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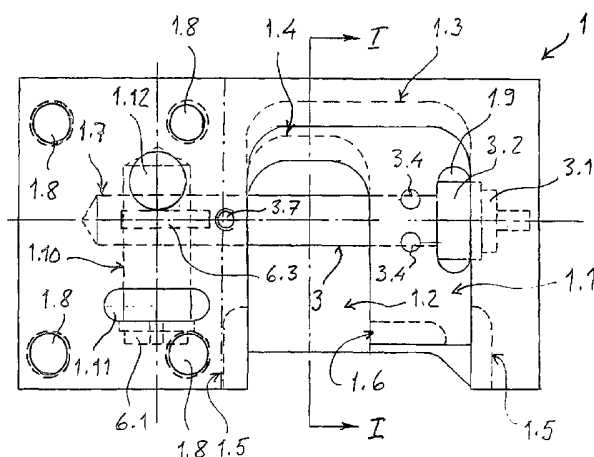
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(54) Title: TWO-PIECE LOCK ARRANGEMENT



(57) Abstract: A lock arrangement comprising a first lock part, intended to be attached to, for example, one door of a double door, and a second lock part, intended to be attached to the second door, whereby the first lock part offers a lock bolt that can, when the lock parts are brought together, be brought into interaction with the second lock part. The first lock part offers one or several cavities provided with tracks and the second lock part offers a lock head that can be displaced and that is provided with edges arranged in a vertical plane that are intended to interact with corresponding tracks when the lock head is vertically displaced upwards to the position in which the lock bolt can be activated and lock the lock parts together. The bolt can be rotated around its axis in the first lock part. The lock head is mounted such that it can be displaced in a guide arrangement on a base plate. Furthermore, the lock head can be displaced upwards or downwards with the aid of a manoeuvre lever. A lock cylinder is arranged in the first lock part in order to lock or to release the lock bolt when this is positioned in the locking position. The lock bolt is manoeuvred between the locked and the released position with the aid of a shaft arranged on the same, which shaft extends from the first lock part.



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## TWO-PIECE LOCK ARRANGEMENT

### *Technical Area*

The present lock arrangement is intended to lock doors and comprises a first lock part, intended to be attached, for example, to one door of a double door, and a second lock part, intended to be attached to the other door, whereby the first lock part offers a lock bolt that, when the lock parts are brought together, can be brought into interaction with the second lock part.

### *Background to the Invention*

The Swedish patent application SE C2 510 672 describes a lock arrangement that is intended to be used within the same field as the present invention, and that comprises two fixed lock parts, intended to be mounted, for example, each to one door of a double door, and a removable lock part equipped with a lock bolt and a lock cylinder, intended to be threaded onto the two fixed lock parts. The lock parts are locked together by the rotation of the lock bolt to a locked position with the aid of a key in the lock cylinder.

The disadvantage with this lock arrangement is that the removable part can be lost or it can end up in the wrong place, for example, when transporting empty containers on which the lock arrangement has been mounted. The aim of the present invention is to achieve a lock arrangement with the same resistance to intrusion as that previously known, without having the latter's disadvantages.

### *Summary of the Invention*

The lock arrangement according to the invention comprises a first lock part, intended to be fixed, for example, to one door of double door, and a second lock part, intended to be fixed to the second door, whereby the first lock part offers a lock bolt that, when the lock parts are brought together, can be brought into interaction with the second lock part. The first lock part offers one or several cavities provided with tracks that are open in a vertical plane downwards in the cavities, while the second lock part offers a head that can be displaced in a vertical plane and that is equipped with edges arranged in a vertical plane that are directed upwards towards the upper part of the head. The edges are intended to interact with the equivalent track when the head is displaced vertically upwards to

the position in which the lock bolt can be activated and lock the lock parts together.

It is possible to rotate the bolt around its long axis in a cylindrical hole in the first lock part, and the bolt runs in a first cavity with the shape of a half cylinder in the bottom of the inner of the cavities in the first lock part. The lock bolt runs in a second cavity with the shape of a half cylinder in the lock head when the lock parts are brought together and when the lock head has been displaced into the first lock part. The lock bolt offers a cavity to the extent of half of its diameter that extends over the width of the lock head and that allows the lock head to be displaced upwards or downwards in the first lock part when the section of the lock bolt remaining at the cavity in the same is inserted into the first lock part.

The lock head is mounted onto a base plate such that it can be displaced and it can be displaced in a vertical direction within this along a guide arrangement. The lock head can furthermore be displaced upwards or downwards with the aid of a control lever. A lock cylinder is arranged in the first lock part in order to lock or to release the lock bolt when it is positioned in the locking position. The lock bolt is manoeuvred between locked and free positions with the aid of a shaft arranged on the same, which shaft protrudes from the first lock part.

The use of the lock arrangement according to the invention is not limited to double doors such as those on, for example, containers, but it can refer to all types of door, hatch and similar arrangements, both single and double. When used, for example, on a single door, the first lock part can be placed on the door leaf while the second part with the displaceable lock head can be placed on the door frame or on the wall beside the door. The lock arrangement according to the invention is principally intended to be mounted such that the lock head can be displaced vertically such that it falls under its own weight from the locked position when the lock bolt is rotated. However, there is nothing in principle to prevent the lock arrangement being mounted upside down, whereby the lock head must be pulled upwards manually from its interaction with the first lock part. It is also conceivable that the lock arrangement be mounted with the lock head mobile in a horizontal plane or at various angles to the horizontal plane.

Further characteristics and details concerning the present invention are made clear by the description of the drawings and by the attached patent claims.

The invention will be described below in the form of an embodiment with reference to the attached drawings.

### ***Description of Drawings***

- Figure 1 shows the first part of the two-piece lock arrangement according to the invention, viewed from the inside.
- Figure 2 shows the first part of the lock according to Figure 1 viewed in cross-section along the line I-I in Figure 1.
- Figure 3 shows the second part of the lock arrangement seen in a view from one end.
- Figure 4 shows the second part of the lock according to Figure 3 seen from a view to the left in Figure 3.
- Figure 5 shows the first lock part according to Figure 1 from underneath.
- Figure 6 shows the lock bolt that is part of the first lock part.
- Figure 7 shows the lock bolt according to Figure 6 from above.

### ***Description for the Figures***

The lock arrangement according to the invention, as is shown in the drawings, comprises a first lock part 1, intended to be attached to, for example, one door leaf of a double door of a container, and a second lock part 2, intended to be attached to the second door leaf of the said container. The first lock part 1 offers a lock bolt 3 that can be rotated around its long axis and that, when the lock parts 1 and 2 are brought together, is brought to interact with a lock head 4 that can be displaced in a vertical direction and that during locking is vertically displaced upwards before the lock bolt 3 is rotated.

The first lock part is constituted by a prism of steel, principally rectangular, the sides of which are inclined inwards towards the outer plane surface of the lock part 1. The first lock part 1 offers on its inner surface an outer, essentially rectangular, cavity 1.1 in which an inner, also this being rectangular, cavity 1.2 is situated. The outer cavity 1.1 offers at its upper edge a horizontal external track 1.3 that opens downwards towards the centre of the cavity, while the inner cavity 1.2 offers a similar inner track 1.4 at the equivalent edge. The outer cavity 1.1 further offers two vertical lower tracks 1.5 at the lower edge of the lock part 1, while the inner cavity 1.2 offers a horizontal lower track 1.6 that is open at its lower

edge. The tracks in the cavities 1.1, 1.2 in the first lock part 1 are intended to enter into interaction with equivalent means on the second lock part 2 when the lock is locked. The lock bolt 3 is arranged such that it extends in a horizontal hole 1.7, with the shape of a cylinder, and over the inner cavity 1.2, in the rear wall of which the lock bolt 3 is inserted to half of its length.

The second lock part 2 offers a lock head 4 that can be displaced on a base plate 2.1 in a vertical direction between an upper position, in which the combined lock arrangement can be locked, and a lower position, in which it is unlocked. The lock head 4 offers at its external edge an outer head 4.1, the shape of which is essentially equivalent to the shape of the inner cavity 1.2 in the first lock part 1, and that protrudes from an inner head 4.2, the shape of which is essentially equivalent to the shape of the outer cavity 1.1 in the first lock part 1. The outer head 4.1 offers at its upper edge a horizontal outer edge 4.3 that is intended to enter during locking into interaction with the inner track 1.3 in the inner cavity 1.2 in the first lock part 1. The inner head 4.2 demonstrates at its upper edge a horizontal inner edge 4.4 that is intended to enter during locking into interaction with the outer track 1.3 in the outer cavity 1.1 in the first lock part 1.

The inner head 4.2 further offers two vertical lower edges 4.5, protruding towards the sides, that are intended during locking to enter into interaction with the vertical lower tracks 1.5 in the outer cavity 1.1, while the outer head 4.1 offers a horizontal lower edge 4.6 that is intended during locking to enter into interaction with the horizontal outer track 1.6 in the outer cavity 1.2 in the first lock part 1. Furthermore, a horizontal cavity 4.7 with the shape of a half cylinder and intended for the lock bolt 3 extends across the outer plane surface of the outer head 4.1.

The lock head 4 is screwed attached with two screws 4.8 into a guide plate 2.2 that runs in a vertical cavity 2.3 on the back surface of the base plate 2.1. The cavity 2.3 is sufficiently long to allow the guide plate 2.2 to be displaced downwards sufficiently far such that the edges of the lock head 4 can release their interaction with the equivalent track in the first lock part 1 during unlocking. The screws 4.8 extend downwards through an extended hole 2.4 in the base plate 2.1 to threaded holes 2.2 in the guide plate. A control lever 2.5 is attached in a cavity on the inner surface of the lock head 4 and extends downwards a certain distance from its lower edge. The base plate 2.1 is fixed attached by screws, not shown in the drawings, that extend from the inner surface of the door leaf and into threaded

holes 2.6 on the rear surface of the base plate, which faces the door leaf. With the aim of locating the first lock part 1 in the same plane as the second lock part 2, a distance plate 5 is placed between the door leaf and the first lock part 1 when mounting, with the aid of screws, not shown in the drawings, that extend from the inner surface of the door leaf, through holes in the distance plate 5, and into threaded holes 1.8 on the inner surface of the first lock part 1.

The lock bolt 3, which is shown in Figures 6 and 7, is mounted by inserting it into the horizontal hole 1.7, which has the shape of a cylinder, in the first lock part 1 into an inner position, at which not only a hardened first drilling protection plate 3.1 but also an impact protection plate 3.2 can be inserted through a first assembly opening 1.9 in the inner surface of the first lock part 1. The lock bolt 3 is subsequently displaced backwards such that its shaft 3.3 protrudes through holes in the plates and out from the hole 1.7 in the first lock part 1. The lock bolt 3 is held in this position by pins 3.4 being inserted into holes in the inner surface of the first lock part 1 and being allowed to protrude downwards into a ring-shaped track 3.5 in the lock bolt 3.

A lock cylinder 6 that can be controlled by a key is inserted into an inner position in a hole 1.10 with the shape of a cylinder sufficiently far that the lock cylinder 6 passes a second assembly opening 1.11, after which a second hardened drilling protection plate 6.1 is inserted in order to cover the hole 1.10. The second drilling protection plate 6.1 offers an opening 6.2 for a key, not shown in the drawings. The lock cylinder 6 is subsequently displaced backwards towards the second drilling protection plate 6.1 by it being pressed with a finger that is inserted through a third assembly opening 1.12. A safety bolt 6.3 is mounted through the third assembly opening 1.12 onto the lock cylinder 6 and can subsequently be brought to lock the lock bolt 3 against turning, in that the safety bolt 6.3 interacts with a cavity 3.6 in the end of the lock bolt 3. In order to retain the lock bolt 3 in its open position, a spring means 3.7 in the form of, for example, a ball, is arranged on the inner surface of the first lock part 1 and in contact with a cavity 3.8 with the form of a bowl in a cylinder-shaped surface on the lock bolt 3.

Locking and unlocking of the lock arrangement is achieved in that the lock bolt 3 offers a cavity 3.9 for half of its diameter, at which the remaining section of the same when in the unlocked position is located inserted into the first lock part 1, as is shown in Figure 1. This section is located in the locked position in the

cavity 4.7 in the lock head 4 on the second lock part 2. During unlocking, a key is placed in the lock cylinder 6 and turned through 90°. The safety bolt 6.3 is in this manner removed from interaction with the lock bolt 3, which is subsequently rotated through 180° with the aid of a handle, not shown in the drawings, that is mounted on the shaft 3.3 of the lock bolt 3. A removable handle that functions as a "key" may alternatively be used. The lock head 4 on the second lock part 2 thus falls by its own weight from its interaction with the first lock part 1, after which the lock parts 1, 2 can be moved apart and the door can be opened. During locking, the lock head 4 is initially manually displaced upwards with the aid of the control lever 2.5, after which the lock bolt 3 is rotated back through 180° and the key through 90° such that the security bolt 6.3 regains interaction with the lock bolt 3. The key is subsequently removed.

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## CLAIMS

1. A lock arrangement in two pieces comprising a first lock part (1), intended to be attached to, for example, one door of a double door, and a second lock part (2), intended to be attached to the second door, whereby the first lock part (1) offers a lock bolt (3) that can, when the lock parts are brought together, be brought into interaction with the second lock part (2), **characterised** in that the first lock part (1) offers one or several cavities (1.1, 1.2) provided with tracks (1.3, 1.4, 1.5, 1.6) that are open in a vertical plane downwards in the cavities (1.1, 1.2), that the second lock part (2) offers a lock head (4) that can be displaced in a vertical plane and that is provided with edges (4.3, 4.4, 4.5, 4.6) arranged in a vertical plane that are directed upwards towards the upper part of the lock head (4), whereby the edges (4.3, 4.4, 4.5, 4.6) are intended to interact with corresponding tracks (1.3, 1.4, 1.5, 1.6) when the lock head (4) is vertically displaced upwards to the position in which the lock bolt (3) can be activated and lock the lock parts (1, 2) together.
2. The lock arrangement according to claim 1, **characterised** in that the lock bolt (3) can be rotated around its axis in a hole (1.7) in the first part (1) with the shape of a cylinder, and that the lock bolt runs in a first cavity with the shape of a half cylinder in the bottom of the inner of the cavities (1.2) in the first lock part (1), that the lock bolt (3) runs in a second cavity (4.7) having the form of half a cylinder in the lock head (4) when the lock parts (1, 2) are brought together and the lock head (4) is displaced upwards into the first lock part (1), and that the lock bolt (3) offers a cavity (3.9) to the extent of half of its diameter that extends over the width of the lock head (4), and that allows the lock head (4) to be displaced upwards or downwards in the first lock part (1) when the remaining section of the lock bolt (3) at the cavity in the same is inserted into the first lock part (1).
3. The lock arrangement according to claim 1 or 2, **characterised** in that the first lock part (1) offers an outer cavity (1.1) and an inner cavity (1.2) that extends from this, and that the lock head (4) offers an outer head (4.1) that is intended to extend into the inner cavity (1.2), and an inner head (4.2) located inside of this that is intended to extend into the outer cavity (1.1) in the first lock part (1) for locking.

4. The lock arrangement according to any one of claims 1-3, **characterised** in that the lock head (4) is mounted such that it can be displaced on a base plate (2.1) and can be displaced vertically in the same by a guide arrangement (2.2, 2.3, 4.8).

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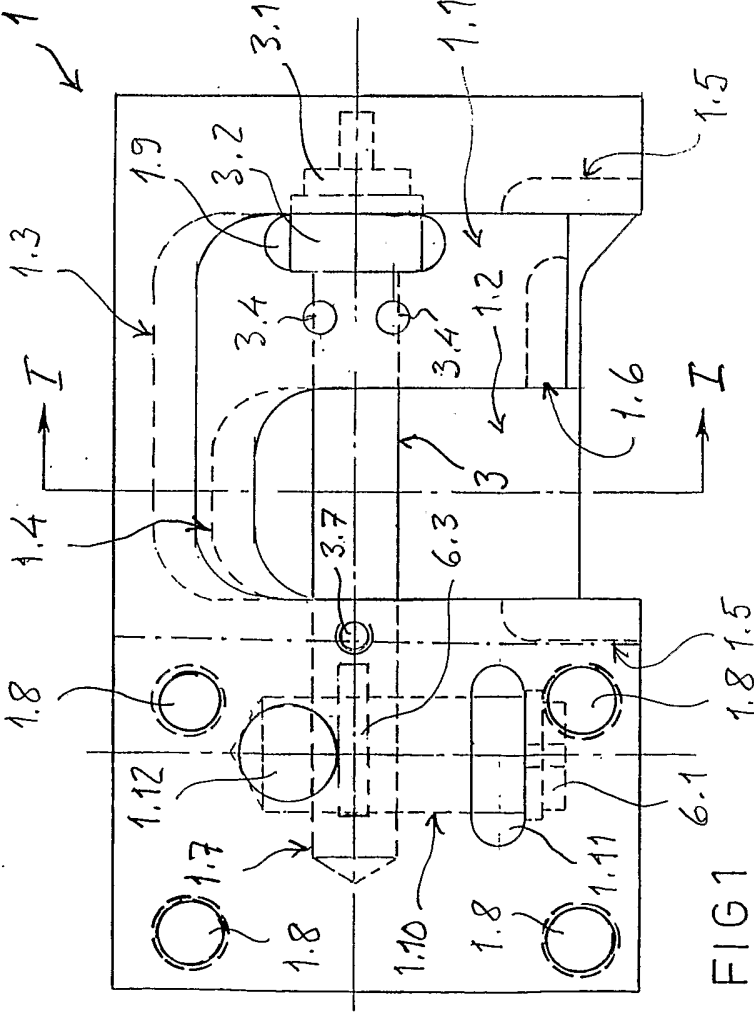
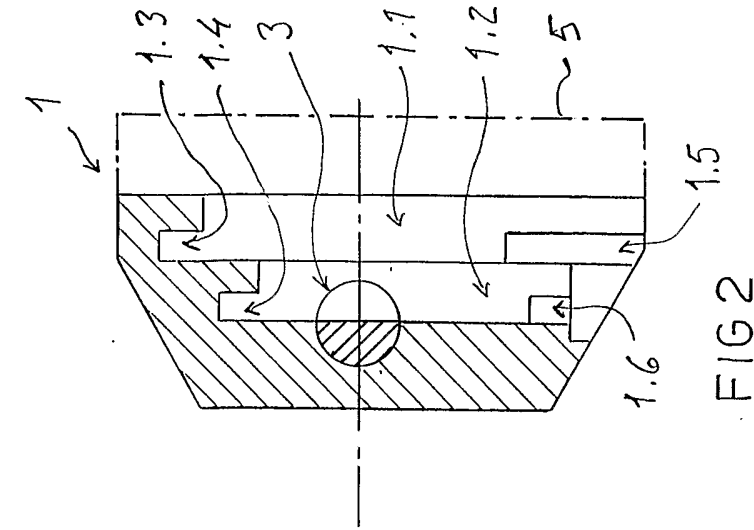
5. The lock arrangement according to any one of claims 1-4, **characterised** in that the lock head (4) can be displaced upwards or downwards with the aid of a control lever (2.5).

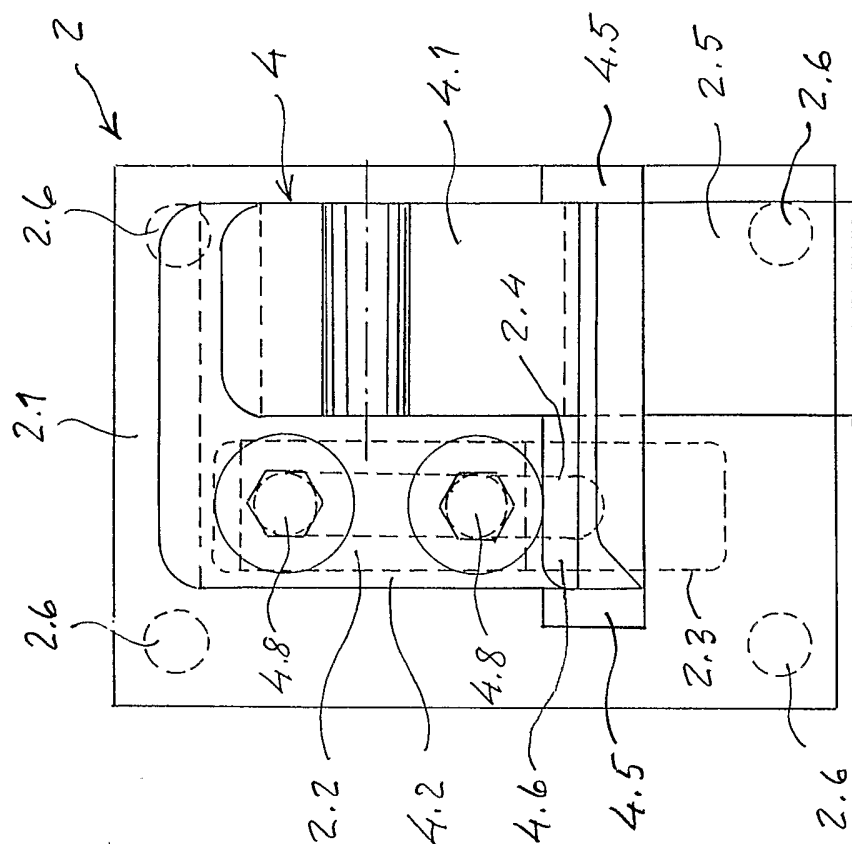
10 6. The lock arrangement according to any one of claims 1-5, **characterised** in that a lock cylinder (6) is arranged in the first lock part (1) in order to lock or to release the lock bolt (3) when this is positioned in the locking position.

15 7. The lock arrangement according to claim 6, **characterised** in that the lock bolt (3) is manoeuvred between the locked and the released position with the aid of a shaft (3.3) arranged on the same, which shaft extends from the first lock part (1).

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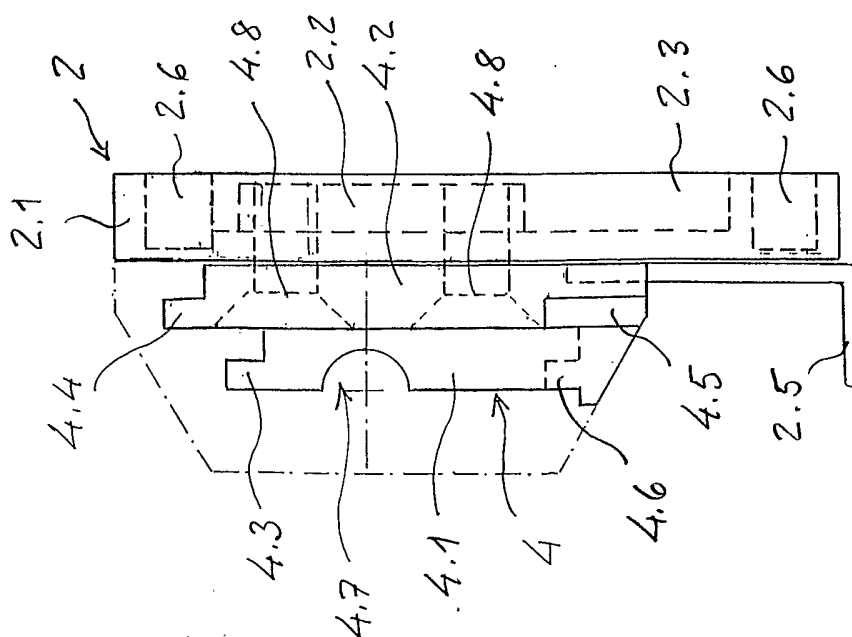
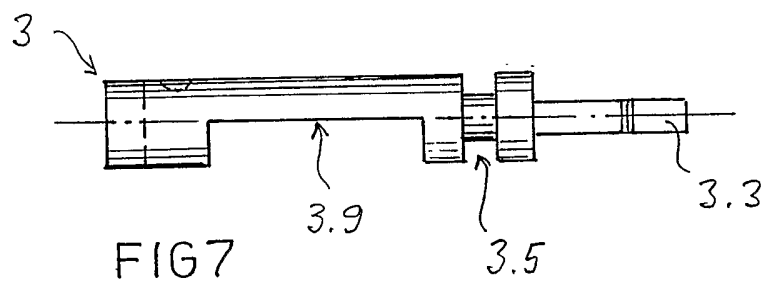
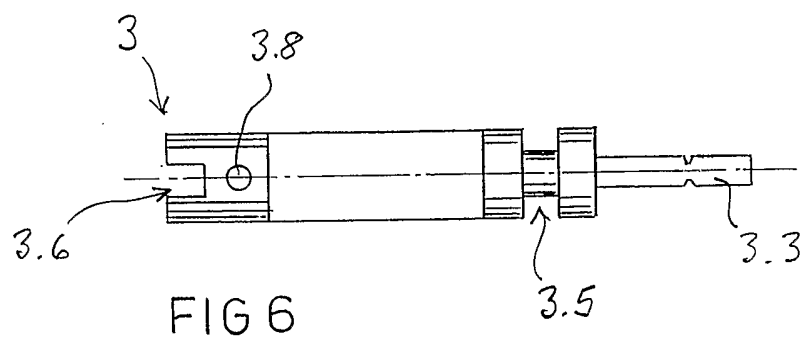
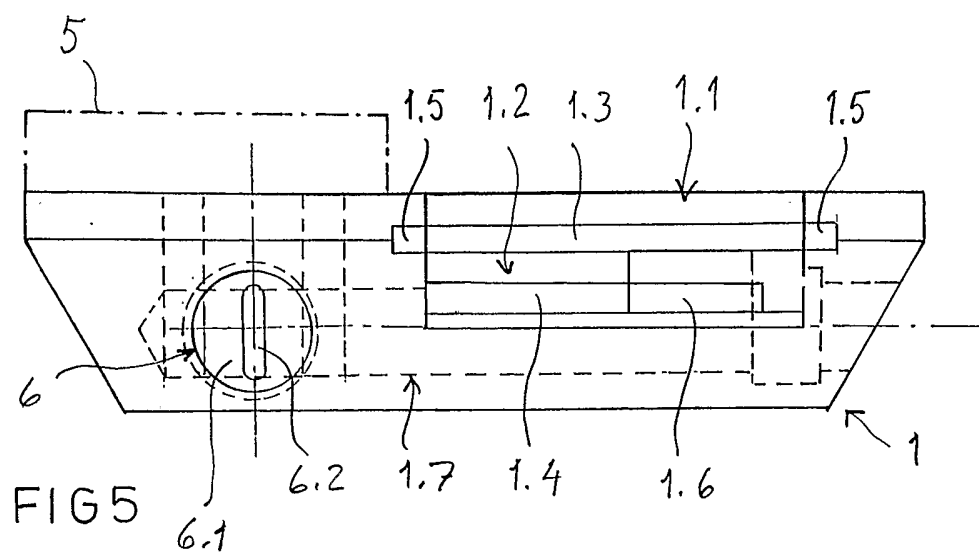


FIG 3

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## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 03/00822

## A. CLASSIFICATION OF SUBJECT MATTER

IPC7: E05B 65/48, E05B 67/38, E05B 63/12

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: E05B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

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☐ Further documents are listed in the continuation of Box C.
 ☒ See patent family annex.

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

02/06/03

International application No.

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| Patent document<br>cited in search report |         |    | Publication<br>date | Patent family<br>member(s) |              | Publication<br>date |
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