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## (54) Striking plate assembly

(57) A striking plate assembly (1) for a lock to be secured to a frame comprising a striking plate (2), which has a bolt opening (3) arranged in the front surface (2.1) thereof and to which a bolt casing (4) is secured, inside of which casing a body part (5) providing a bolt housing is movably adapted, the bolt housing (5.1) itself forming a stationary part thereof, and an adjusting screw arrangement operated from the front surface (2.1) of the striking plate for adjusting the bolt housing (5.1) with respect to the striking plate (2), whereby the adjusting screw arrangement is arranged to be supported on one hand by the striking plate (2) and on the other hand by the bolt casing (4). The adjusting screw arrangement comprises guiding members (7, 8), which are arranged to affect directly the body part (5) so that they adjust the position of the bolt housing (5.1) with respect to the striking plate (2) and its bolt opening (3) and lock the current position of the body part (5) of the lock housing.

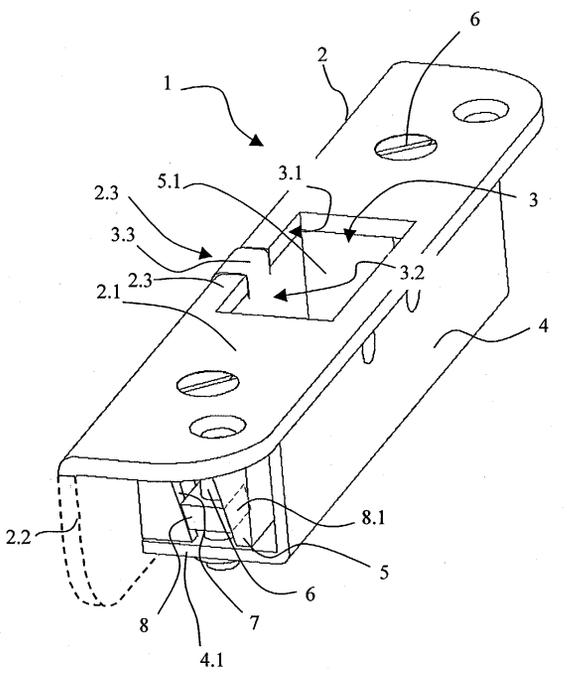


**Fig. 1**

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## Description

**[0001]** The invention relates to a striking plate assembly in accordance with the preamble of claim 1.

**[0002]** Striking plates are generally used as counterparts for locks to reinforce the frame. Especially in doors, seals are used between the door and the frame in order to provide a force pushing the door open when the door is locked. When closing the door it always has to be pushed against the seals with such a force that the seal is squeezed so as to make the bolt meet the opening in the striking plate so that it may penetrate into the opening for the bolt. Thus, a certain sealing force is required. Generally in the art, the sealing force refers to a force, which is required when closing a door or the like for pressing the door against the sealing so that the lock bolt may penetrate properly through the opening for the bolt into the bolt housing. In constructions of this kind there have been several reasons for adjusting this sealing force. For instance the position of the door frame may slightly change with the years or the seals may need to be replaced with stiffer ones.

**[0003]** One approach to the adjustment of sealing force is disclosed in the publication FI 820120. The suggestion therein is to arrange behind the striking plate an element parallel to the normal of the front surface thereof, and screws transverse relative to the longitudinal direction, by turning of which screws the element abutting the side of the bolt may be moved. One problem here is, however, the fact that it is very difficult to adjust the sealing force when the striking assembly is in its place, as the adjustment needs to be made through small openings by turning the screws behind the striking plate. Moreover, the retention of the plate member determining the sealing force in place is dependent on the force of the springs arranged in conjunction with the adjusting screws, which increases the risk of malfunctions. In addition, the adjustment requires, due to the spring force, a relatively great torsion force. Further, an arrangement of this kind has the disadvantage that when the adjustment piece is moved a longer distance, a stepping or even an intermediate space is formed between the striking plate surface and the adjustment piece edge, into which space the bolt may slightly penetrate. In this situation the lock is not properly locked, even though one might get that impression when trying to open the door. This involves a great risk of burglary.

**[0004]** An aim of the present invention is to provide a striking plate assembly minimizing the problems related to prior art. A particular aim of the invention is to provide a striking plate assembly, where the adjustment of the sealing force is simple and at the same time the locking of position is performed reliably and efficiently.

**[0005]** The invention provides a striking plate assembly according to claim 1. Preferred or optional features of the invention are defined in the other claims.

**[0006]** According to the invention the adjusting screw arrangement comprises guiding members, which are arranged to affect directly the body part providing the bolt housing so that they adjust the position of the bolt housing with respect to the striking plate and its bolt opening and lock the current position of the body part of the lock housing.

**[0007]** The adjusting screw arrangement preferably comprises a screw member or the like, with the thread of which a force transmission element provided with a female thread is operatively connected, and a guide groove or the like provided in the body part, with a guide surface of which groove the force transmission element is adapted to cooperate.

**[0008]** If the guide surface of the guide groove or the like is at an angle with respect to the longitudinal axis of the screw member or the like, a movement of the body part is accomplished by turning the screw member. The transmission element can comprise a counter surface for the guide surface of the guide groove, the guide surface and the counter surface being substantially at the same angle with respect to the longitudinal axis of the screw member or the like. Preferably, the afore-mentioned angle is less than 45 degrees.

**[0009]** The body part providing the bolt housing is preferably provided on both sides of the bolt opening with a guiding arrangement, which is in operative communication with the screw member or the like and converts the rotary motion of the screw member or the like to a displacement movement of the body part parallel to the striking plate. In the arrangement according to the invention the guide groove or the like preferably comprises two guide surfaces facing each other, whereby the first guide surface at the first end of the guide groove comprises a screw member space on the guide surface and at the second end of the guide groove the second guide surface comprises a screw member space on the guide surface. The screw member spaces are substantially parallel to the longitudinal axis of the screw member. Thus the movement range of the body part of the bolt housing is made sufficiently wide.

**[0010]** Preferably, the screw member is supported by the striking plate as well as by the bolt casing at the other end, and it extends through the body part of the bolt housing. The forces exerted by the bolt on the body part are thus transmitted primarily via the screw member over to the striking plate as shear forces of the screw member, i.e. in the transverse direction with respect to the longitudinal axis thereof.

**[0011]** Several advantages are obtained by the striking plate assembly according to the invention, such as an easy and precise adjustability when the striking plate is assembled in the frame. In addition, the arrangement according to the invention does not require separate locking of the moving parts, but the moving parts are always locked with respect to the forces exerted by the bolt.

**[0012]** In the following the invention is described in more detail, by way of example only, with reference to the attached drawings, in which

- Figure 1 shows a schematic view of an embodiment of the striking plate assembly according to the invention;
- Figure 2 shows the body part of the bolt housing according to Figure 1;
- Figure 3 shows the striking plate assembly in its first extreme position;
- Figure 4 shows the striking plate assembly in its second extreme position;
- Figure 5 shows a schematic view of a detail in a second embodiment according to the invention; and
- Figure 6 shows a schematic view of a detail in a third embodiment according to the invention.

**[0013]** In Figure 1 the reference number 1 indicates a striking plate assembly to be assembled in a rebated frame. The striking plate assembly 1 comprises a striking plate 2, in the front surface 2.1 of which is arranged a bolt opening 3, into which the lock bolt may penetrate. In Figure 1 also the lateral surface 2.2 of the striking plate is shown by a dashed line, which surface is approximately at a right angle with respect to the front surface. The lateral surface is used for instance for reinforcing the striking plate structure and on the other hand for hampering burglary attempts. The striking plate assembly also comprises an adjustable bolt housing 5.1, in which a wall structure 3.2 substantially perpendicular to the striking plate is arranged. This wall structure comprises at least one extension part 3.3, which extends from the bolt housing up to the level of the front surface of the striking plate. In order to secure the movement of the bolt in the different positions of the bolt housing the extension part is adapted to extend first on the level of the wall structure 3.2 of the bolt housing and thereafter substantially parallel to the front surface 2.1 of the striking plate and substantially on the same level.

**[0014]** The striking plate assembly also comprises a bolt casing 4. In the space delimited by the bolt casing 4 and the striking plate 2 is provided the body part 5 for the bolt housing, inside which the bolt housing 5.1 is arranged. The body part 5 is arranged to be moved perpendicularly with respect to the longitudinal axis of the striking plate parallel to the front surface level thereof in a way described further on. The bolt opening 3 fits in the front surface 2.1 so that it forms a support surface 3.1 for the lock bolt in the edge area of the striking plate. In the striking plate assembly the front surface 2.3 of the striking plate 2 receiving the bolt lock and delimiting the bolt opening 3 comprises a space 2.3 for the extension part 3.3 of the wall structure 3.2 of the bolt housing. Thereby, when the position of the bolt housing is adjusted and the wall structure 3.2 of the bolt housing 5.1 is as far away as possible from the surface 2.3 receiving the bolt and delimiting the opening for bolt, the extension part 3.3 and the front surface 2.3 of the striking plate form a substantially even sliding surface for the bolt. The sliding surface extends from the striking plate edge up to the bolt housing. The space 2.3 for the extension part 3.3 of the wall structure of the bolt housing is longer, in the transverse direction with regard to the longitudinal direction of the striking plate, than the thickness of the material of the wall structure of the bolt housing. Thus a proper closing of the lock, i.e. the protrusion of the bolt out of the lock to its extreme position, for instance into a deadlocking position can be secured.

**[0015]** With reference to Figures 1 and 2 the body part for the bolt housing comprises a bolt housing 5.1, which also forms a support surface 3.2 for the lock bolt. When the sealing force of a door or the like for some reason needs to be changed, this may be carried out by means of the arrangement according to the invention as follows. In the arrangement according to the figures the front surface of the striking plate is provided with two screws 6, which act as force transmission means based on rotary motion. The screws 6 are turnably supported at one end by the striking plate 2 and at the other end by the bolt casing 4. The bolt casing also has a component 4.1 parallel to the striking plate surface, and these two together form guiding and support surfaces for the body part 5 of the bolt housing. Thus the forces exerted by the lock bolt on the body part are transmitted forward by means of the screws 6 via the striking plate and the component 4.1 of the bolt casing. The screws 6 are provided with a male thread along the distance between their ends. The body part 5 of the bolt housing comprises at least one auxiliary member, which is connected to the screw 6. By means of the auxiliary member the rotary motion of the screw 6 can be converted to a displacement movement of the body part 5 of the bolt housing parallel to the front surface of the striking plate 2.

**[0016]** In the arrangements according to Figures 1 - 4 there are guide grooves or the like 7 at both ends of the body part extending in this embodiment through the body part. In conjunction with the screws 6 there is a transmission element 8 provided with a female thread and moving in the direction of the longitudinal axis of the screw when the screw is turned. The transmission element 8 is adapted to move in the guide groove 7 along the guide surfaces thereof. The guide groove 7 and its guide surfaces are arranged at a certain angle with respect to the longitudinal axis of the screw 6, whereby the transmission element, when moving, exerts a component force on the body part, which force moves the body part 5 parallel to the front surface of the striking plate. A suitable angle is selected, producing by means of the combined effect of the thread of the screw 6 and the transfer member 8 an appropriate transmission ratio for the movement. In practice it is preferable that the angle is less than 45 degrees. In Figure 1 the guide groove comprises two guide surfaces facing each other, and in order to provide a sufficiently long movement for the body part the first guide surface at the first end of the guide groove comprises a screw member space 7.3 on the guide surface and at the second end of the guide groove the second guide surface comprises a screw member space 7.4 on the guide surface. The wall sur-

faces of the screw member spaces are substantially parallel to the longitudinal axis of the screw.

**[0017]** Figure 3 depicts the striking plate assembly in its first extreme position, where the sealing force of a door or the like is as low as possible. In this position the support surface 3.1 of the bolt housing 5.1 is as close to the lateral surface 2.2 of the striking plate 2 as possible. The transmission element 8 is now screwed down to the screw 6 at the end closer to the bolt casing. In this position the extension part 3.3 of the wall structure 3.2 of the bolt housing 5.1 is totally overlapping the space 2.3 and extending even somewhat beyond the lateral surface 2.2. When the screw is turned in such a direction that the transmission element 8 moves towards the front surface 2.1 of the striking plate, the body part 5 moves away from the lateral surface of the striking plate guided by the inclined guide surface. Also the extension part 3.3 moves in the space 2.3 further away from the lateral surface 2.2. When the transmission element 8 is in its extreme position at the end of the screw 6 closer to the front surface of the striking plate, the body part is as far away as possible from the lateral surface 2.2 of the striking plate. This position is shown in Figure 4. In this position the extension part 3.3 extends towards the lateral surface 2.2 so that the extension part 3.3 and the front surface 3.2 of the striking plate form a substantially even sliding surface for the bolt, which sliding surface extends from the striking plate edge to the bolt housing.

**[0018]** Figures 5 and 6 show alternative ways to arrange a force transmission means 6 based on rotary motion, and a guiding arrangement in cooperation therewith, which guiding arrangement is in operative communication with the force transmission means 6 and converts the rotary motion of the force transmission means to a displacement movement of the body part of the bolt housing parallel to the front surface of the striking plate. According to Figure 5 this is accomplished by means of gear wheel arrangements and in Figure 6 by the operating principle of an articulated jack. In the figures the connections between the turning direction and the direction of motion are shown by arrows.

**[0019]** The invention is not limited to the above-described applications, as several other modifications are conceivable within the scope of the appended claims.

## Claims

1. A striking plate assembly (1) for a lock to be secured to a frame, comprising a striking plate (2), which has a bolt opening (3) arranged in the front surface (2.1) thereof and to which a bolt casing (4) is secured, inside of which casing a body part (5) is movably located, a bolt housing (5.1) forming a stationary part of the body part, and an adjusting screw arrangement operated from the front surface (2.1) of the striking plate for adjusting the bolt housing (5.1) with respect to the striking plate (2), wherein the adjusting screw arrangement is arranged to be supported on one hand by the striking plate (2) and on the other hand by the bolt casing (4), **characterised in that** the adjusting screw arrangement comprises guiding members (7, 8), which are arranged to affect directly the body part (5) so that they adjust the position of the bolt housing (5.1) with respect to the striking plate (2) and its bolt opening (3) and lock the current position of the body part (5).

2. A striking plate assembly (1) according to claim 1, **characterised in that** the adjusting screw arrangement comprises a screw member or the like (6), with the thread of which a force transmission element (8) provided with a female thread is operatively connected, and a guide groove or the like (7) provided in the body part (5), with a guide surface (7.5) of which groove the force transmission element (8) is adapted to cooperate.

3. A striking plate assembly according to claim 2, **characterised in that** the guide surface (7.5) of the guide groove or the like (7) is at an angle with respect to the longitudinal axis of the screw member or the like (6).

4. A striking plate assembly according to claim 3, **characterised in that** the transmission element (8) comprises a counter surface (8.1) for the guide surface (7.5) of the guide groove (7) and **in that** the guide surface (7.5) and the counter surface (8.1) are substantially at the same angle with respect to the longitudinal axis of the screw member or the like (6).

5. A striking plate assembly according to claim 3 or 4, **characterised in that** the angle is less than 45 degrees.

6. A striking plate assembly according to any one of claims 2 to 5, **characterised in that** the body part (5) is provided with a guiding arrangement (7, 8), on both sides of the bolt opening (3), which guiding arrangement (7, 8) is in operative communication with the screw member or the like (6) and converts the turning movement of the screw member or the like to a displacement movement of the body part (5) parallel to the striking plate.

7. A striking plate assembly according to any one of claims 2 to 6, **characterised in that** the guide groove or the like (7) comprises two guide surfaces (7.5) facing each other, wherein the first guide surface at the first end (7.1) of the guide groove comprises a screw member space (7.3) on the guide surface and at the second end (7.2) of the guide groove the second guide surface comprises a screw member space (7.4) on the guide surface, and that

the screw member spaces (7.3, 7.4) are substantially parallel to the longitudinal axis of the screw member (6).

**8.** A striking plate assembly according to any one of claims 2 to 7, **characterised in that** the screw member (6) is supported by the striking plate (2) at one end as well as by the bolt casing (4) at the other end, and **in that** it extends through the body part (5).

**9.** A striking plate assembly according to any one of the preceding claims, **characterised in that** the wall structure (3.2) of the adjustable bolt housing (5.1), being substantially perpendicular to the striking plate, comprises at least one extension part (3.3), which extends to the level of the front surface of the striking plate, and **in that** the extension part (3.3) extends firstly coplanar with the wall structure (3.2) of the bolt housing and thereafter substantially parallel to the front surface (2.1) of the striking plate.

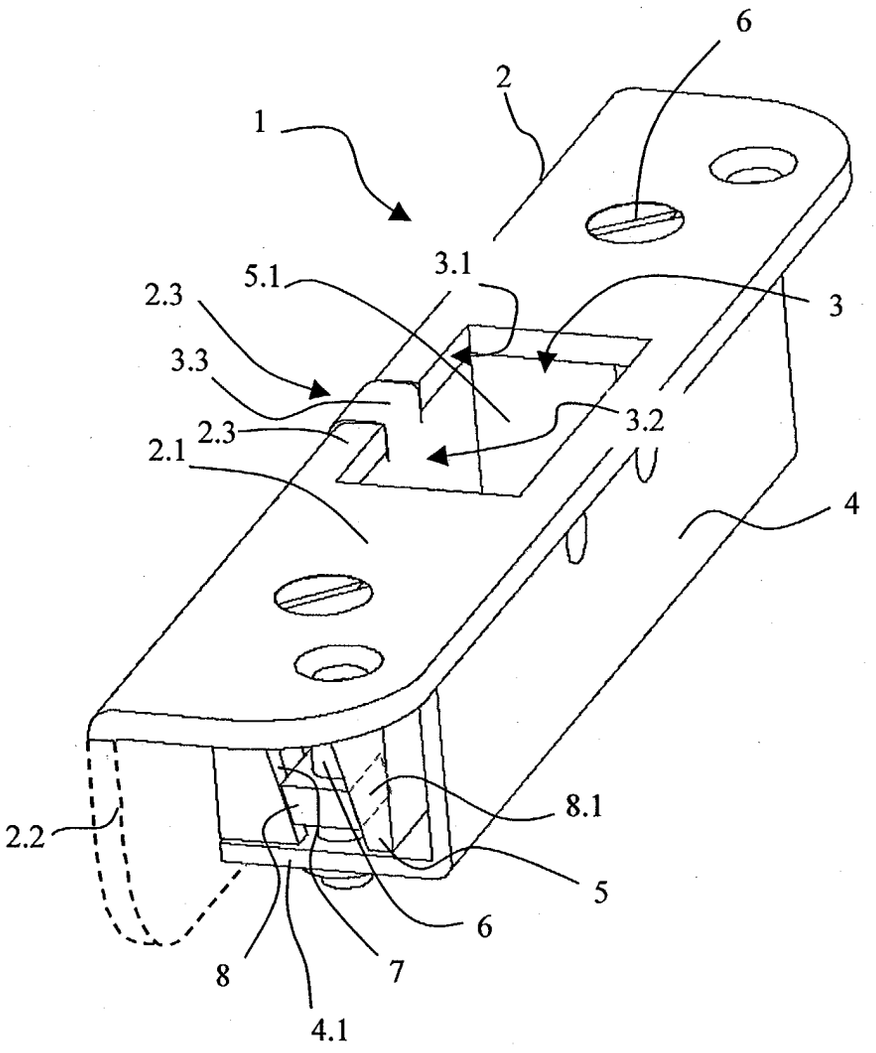


Fig. 1

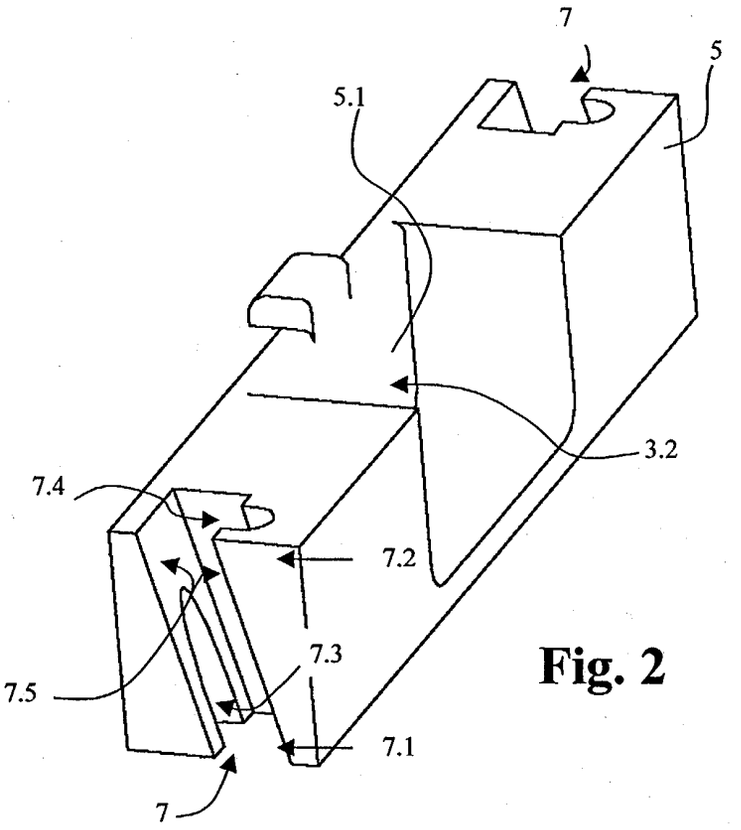


Fig. 2

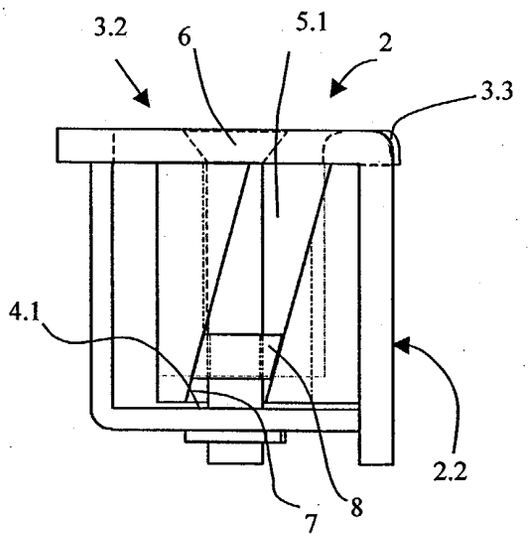


Fig. 3

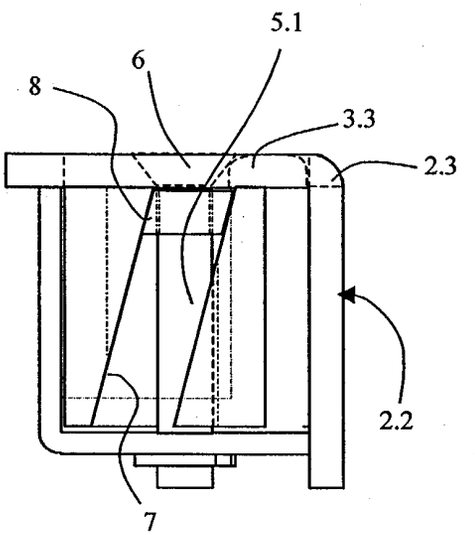


Fig. 4

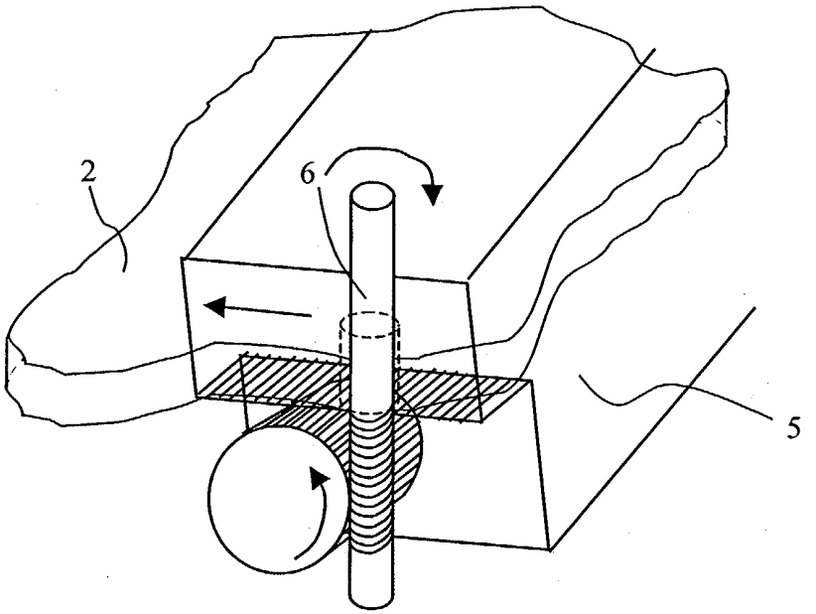


Fig. 5

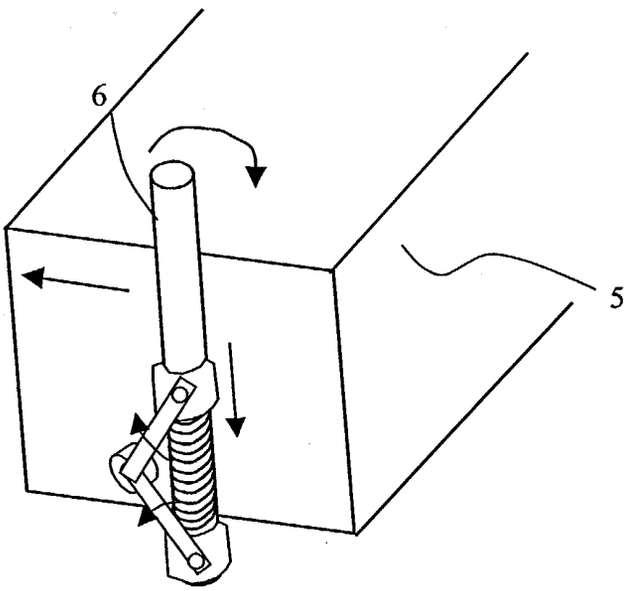


Fig. 6