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(54) Adjustable cylinder with vacant/engaged notice

(57) An adjustable cylinder (1) with vacant/engaged notice constructed as an insert for door locks of for example toilets, cubicles, and the like, the cylinder (1) comprising a housing (2) in which a shaft (3) is rotatably mounted, a driver plug (4) for engaging a bolt of the door lock being mounted on the shaft (3), a grip (7) for turning the shaft (3) being fixed to a first end (5) of the shaft and an outwardly visible indicator (8) being provided on a second end (6) of the shaft (3), the indicator (8) having two different indications (9, 10) for providing the vacant/engaged notice, the shaft (3) and driver plug (4) being rotatable between two limits of a predefined work sector which are in a relation to the indications (9, 10) of the indicator (8), the cylinder (1) further comprising adjusting means (11) for adjusting the relation between the limits of the work sector and the indications of the indicator (8), the adjusting means being accessible from outside the housing (2).

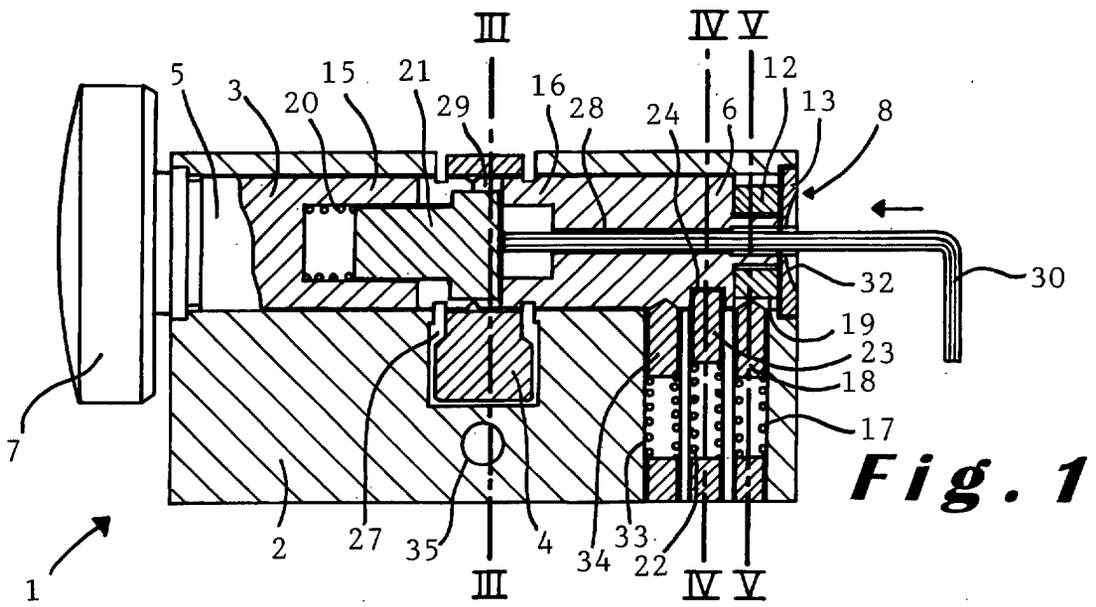

Fig. 1

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Description

[0001] This invention relates to an adjustable cylinder with vacant/engaged notice according to the preamble of claim 1.

[0002] From CH-A-560 307, an adjustable cylinder is known which is constructed as an insert for door locks of toilets, cubicles, etc. The cylinder comprises a housing in which a shaft of square cross section is rotatably mounted. A driver plug for engaging a bolt of the doorlock is fixed centrally on the shaft. A grip for turning the shaft and the driver plug is fixed on one end of the shaft and an indicator is provided on the other end of the shaft. The indicator is visible towards the outside of the cylinder, so that it provides the vacant/engaged notice. The indicator is provided on a contact disc, which is provided for limiting the rotation of the shaft and the driver plug to a predefined work sector. In the extreme positions of the driver plug, the contact disc engages a striker. By displacing the contact disc longitudinally along the shaft against the force of a spring, it can be moved past the striker, so that the driver plug can be rotated outside the work sector into an opening in the housing. This enables insertion of the cylinder in the door lock.

[0003] It is commonly known that the rotation direction of a door lock, i.e. the direction in which the grip is turned for locking the door, depends on the side of the door at which the lock is located. The cylinder known from CH-A-560 307 has the disadvantage that adjusting the cylinder to the left or right rotation direction of the door lock is a laborious operation.

[0004] It is an aim of the invention to provide an adjustable cylinder which is more easily adjustable to the rotation direction of the door lock.

[0005] This aim is achieved according to the invention with an adjustable cylinder showing the technical characteristics of the characterising part of claim 1.

[0006] The cylinder according to the invention comprises a housing in which a shaft is rotatably mounted. A driver plug for engaging a bolt of the door lock is mounted on the shaft. A grip for turning the shaft is fixed to a first end of the shaft and an outwardly visible indicator is provided on a second end of the shaft. The indicator has two different indications for providing the vacant/engaged notice. The shaft and the driver plug together are rotatable between two limits of a predefined work sector. These limits are in a relation to the two indications of the indicator, so that the locked/unlocked position of the driver plug and the bolt of the door lock are shown towards the outside. The cylinder of the invention further comprises adjusting means for adjusting the relation between the limits of the work sector and the indications of the indicator. These adjusting means are accessible from outside the housing.

[0007] With the cylinder of the invention, adjustment of the relation between the indications of the indicator and the limits of the work sector is enabled by providing the adjusting means. The limits of the work sector correspond to locked/unlocked positions of the driver plug. As a result the adjusting means enable adjustment of the relation between the indications of the indicator and the locked/unlocked positions of the driver plug. This shows that the cylinder of the invention is adjustable to the rotation direction of the door lock in which it is to be mounted.

[0008] In the prior art cylinder mentioned above, the position of the contact disc, which functions as the indicator, is fixed with respect to the driver plug, due to the square cross section of the shaft on which both parts are mounted. As a result, adjusting the relation between the indicator and the positions of the driver plug, i.e. adjusting the cylinder to the rotation direction of the door lock requires removal of the indicator from the shaft. Consequently, the adjustment can only be effected by at least partly disassembling the cylinder. This involves a laborious operation, which is undesirable.

[0009] In the cylinder of the invention, the adjusting means for adjusting the relation between the indications of the indicator and the limits of the work sector of the driver plug are accessible from outside the housing. As a result, the adjustment to the rotation direction can be effected without removing any part of the cylinder. Consequently, the cylinder of the invention is easily adjustable to the rotation direction of the door lock. Furthermore, the adjustment can even be effected after mounting the cylinder of the invention in the door lock, without having to remove it from the door lock.

[0010] In a preferred embodiment of the cylinder of the invention, the indicator comprises an indicator disc and a cover which partly covers the indicator disc, so that part of the indicator disc remains outwardly visible. The cover is provided to rotate with the shaft, so that the different indications of the indicator disc are shown, corresponding to the position of the driver plug. In this embodiment, the cylinder further comprises a first spring with a first contact member for engaging one of a plurality of circumferential recesses in the indicator disc and consequently holding the indicator disc in a fixed position with respect to the housing. This fixed position is releasable in that at least on surface recess is provided in the indicator disc, so that a force can be applied on the indicator disc which counteracts the first spring and forces the first contact member out of the circumferential recess. In this way, the indicator disc can be freely rotated with respect to the shaft and the driver plug until the first contact member engages a subsequent circumferential recess in the indicator disc. In this way, the adjustability of the relation between the indications of the indicator and the positions of the driver plug is achieved. However, it should be noted that the indicator may be constructed in various other embodiments, such as for example a disc which normally rotates with the shaft behind a fixed partial cover, but which can be disconnected from and re-connected to the shaft in a different position.

[0011] The cylinder of the invention preferably com-

prises limiting means for limiting the rotation of the shaft and the driver plug to the predefined work sector. In this embodiment, the cylinder also comprises releasing means for enabling rotation of the driver plug beyond the limits of the work sector, and into an opening in the housing, so that insertion of the cylinder into a door lock is enabled. The releasing means are accessible from outside the housing, so that the driver plug can be rotated back into the work sector after insertion of the cylinder into the lock. Furthermore, the outward accessibility of the releasing means also enables rotating the driver plug into the opening in the housing after the cylinder has been mounted in the door lock, so that the removal of the cylinder from the door lock is enabled.

[0012] Alternatively, the limiting means for limiting the rotation of the driver plug to the predefined work sector may also be provided in the door lock, in which case the rotation of the driver plug on the cylinder itself may be unlimited, i.e. may be enabled over 360°. In this case, it is unnecessary to provide releasing means on the cylinder. It is however preferred to provide the limiting means, along with the releasing means on the cylinder, as this can increase the number of door locks with which the cylinder of the invention is usable. Furthermore, it is technically simpler to provide the limiting means on the cylinder than to provide them in the door lock.

[0013] A preferred embodiment of the releasing means comprises a connecting member which releasably connects first and second parts of the shaft. The grip and the driver plug are fixed on the first part of the shaft and the indicator is provided on the second part of the shaft. The releasable connection is provided by a second spring, which acts on the connecting member and can be counteracted by exerting a force. In order to enable the exertion of the counteracting force, the connecting member is accessible via a through bore which is provided in the second part of the shaft, enabling access by means of a tool. It should however be noted that the releasing means may also be constructed in various other embodiments, for example by providing the through bore in the first part of the shaft, so that the connecting member is accessible from the side of the grip.

[0014] The through bore is preferably closed by means of a screw, which is screwed into a threaded portion of the through bore. This has the advantage of preventing dust from entering the through bore and hampering the operation of the cylinder of the invention.

[0015] The limiting means for limiting the rotation to the predefined work sector preferably comprise a third spring with a second contact member for engaging end walls of a sleeve in the second part of the shaft. This sleeve is constructed such that it defines the predefined work sector of the driver plug. As the limiting means are provided on the second part of the shaft, i.e. on the indicator side of the cylinder, they do not interfere with the releasability of the driver plug and its rotation beyond the limits of the work sector.

[0016] In a preferred embodiment of the cylinder of the invention, the adjusting means and the releasing means are constructed such that they are operable by means of one and the same tool. This can increase the user-friendliness of the cylinder of the invention. Preferably also the screw for closing the through bore in the shaft is chosen such that it is operable by means of this tool.

[0017] The housing of the cylinder of the invention is preferably constructed as a single unit. This can facilitate the mounting of the cylinder in a door lock. In the prior art, the cylinder is constructed in three parts, namely a front part comprising the indicator, a central part comprising the driver plug and a back part comprising the grip, which are connected by means of screws before mounting the cylinder in the door lock. The reason for constructing the housing in three parts is that different, interchangeable front and back parts are needed for suiting different door locks, namely left-turning and right-turning door locks. This need for different parts is obviated with the cylinder of the invention by providing the adjusting means, by means of which the cylinder is adjustable to the rotation direction of the door lock. This enables the construction of the housing as a single part, which has the advantage that little or no assembly of parts is required before the cylinder of the invention can be mounted in a door lock.

[0018] Preferably, a groove is provided in the second end of the shaft for enabling turning of the shaft by means of a coin or the like. This has the advantage that the door lock can be unlocked from the outside if necessary, for example if intervention is needed for freeing a person from a toilet cubicle.

[0019] The cylinder of the invention is preferably shaped in conformity with international standards. An example of such a standard is the eurocylinder shape.

[0020] The invention will be further elucidated by means of the appended figures and the description of a preferred embodiment given below.

[0021] Figure 1 shows a longitudinal section of a preferred embodiment of the adjustable cylinder according to the invention.

[0022] Figure 2 shows a front view of the adjustable cylinder of figure 1.

[0023] Figure 3 shows a cross section on the line III-III of the adjustable cylinder of figure 1.

[0024] Figure 4 shows a cross section on the line IV-IV of the adjustable cylinder of figure 1.

[0025] Figure 5 shows a cross section on the line V-V of the adjustable cylinder of figure 1.

[0026] Figure 6 shows another front view of the adjustable cylinder of figure 1.

[0027] The adjustable cylinder of figure 1 comprises a housing 2 in which a shaft 3 is rotatably mounted. A driver plug 4 for engaging a bolt of the door lock is mounted on the shaft 3. The shaft 3 has two ends 5, 6: a grip 7 for turning the shaft 3 is fixed to the first end 5 and an outwardly visible indicator 8 is provided on the second end. The indicator 8 has two different indications

9, 10 for providing the vacant/engaged notice. The shaft 3 and driver plug 4 together are rotatable between two limits of a predefined work sector, shown by the double arrow in figure 2. These limits are in a relation to the indications 9, 10 of the indicator. The cylinder further comprises adjusting means 11 for adjusting the relation between the limits of the work sector and the indications 9, 10 of the indicator 8. These adjusting means are accessible from outside the housing 2.

[0028] The indicator 8 of the cylinder 1 of figure 1 comprises an indicator disc 12 and a cover 13 which partly covers the indicator disc 12 and which is fixed to the shaft 3, so that it rotates with the shaft 3. The indicator disc 12 is visible through two holes 14 in the cover 13, which are located symmetrically with respect to the central axis of the shaft 3. From figure 6 it can be seen that the indicator disc 12 comprises parts in two different colours 9, 10, which are located such that the first colour 9 is visible in one extreme position of the driver plug 4 and the second colour 10 in the second extreme position of the driver plug 4. In order to hold the indicator disc 12 in fixed position with respect to the housing 2 as the shaft 3 rotates, a first spring 17 having a first contact member 18 is mounted in the housing 2 for engaging one of a plurality of circumferential recesses 19 in the indicator disc 12. This fixed position is releasable in that outwardly accessible recesses 11 are provided in the surface of the indicator disc 12, which enable exertion of a force on the indicator disc 12 which counteracts the first spring 17 and pushes the first contact member 18 out of the recess 19. In this way, the indicator disc 12 can be rotated until the contact member 18 is pushed into the next recess 19 and the position of the indicator disc 12 becomes fixed again with respect to the housing 2. The circumferential recesses 19 are located on predetermined locations in the circumference of the indicator disc 12, so that rotating the indicator disc 12 one step switches the relation between the colours 9, 10 shown and the extreme positions of the driver plug 4, i.e. the limits of the work sector. As a result, the cylinder 1 is adaptable to the rotation direction of the door lock in which it is to be mounted, i.e. it is suitable for use with left-turning as well as right-turning locks. Furthermore, the location of the recesses 11 on the outwardly accessible surface of the indicator disc 12 enables the adjustment even after the cylinder 1 has been mounted in the door lock, without having to remove it or disassemble it.

[0029] The indicator of the cylinder 1 can however also be constructed in other ways (not shown), such as for example a fixed cover plate partly covering an indicator disc which rotates with the shaft, the indicator disc then being releasably fixed to the shaft for enabling the adjustment.

[0030] The rotation of the driver plug 4 of the cylinder 1 of figure 1 is limited to a predefined work sector by limiting means 22-24, which will be described in more detail below. However, in the figures 1 and 3, the driver plug 4 is shown in a position outside the work sector, namely in its position to which it is turned for enabling mounting the cylinder 1 in the door lock (not shown). In the position shown, the driver plug 4 is located within an opening 27 in the housing 2 and does not protrude sideways from the housing 2, so that it does not hamper the insertion of the cylinder 1 in the lock. Rotating the driver plug 4 to this position, which is outside its work sector during normal operation, is enabled by releasing means 21, which serve to release the driver plug 4 from the limiting means 22-24. In the embodiment of the figures 1 and 3, these releasing means comprise a connecting member 21, which releasably connects two parts of the shaft: a first part 15 on which the grip 7 and the driver plug 4 are mounted and a second part 16 on which the indicator 8 is provided. The connecting member 21 is accessible from outside the housing via a through bore 28 in the second part 16 of the shaft 3. It is held in a connecting sleeve 29 in the second part 16 of the shaft 3 by means of a second spring 20, which is located between the connecting member 21 and the first part 15 of the shaft. By pushing the connecting member 21 against the action of the spring 20, for example by means of a tool 30 inserted in the through bore 28 as shown in figure 1, the connecting member 21 can be pushed out of the connecting sleeve 29, so that the first part 15 can be freely rotated with respect to the second part 16 of the shaft 3, of which the rotation is limited to the work sector by the limiting means 22-24, i.e. the driver plug 4 can be rotated freely over the full 360° and more particularly into the opening 27 in the housing.

[0031] In the embodiment shown, the work sector of the driver plug 4 is about 90°. This work sector is defined by a sleeve 24 in the second part 16 of the shaft 3, in which a second contact member 23 is pushed by a third spring 22. The sleeve 24 has two ends 25, 26 which contact the contact member 23 when the driver plug 4 is turned to its extreme positions. It is clear that by making the sleeve 24 shorter or longer, the work sector of the driver plug 4 can be made less or more than 90°. Also, other means can be devised for limiting the rotation of the driver plug 4 to the predefined work sector and also for releasing the driver plug 4 from the predefined work sector.

[0032] The through bore 28 in the second part of the shaft, which enables access to the connecting member 21 from outside the housing 2, is provided with a threaded portion for receiving a screw 31 for closing the through bore 28. This has the advantage that dust can be prevented from entering the interior of the cylinder 1 and hampering its operation.

[0033] In the embodiment of figures 1-6, the through bore 28, the screw 31 and the surface recesses 11 in the indicator disc 12 are designed such that they are all operable by one and the same tool 30, namely the hexagon wrench 30 shown in figure 1. To this end, the screw 31 has a hexagon socket (not shown) with a shape conforming to the cross section of the wrench. The through bore 28 has a diameter slightly larger than that of the

wrench 31, so that the connecting member 21 can be accessed by means of the wrench 31. The surface recesses 11 of the indicator disc 12 are shaped such that a force for rotating the indicator disc 12 can be exerted on the recesses 11 by means of the wrench 31.

[0034] The housing 2 of the cylinder 1 of figure 1 is constructed as a single unit. This can facilitate the assembly of the cylinder and afterwards also the mounting of the cylinder in the lock, as all parts are then already assembled. The construction of the housing 2 as a single unit is enabled by providing the releasing means 21 for releasing the driver plug 4 from its work sector and the adjusting means 11 for adjusting to the rotation direction of the lock, both means being outwardly accessible.

[0035] Figures 2 and 6 show that a groove 32 is provided in the second end 6 of the shaft 3, i.e. in the cover 13. This groove 32 is provided for enabling turning of the shaft 3 by means of a coin or the like, so that - if necessary - the door lock can easily be opened from the outside, i.e. the side opposite the grip 7.

[0036] The cylinder 1 of figure 1 further comprises a fourth spring 33 with a third contact member 34, which are located sideways from the shaft 3, next to the first and third springs 17, 22. The spring 33 and contact member 34 merely have the purpose of holding the shaft 3 in position. In other words, they prevent movement of the shaft 3 in axial direction or removal of the shaft 3 from the housing 2.

[0037] The cylinder 1 shown in figures 1-6 has an internationally standardised shape, commonly known as the shape of a "eurocylinder". It may however also have any other shape known to the person skilled in the art, such as for example a circular or oval shape. The eurocylinder shape is however very useful, since this enables the use of the cylinder 1 with a wide variety of door locks, which all conform to the eurocylinder standards. The cylinder 1 of figure 1 is in fact an adapted eurocylinder lock, with a grip 7 and indicator 8 instead of keyholes on one or both sides. This can for example be seen from the location of the springs 17, 22 and 33 in the housing 2. In keyhole cylinders, these springs are used to define the cylinder to a particular shape of the key. In the embodiment of figure 1, the springs are used for different purposes, namely holding the indicator plate 12 in position, defining the work sector and holding the shaft 3 in position, as has been described above.

[0038] Installing the cylinder 1 of figures 1-6 in a door lock is carried out as follows. Initially, the cylinder 1 is supplied to users with the driver plug 4 in the mounting position as shown in figures 1 and 3, so that the cylinder is immediately insertable into the door lock. After insertion, the cylinder 1 is fixed in the door lock by inserting a screw (not shown) into a screw hole in the door lock and further into the screw hole 35 in the cylinder 1. Next, the hexagon socket screw 31 is removed from the shaft 3 by unscrewing it with the tool 30, so that the connecting member 21 becomes accessible. By inserting the tool 30 in the through bore 28 and pushing it onto the connecting member 21, the connecting member 21 is removed from the connecting sleeve 29 and the driver plug 4 is released from the mounting position and can be turned to its operating position within the work sector by means of the grip 7. By subsequently releasing the force on the connecting member 21, this is moved back into the connecting sleeve 29, although in opposite orientation with respect to the initial orientation shown in figure 3. Next, it is checked if the indications 9, 10 of the indicator 8 correspond to the locked/unlocked positions of the door lock. If necessary, the cylinder 1 is adjusted to the rotation direction of the door lock, by operating the adjusting means 11, i.e. by exerting a force by means of the tool 30 onto one of the surface recesses 11 in the indicator plate 12, so that the latter is rotated to its next fixed position with respect to the housing. Finally, the screw 31 is placed back in the threaded portion in the shaft 3.

[0039] It should be noted that the adjustment to the rotation direction of the door lock can also be carried out before mounting the cylinder 1 in the door lock. It is however simpler for the person skilled in the art to perform the adjustment afterwards, as he can then immediately check whether the indications 9, 10 correspond to the locked/unlocked positions of the door lock.

Claims

1. An adjustable cylinder (1) with vacant/engaged notice constructed as an insert for door locks of for example toilets, cubicles, and the like, the cylinder (1) comprising a housing (2) in which a shaft (3) is rotatably mounted, a driver plug (4) for engaging a bolt of the door lock being mounted on the shaft (3), a grip (7) for turning the shaft (3) being fixed to a first end (5) of the shaft and an outwardly visible indicator (8) being provided on a second end (6) of the shaft (3), the indicator (8) having two different indications (9, 10) for providing the vacant/engaged notice, the shaft (3) and driver plug (4) being rotatable between two limits of a predefined work sector which are in a relation to the indications (9, 10) of the indicator (8), **characterised in that** the cylinder (1) further comprises adjusting means (11) for adjusting the relation between the limits of the work sector and the indications of the indicator (8), the adjusting means being accessible from outside the housing (2).

2. An adjustable cylinder according to claim 1, **characterised in that** the indicator (8) comprises an indicator disc (12) and a cover (13) which partly covers the indicator disc and is provided to rotate with the shaft (3), the cylinder (1) further comprising a first spring (17) having a first contact member (18) for engaging one of a plurality of circumferential re-

cesses (19) in the indicator disc (12) and holding the indicator disc (12) in a releasable fixed position with respect to the housing (2), the circumferential recesses (19) being provided at predetermined locations on the indicator disc (12), the adjusting means comprising at least one surface recess (11) in the indicator disc for enabling exertion of a force on the indicator disc (12) which counteracts the first spring (17).

3. An adjustable cylinder according to claim 1 or 2, **characterised in that** the cylinder (1) further comprises limiting means (22-24) for limiting the rotation of the shaft (3) and the driver plug (4) to the predefined work sector and releasing means (21) for enabling rotation of the driver plug (4) beyond the limits of the work sector, the releasing means (21) being accessible from outside the housing.

4. An adjustable cylinder according to claim 3, **characterised in that** the releasing means comprise a connecting member (21) which releasably connects first and second parts (15, 16) of the shaft (3), a second spring (20) acting on the connecting member (21), the grip (7) and the driver plug (4) being fixed to the first part (15) of the shaft and the indicator (8) being provided on the second part (16) of the shaft, the connecting member (21) being accessible via a through bore (28) in the second part (16) of the shaft.

5. An adjustable cylinder according to claim 4, **characterised in that** the through bore (28) in the second part of the shaft is provided with a threaded portion for receiving a screw (31) for closing the through bore (28).

6. An adjustable cylinder according to any one of the claims 3-5, **characterised in that** the limiting means (22-24) comprise a third spring (22) having a second contact member (23) for engaging end walls (25, 26) of a sleeve (24) in the second part (16) of the shaft (3), the sleeve (24) defining the predefined work sector.

7. An adjustable cylinder according to any one of the claims 5-6, **characterised in that** the adjusting means (11) and the releasing means (21) are constructed such that they are operable by means of one and the same tool (30).

8. An adjustable cylinder according to any one of the previous claims, **characterised in that** the housing (2) is constructed as a single unit.

9. An adjustable cylinder according to any one of the previous claims, **characterised in that** a groove (32) is provided in the second end (6) of the shaft (3) for enabling turning of the shaft by means of a coin or the like.

10. An adjustable cylinder according to any one of the previous claims, **characterised in that** the cylinder (1) has a eurocylinder shape.

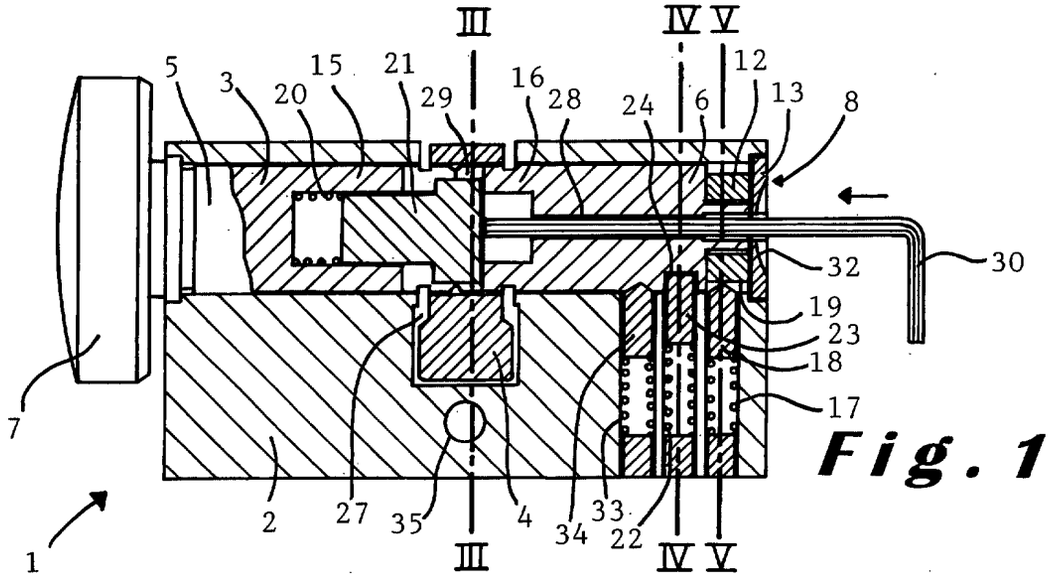

Fig. 1

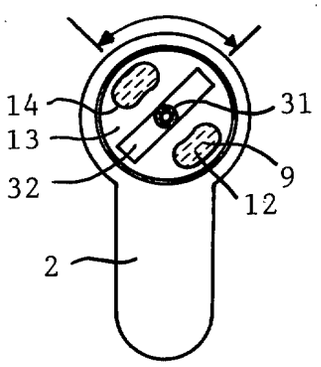

Fig. 2

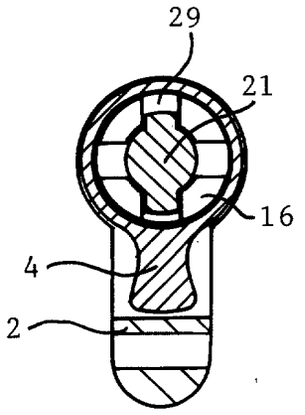

Fig. 3

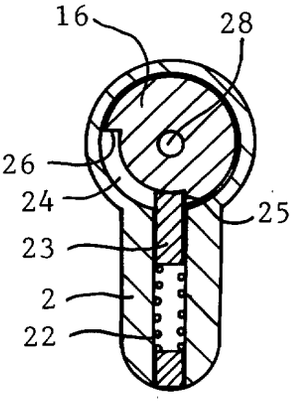

Fig. 4

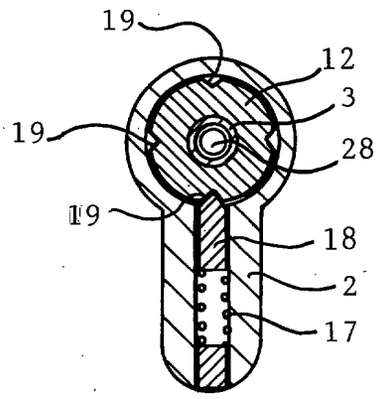

Fig. 5

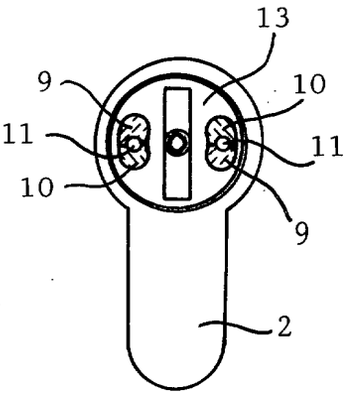

Fig. 6