manner known in the art. If it is adjustable, so that it can be raised into a position clear of the chassis, positive location means for the shooting position of the front cheekpiece may be provided by a shelf or the like extending forwardly under part of the front cheekpiece from the rear cheekpiece.

The rifle as described has excellent stiffness in the stock by virtue of the effect of the stiff chassis beam 11 running beneath the action from butt to fore-end. At least one of the two upright side flanges 43 is continuous for the whole length of the beam, as is the central web 41, and both side flanges are continuous from the fore-end to at least the forward portion of the butt. In the region of the action 12, where the recoil from a shot is initially applied to the stock, the side flanges have both upwardly and downwardly extending portions, so that the chassis beam has an **H** section, for greatest rigidity. It can be appreciated that when a shot is fired from the rifle, the reaction from the shot is applied to the stock where the receiver 23 is bedded on to the chassis beam, while the stock is supported by the shooter at the fore-end and at the butt; and accordingly the ability of the chassis beam to maintain its stiffness from fore-end to butt, and transfer the bending and the torsional forces acting on the rifle stock from one end of the beam to the other, is a principal feature of the prersent invention. This is largely achieved in the illustrated embodiment of the invention by the continuous side flanges of the chassis beam, whether they extend upwardly, as at the fore-end, or downwardly, as at the butt, or both upwardly and downwardly, as in the transitional central portion of the beam in the region of the action of the rifle.

Claims

1. A stock for a firearm having a butt, a fore-end, an action, and a barrel fitted to the action, in which firearm the stock includes the butt and the fore-end, and the action is mounted in the stock, characterised in that the stock comprises a chassis member in the form of a stiff beam (11) on which the butt (14) is mounted, the chassis beam is adapted to mount the action (12), the chassis beam extends to the fore-end of the stock, and the chas-

sis beam includes a channel portion (43, 41, 43) at the fore-end which forms a recess for the barrel (24).

2. A stock for a firearm as claimed in claim 1 further characterised in that the chassis beam (11) comprises a more or less horizontal web (41) between two continuous upright side flanges (43).

3. A stock for a firearm as claimed in claim 2 further characterised in that the side flanges (43) extend above the web (41) at the fore-end to form the channel portion, at least one side flange (43) extends below the web (41) at the butt end of the beam (11), and the side flanges (43) extend above and below the web (41) in the region of the beam adapted to mount the action (12).

4. A stock for a firearm as claimed in any one of the preceding claims further characterised in that the chassis beam (11) comprises a light alloy material or a reinforced plastics material.

5. A method of manufacturing a firearm by fitting an action and a barrel to a stock having a butt and a fore-end, characterised in that the stock includes a stiff chassis member which is formed from a beam (11) of substantially uniform profiled cross-section by removing material to form the chassis member with a channel led (43, 41, 43) fore-end, and the action (12) is mounted on the chassis member with the barrel (24) fitted to the action and recessed into the channelled fore-end.

6. A method as claimed in claim 5 further characterised in that the beam (11) of substantially uniform profiled cross-section is a generally **H** section beam.

7. A method as claimed in claim 5 or claim 6 further characterised in that the substantially uniform profiled cross-section beam (11) is formed by extrusion.

8. A firearm having a stock with a butt and a fore-end, an action mounted in the stock, and a barrel fitted to the action, characterised in that the stock comprises a chassis member in the form of a stiff beam (11) extending to the fore-end of the stock, the action (12) is mounted on the chassis member, the barrel (24) is recessed into the chassis member at the fore-end, and the butt (14) is mounted on the chassis member.

9. A firearm as claimed in claim 8 further characterised in that the underside of the chassis member (11) is provided with a longitudinal re-entrant profiled slot (45).

10. A firearm as claimed in claim 8 or claim 9 further characterised in that the firearm is provided with a pistol grip (16) adjustably mounted on the chassis member (11) so as to be longitudinally slidable under the stock, and means (61, 62, 63, 64) are provided for locking the pistol grip in selected positions.

11. A firearm as claimed in claim 10 further characterised in that means (66) are provided for adjusting the lateral angle taken up by the pistol grip (16) when locked.

12. A firearm as claimed in any one of claims 8 to 11 provided with a bolt action, further characterised in that the butt (14) is provided with a cheekpiece (32) that is readily movable from a shooting position behind the bolt (26) into a non-interfering position to enable the bolt to be worked.

13. A firearm as claimed in claim 12 further characterised in that the movable cheekpiece is a front part (81) of a two part cheekpiece (32) made up of front and rear parts, the front cheekpiece (81) being hinged to the rear cheekpiece (82), and the rear cheekpiece (82) being adjustably mounted on the rifle butt (14).

14. A firearm as claimed in any one of claims 8 to 13 in which the action includes a receiver which is bedded into the stock, further characterised in that the receiver (23) is located on the chassis member (11) by means of a **V** bedding block (19).

15. A firearm as claimed in any one of claims 8 to 14 in which the action, which includes a trigger mechanism, is bedded into the stock, further characterised in that the stock is provided with an aperture (47) below the action (12) through which the trigger mechanism can be removed without disturbing the bedding of the action in the stock.

16. A firearm as claimed in any one of claims 8 to 15 wherein the stock is as claimed in any one of claims 1 to 4.

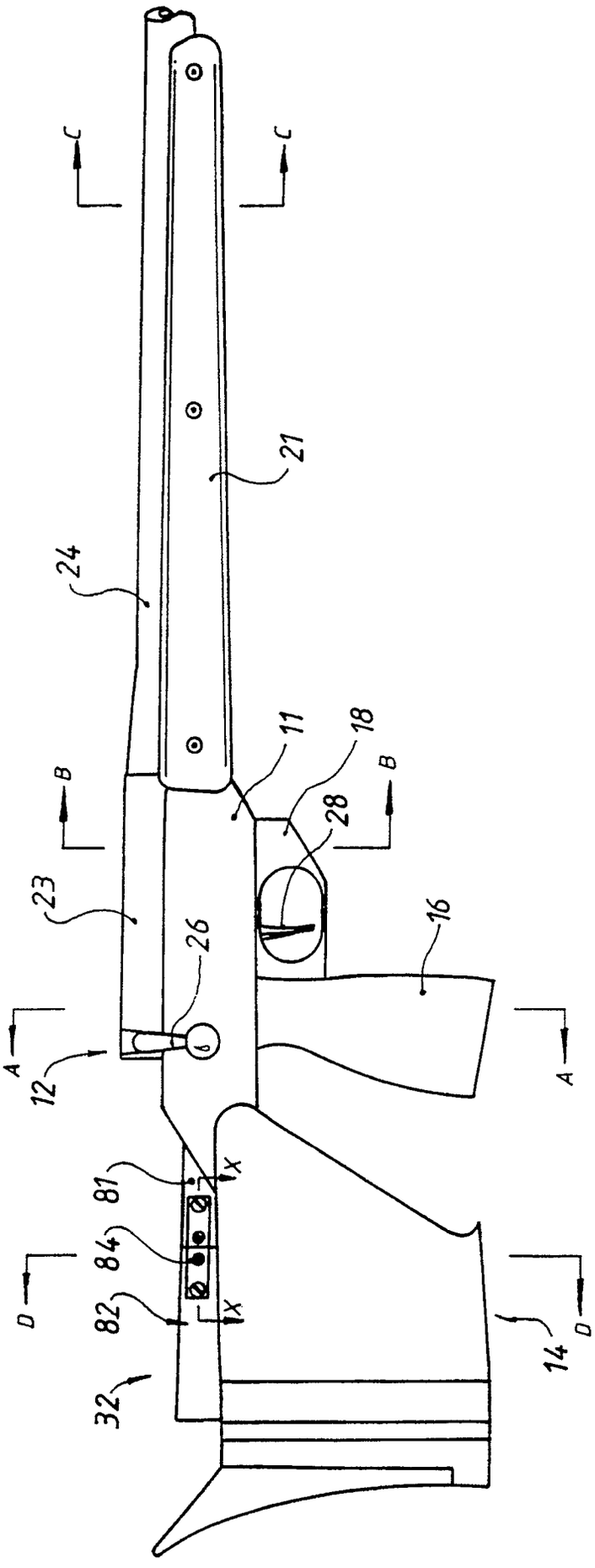

Fig_1.

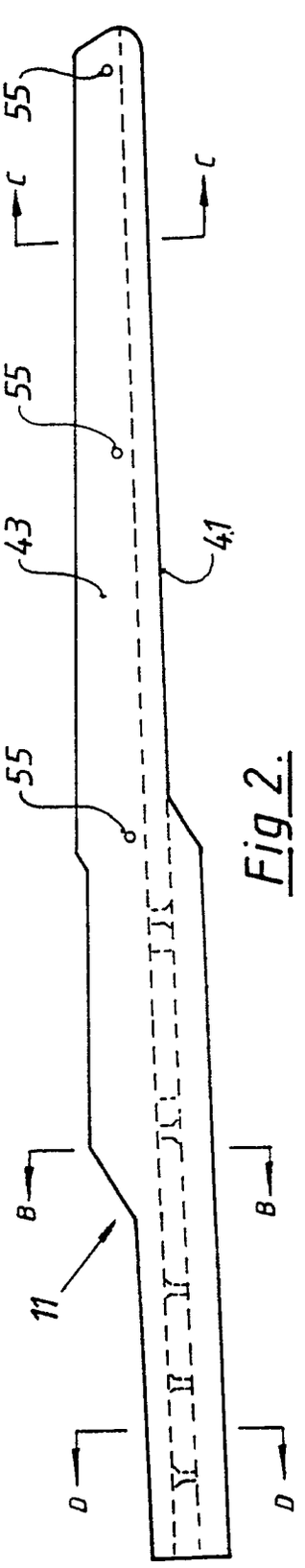

Fig 2.

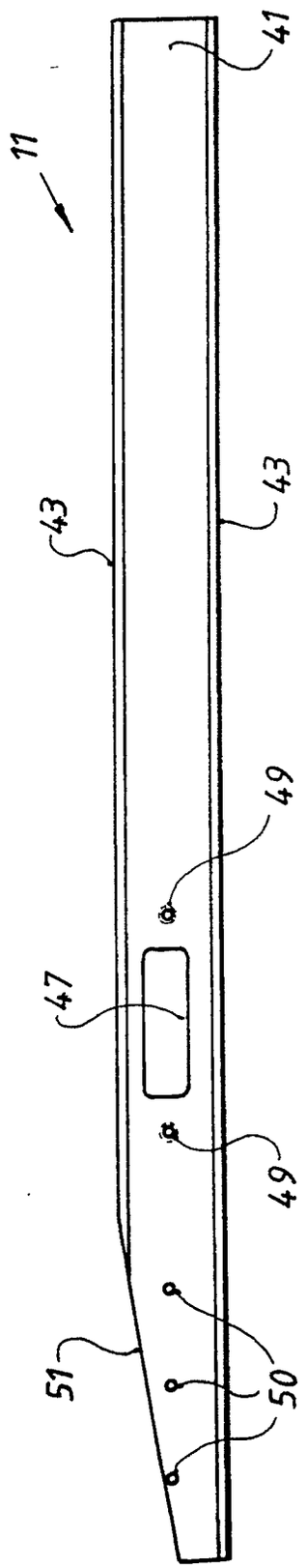

Fig 3.

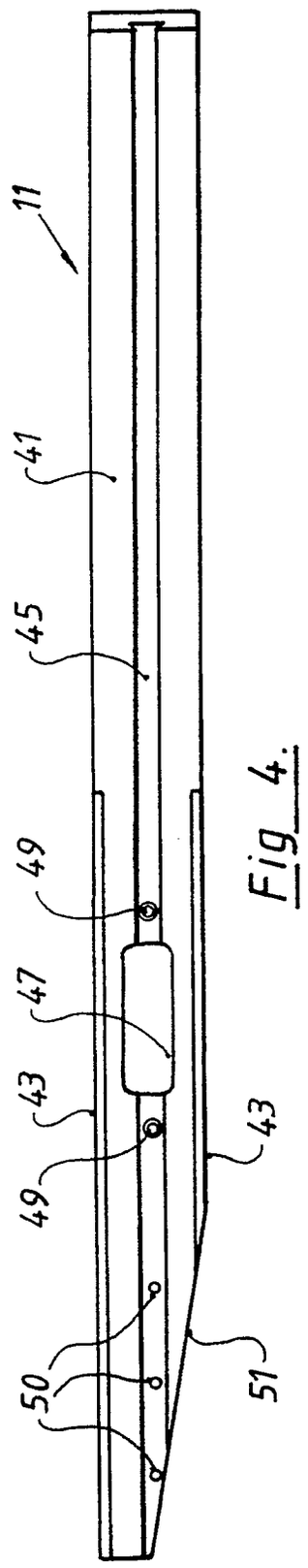

Fig 4.

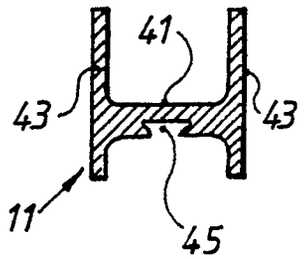

Fig 5.

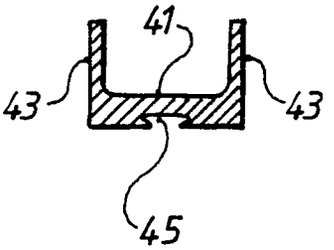

Fig 6.

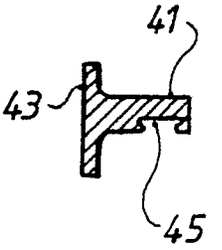

Fig 7.

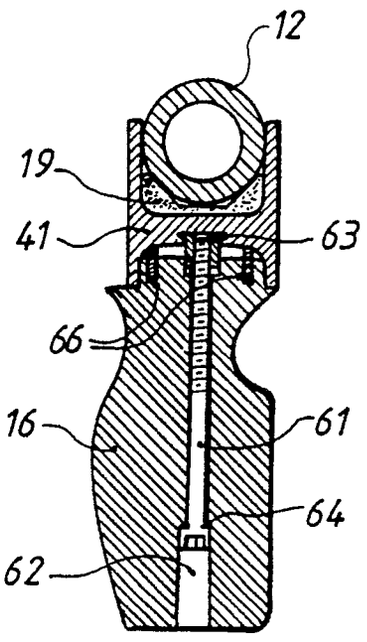

Fig 8.

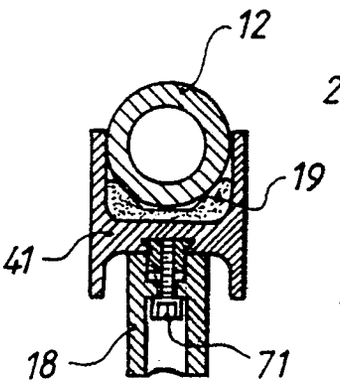

Fig 9.

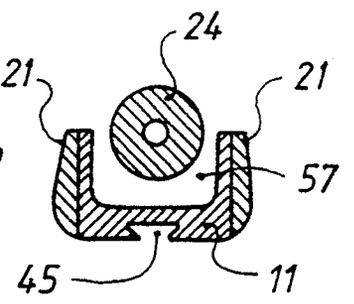

Fig 10.

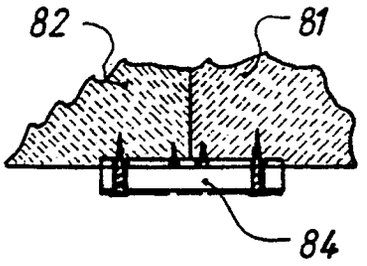

Fig 12.

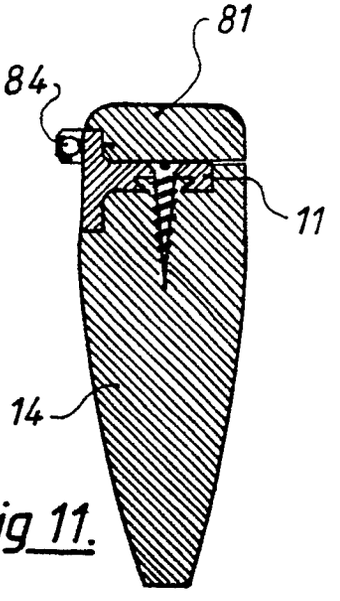

Fig 11.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 90 30 8854

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	GB-A-655125 (THE BIRMINGHAM SMALL ARMS COMPANY LTD) * page 3, lines 13 - 39; figures 1-11 * * page 3, lines 56 - 63 * * page 4, lines 35 - 46 *	1, 2, 5, 8, 10	F41C23/00
Y		4, 16	
A		9	
Y	US-A-3830003 (J. CLERKE) * column 2, lines 28 - 35; figures 1-3 * * column 3, lines 41 - 68 * * column 4, lines 53 - 68 *	4, 16	
X	GB-A-488090 (H. BROWN) * page 1, lines 70 - 81; figures 1a-16 * * page 2, lines 3 - 23 *	1, 2, 5, 8	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)
F41C
F41A

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	22 OCTOBER 1990	VAN DER PLAS J.

CATEGORY OF CITED DOCUMENTS

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

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

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