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(54) **A recoil absorbing assembly for automatic weapons**

(57) A recoil absorbing assembly for automatic weapons secured to a weapon cradle halving an fixed portion (1) and a portion (2) movable longitudinally thereto, the fixed cradle portion being rotatably mounted to a support, comprises a recoil absorbing spring (3) and friction means (4, 5) arranged in connection with the cradle portions. Further the friction means include a main shaft (4) provided with angled friction blocks (6, 7) and a movable bearing housing (5) surrounding the main shaft and having free floating pistons (8, 9) as to cooperate with the friction blocks, the recoil absorbing spring (3) being situated on the main shaft in elongation of the bearing housing.

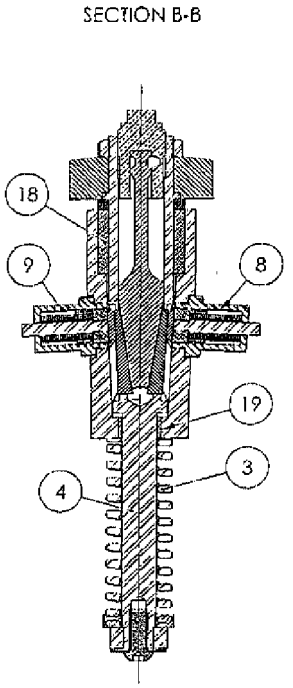

Fig. 1e

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Description

[0001] The present invention relates to a recoil absorbing assembly for automatic weapons, and in particular an assembly in which the recoil energy is absorbed by means of spring and friction force.

[0002] A lot of solutions similar to the assembly mentioned above is known in the prior art. One typical example is presented by US-A 5,159,148 in which the friction force is effected by means of sliding guides comprising a bolt secured to the fixed cradle portion and protruding through a slot in the movable cradle portion and more than one such sliding guide are needed i.e. often three pairs at the longitudinal sides of the two cradle portions. Despite this fact and due to torsional movements, practice has also proved that the precision during firing is not satisfactorily involving that the actual targets are missed. Another secondary disantages are increased weight and manufacturing costs.

[0003] The objects of the present invention are to remedy this disadvantages and tthese are achieved by a recoil absorbing assembly for automatic weapons secured to a weapon cradle having an fixed portion and a portion longitudinally movable thereto, the fixed cradle portion being rotatably mounted to a support, comprising a recoil absorbing spring and friction means arranged in connection with the cradle portions, wherein the friction means are including a main shaft provided with angled friction blocks and a movable bearing housing surrounding the main shaft and having free floating pistons as to cooperate with the friction blocks, the recoil absorbing spring being situated on the main shaft in elongation of the bearing housing.

[0004] To adapt the present recoil absorbing assembly to different types of automatic weapons and ammunitions, the main shaft is provided with means tuning the friction by pushing the friction blocks outwards. The friction tuning means can include a shaft portion longitudinally movable using a tension sleeve arranged in an end of the mains shaft opposite of the friction blocks.

[0005] To further increase the friction effect, the angled friction blocks are formed with inclined surfaces adjacent corresponding surface portions of the main shaft. Friction block surfaces opposite of the main shaft can be inclined vertically. Further, the free floating pistons can be situated in a manner forming an angle to the main shaft, preferentially 4°. The free floating pistons can be provided with friction increasing portions adjacent the friction blocks, and spring biased against the friction blocks.

[0006] To enable unobstructed longitudinal movements relatively to the main shaft, the bearing housing is formed with bearings arranged at each end thereof and surrounding the main shaft. The bearings can be made from metal, preferentially bronze.

[0007] To secure the recoil absorbing assembly, the main shaft is connected to the fixed cradle portion, whereas the bearing housing is connected to the movable cradle portion by preferentially using brackets situated in each end of the main shaft and one end of the bearing housing, respectively.

[0008] The present recoil absorbing assembly allows for mounting and firing of automatic weapons such as heavy machine guns and 40mm automatic grenade launchers from the soft-mount. The recoil is absorbed by using spring force and decreasing/increasing friction which transfers the recoil energy into heat. Thereby, the precision during firing is increased and the weight of the unit including inter alia the recoil absorbing assembly and weapon cradle is reduced.

[0009] The recoil absorbing assembly according to the present invention consists of two main parts. A main shaft including the angled and adjustable friction blocks and its integrated tuning means. The main shaft also acts as a guide for the recoil spring. The second main part is the bearing housing which during recoil travels back and forth along the main shaft. When the assembly is in its forward i.e. extracted position, the recoil spring is preloaded and the forward position is hold by the friction force created by the two pistons trusting against the friction blocks inside the main shaft. When the recoil of the weapon pushes the bearing housing rearwards the recoil spring is compressed and the friction force is slowly decreasing due to the angled friction blocks. On its return, the increasing friction force creates a "soft stop" of the assembly before it enters the physical end stop of the assembly.

[0010] The integrated tuning assembly allows the operator to tune the friction force involving that the two friction blocks are pushed outwards. By tuning the friction force, an adaptation to the different weapons it is possible as to get maximum dampening effect and achieve reliability of the weapons also when firing at high elevations. The recoil spring is also having separate tuning means involving that its spring force needed can be set for the actual weapons.

[0011] Now, the present invention is to be discussed in detail with reference to preferred embodiment illustrated in the accompanying drawings, in which:

Fig. 1a-e show an recoil absorbing assembly in bottom and front perspective, vertical sectional, side perspective and horizontal sectional views, respectively, presented in a extended position;

Fig. 2a-c show the same assembly in bottom perspective, vertical and horizontal sectional views, respectively, presented in the compressed position;

Fig. 3 shows an exploded top perspective view of the same assembly; and

Fig. 4a-b show the assembly used for different types of automatic weapons in perspective views, seen from the left and right hand sides.

[0012] According to the present invention, the recoil absorbing assembly allows mounting and firing of auto-

matic weapons such as heavy machine guns and 40mm automatic grenade launchers from the soft-mount. As illustrated in Fig. 4a-b, two different weapons are mounted in a weapon cradle having a fixed portion 1 and a portion 2 longitudinally movable thereto. The fixed cradle portion is rotatably mounted to a suitable support, not shown, by means of a pin connection 25, for instance. The fixed and movable cradle portions can be formed in any appropriate manner but these features are not part of the present invention and are not be discussed in detail herein as well as the others depicted in Fig. 4a-b.

[0013] As shown in Fig. 1-3, the present assembly includes a recoil absorbing spring 3 and friction means 4, 5 known per se and arranged in connection with the cradle portions. However, contrary to the prior art the present friction means include a main shaft 4 provided with angled friction blocks 6, 7 and a movable bearing housing 5 surrounding the main shaft and having free floating pistons 8, 9 as to cooperate with the friction blocks, whereas the recoil absorbing spring 3 being situated on the main shaft in elongation of the bearing housing; cf. Fig. 1e, for instance. 11. The main shaft 4 is connected to the fixed cradle portion 1, whereas the bearing housing 5 is connected to the movable cradle postion.2 by preferentially using brackets 22, 23, 24 situated in each end of the main shaft and one end of the bearing housing, respectively, see Fig. 1a. It is understood that the brackets illustrated can be replaced by other suitable means.

[0014] The angled friction blocks 6, 7 are formed with inclined surfaces 12, 13 adjacent corre-spending surface portions 14, 15 of the main shaft 4. The respective inclined surfaces and surface portions of the friction blocks and main shaft, respectively, are preferentially planar but this other configurations such as angled or curved are not excluded. The friction effect is increased by means of friction block surfaces 16, 17 opposite of the main shaft portion 10 being vertically inclined. The slope of these surfaces can be varied as to fit to different weapon and ammunition types.

[0015] Further, the main shaft 4 is provided with means 10, 11 tuning the friction by pushing the friction blocks 6, 7 outwards. These means could include a main shaft portion 10 longitudinally movable using a tension sleeve 11 arranged in an end of the mains shaft 4 opposite of the friction blocks 6, 7. The shaft portion and tension sleeve are arranged in connection with a bore within the main shaft and are mutually rotatably using a ball bearing 26, for instance. These can be secured using appropriate means.

[0016] The movable bearing housing 5 is formed with bearings 18,19 arranged at each end thereof and surrounding the main shaft 4, see Fig. 1c. These bearings are made from metal, preferentially bronze.

[0017] The free floating pistons 8, 9 arranged in the bearing housing 5 are situated in a manner forming an angle to the main shaft 4, preferentially 4°. The pistons are within apertures 26, 27 made therethrough and are communicating with corresponding aperture 28, 29 formed in the main shaft 4, whereby the friction blocks 6, 7 are pressed against the shaft portion 10. Additionally, the floating pistons are provided with friction increasing portions 20, 21 adjacent the friction blocks and are spring biased against these friction blocks. The floating pistons are preferentially biased using cup springs 30, 31 but other types of springs are also applicable.

[0018] Although Fig. 1-3 illustrate more elements than discussed above, these shall only be considered as examples of supplementary accessories and not understood in a restrict manner. Moreover, it is noted that the exploded view in Fig. 3 is not including the bearings 18, 19 situated in each end of the bearing housing 5. The spring force of the recoil spring 3 can be adjusted to different types of weapons and ammunitions by means of appropriate means such as a set screw 32.

Claims

1. A recoil absorbing assembly for automatic weapons secured to a weapon cradle having an fixed portion (1) and a portion (2) movable longitudinally thereto, the fixed cradle portion being rotatably mounted to a support, comprising a recoil absorbing spring (3) and friction means (4, 5) arranged in connection with the cradle portions, **characterized** i n that the friction means are including a main shaft (4) provided with angled friction blocks (6, 7) and a movable bearing housing (5) surrounding the main shaft and having free floating pistons (8, 9) as to cooperate with the friction blocks, the recoil absorbing spring (3) being situated on the main shaft in elongation of the bearing housing.

2. A recoil absorbing assembly according to claim 2, **character ized in** that the main shaft (4) is provided with means (10, 11) tuning the friction by pushing the friction blocks (6, 7) outwards.

3. A recoil absorbing assembly according to claim 2, **characterized in that** the friction tuning means include a shaft portion (10) longitudinally movable using a tension sleeve (11) arranged in an end of the mains shaft (4) opposite of the friction blocks (6, 7).

4. A recoil absorbing assembly according to any of the preceding claims, **characterized in that** the angled friction blocks (6, 7) are formed with inclined surfaces (12, 13) adjacent corresponding surface portions (14, 15) of the main shaft (4).

5. A recoil absorbing assembly according to claim 4, **characterized in that** friction block surfaces (16, 17) opposite of the main shaft portion (10) are inclined vertically.

6. A recoil absorbing assembly according to any of the

preceding claims, **characterized in that** the movable bearing housing (5) is formed with bearings (18, 19) arranged at each end thereof and surrounding the main shaft (4).

7. A recoil absorbing assembly according to claim 6, **characterized in that** the bearings (18, 19) are made from metal, preferentially bronze.

8. A recoil absorbing assembly according to any of the preceding claims, **characterized in that** the free floating pistons (8, 9) are situated in a manner forming an angle to the main shaft (4), preferentially 4°.

9. A recoil absorbing assembly according to claim 8, **characterized in that** the free floating pistons (8, 9) are provided with friction increasing portions (20, 21) adjacent the friction blocks (6, 7).

10. A recoil absorbing assembly according to any of the preceding claims, **charactcrized in** that the free floating pistons (8, 9) are spring biased against the friction blocks (6, 7).

11. A recoil absorbing assembly according to any of the preceding claims, **characterized in that** the main shaft (4) is connected to the fixed cradle portion (1), whereas the bearing housing (5) is connected to the movable cradle portion.(2) by using brackets (22, 23, 24) situated in each end of the main shaft and one end of the bearing housing, respectively.

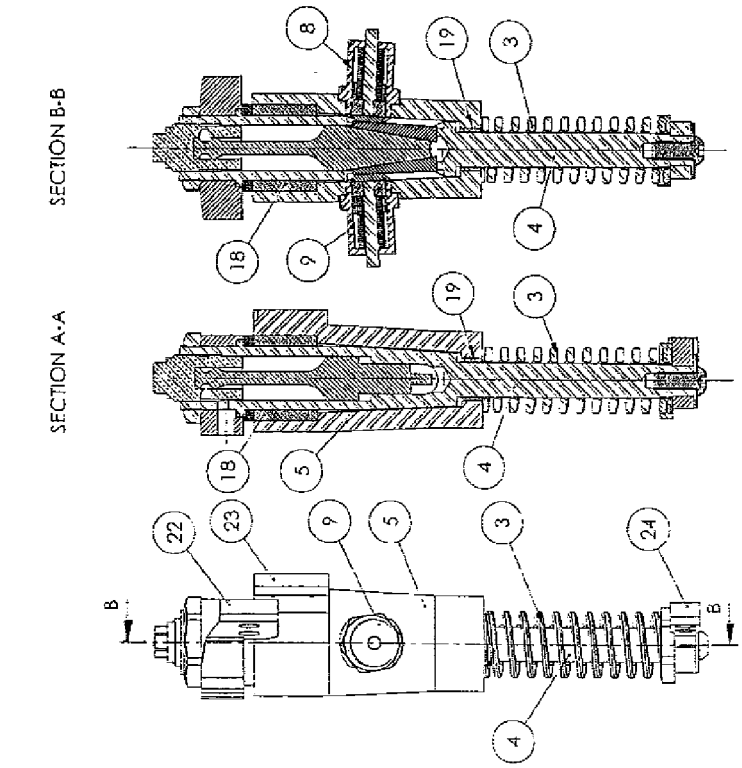

Fig. 1d

Fig. 1e

Fig. 1c

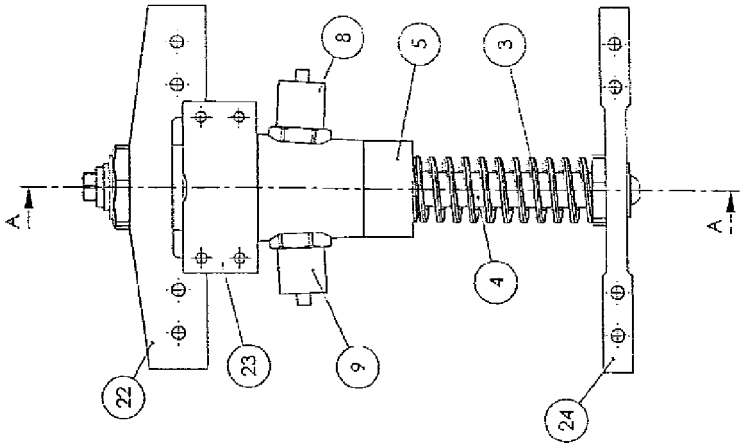

Fig. 1a

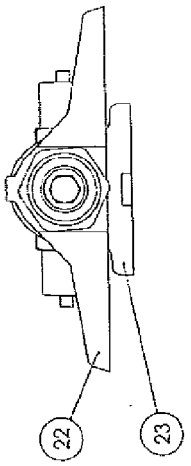

Fig. 1b

SECTION B-B

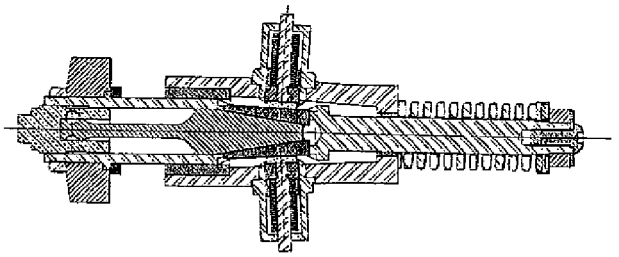

Fig. 2c

SECTION A-A

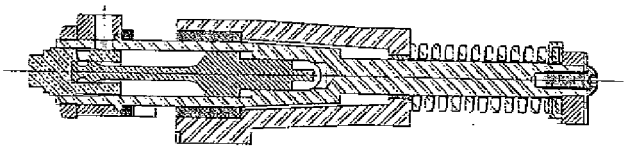

Fig. 2b

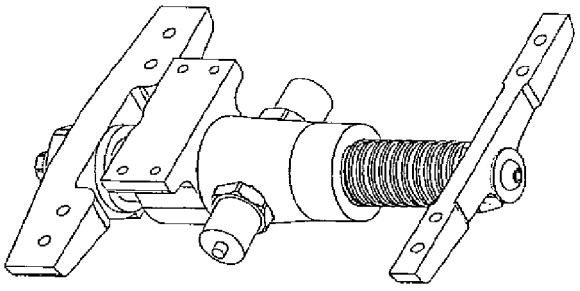

Fig. 2a

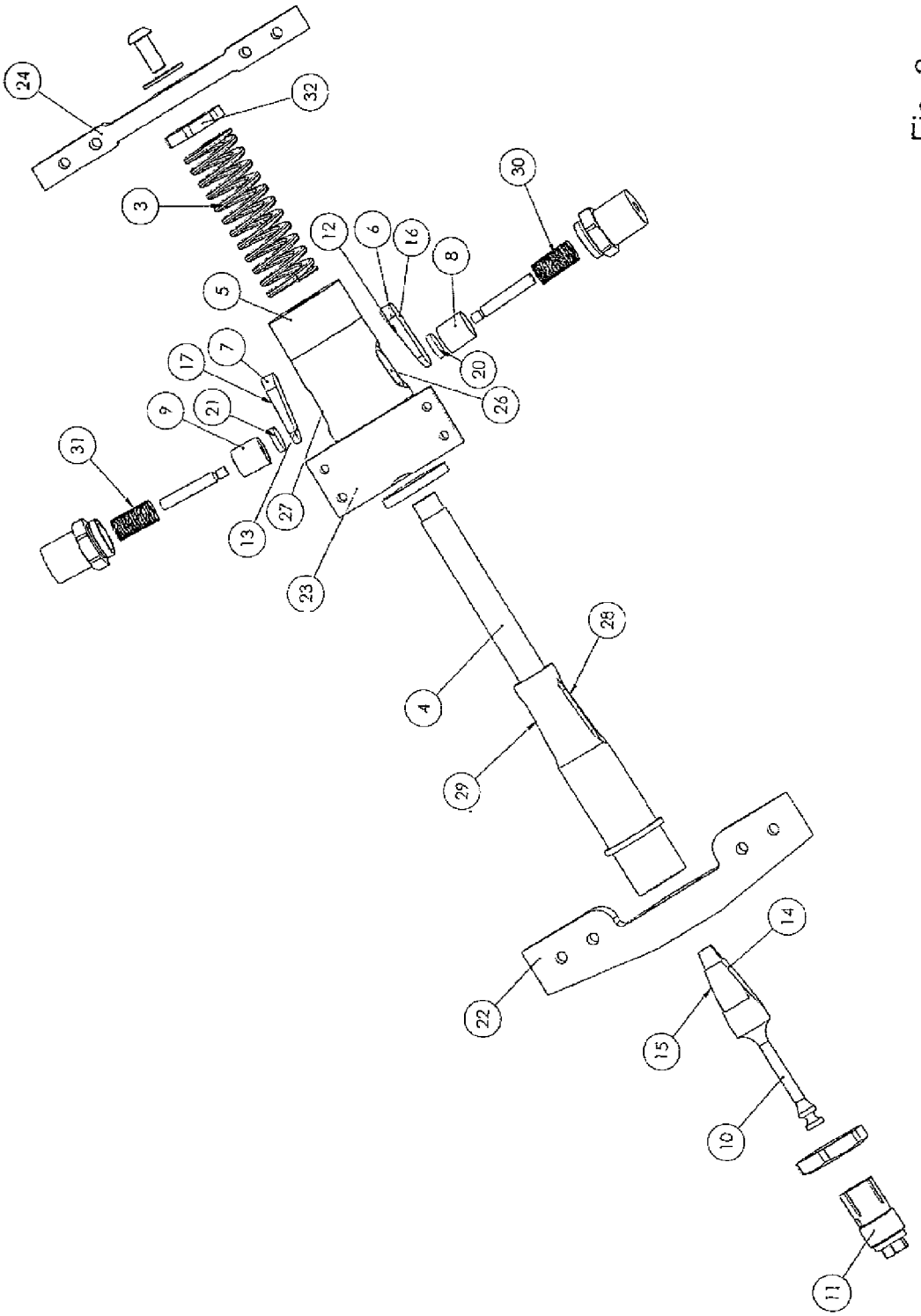

Fig. 3

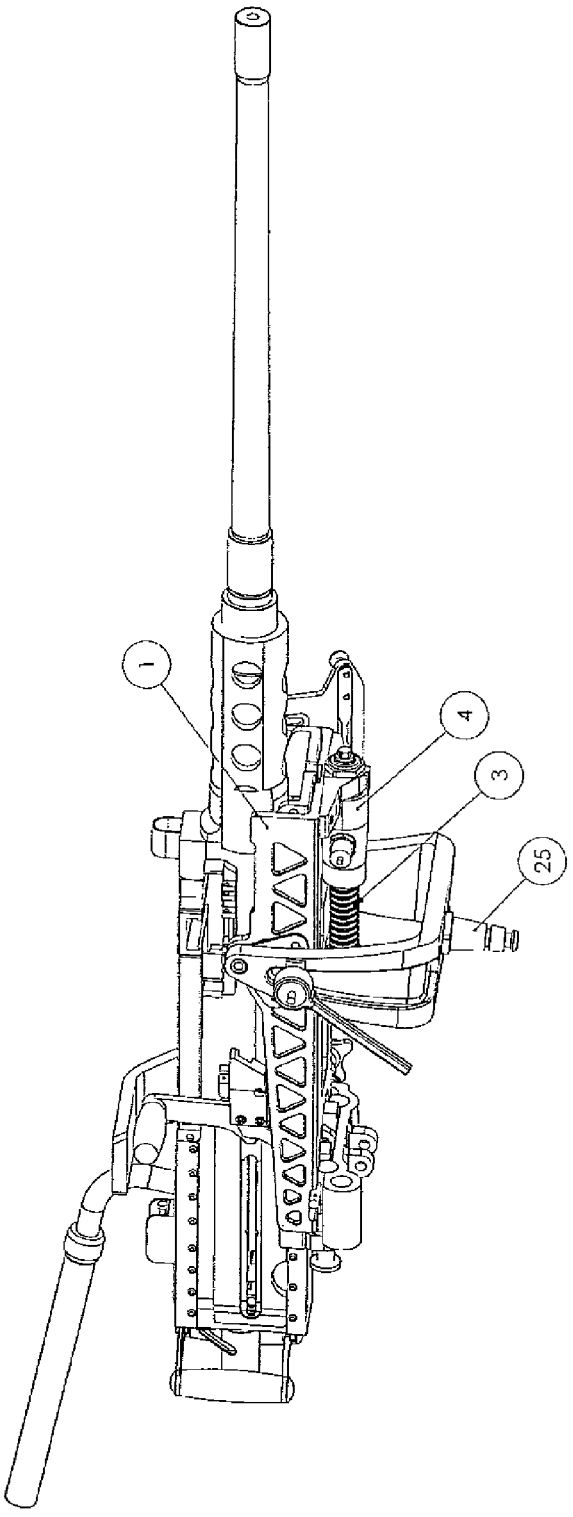

Fig. 4a

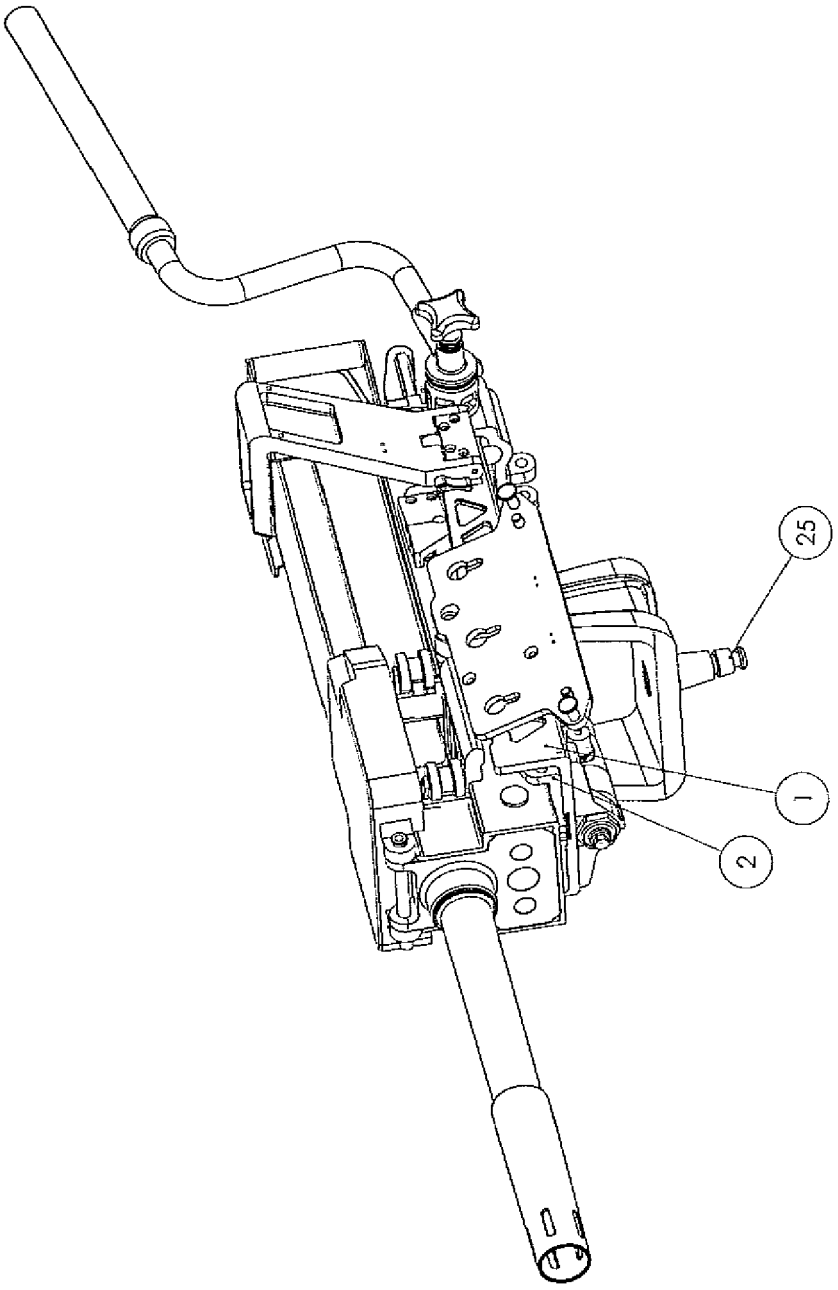

Fig. 4b

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EUROPEAN SEARCH REPORT

Application Number
EP 10 15 4494

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	2 July 2010	Gex-Collet, A

CATEGORY OF CITED DOCUMENTS

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1

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REFERENCES CITED IN THE DESCRIPTION

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