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(54) **A cylinder lock**

(57) The present invention concerns a cylinder lock comprising a cylinder housing having a plug receiving opening and a lock cam opening extending substantially perpendicular to said plug receiving opening, and a plug comprising a cylindrical portion with a curved surface, at least a first end opening for a first key, and a cam member mounted on the curved surface of the cylindrical portion of the plug so that the cam member is rotated when the plug is rotated in the housing.

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Description

[0001] The present invention relates to a cylinder lock comprising a housing and a rotatable plug with a cam member.

[0002] Cylinder lock systems, which may be locked or unlocked with a proper key, are well known. A particular kind of cylinder lock is the pin tumbler lock system which has been in use at least since one type was patented by inventor Linus Yale, Sr. in 1848. The basic principles are still used today, in particular, the lock may be opened when the gap between tumbler pins, called key pins and driver pins, are arranged along a shear line and conversely the lock is closed when the driver pins extend across the shear line. Closely related to the cylinder lock system is the double cylinder lock system, which may be unlocked from opposite sides of a door, a window or the like.

[0003] Single and double cylinder lock systems often have a rotatable cam member at the end of the plug. An example of a double cylinder lock system is disclosed in WO 2007/099523 A2, wherein a first and a second plug are arranged in each their cylinder lock housing and are connected to a central rotatable thrower or cam. Such a system is advantageously used with identical lock pin settings in both cylinder lock housings. The system may also be adapted for two separate keys, each adapted to work with each of the plugs, i.e. one key for operating the lock from the outside and another key for operating the lock from the inside.

[0004] However, these kinds of cylinder lock systems are characteristic in that the rotatable cam member is provided at the end of a cylinder plug. In particular for a double cylinder lock arrangement, this results in a relatively large size of the lock which may be undesirable in relation to installation in doors, windows or the like.

[0005] On this background, it is an object of the invention to provide a more compact lock system.

[0006] The object is achieved by a cylinder lock comprising a cylinder housing having a plug receiving opening and a lock cam opening extending substantially perpendicular to said plug receiving opening, and a plug comprising a cylindrical portion; at least a first end opening for a first key, and a cam member mounted on the cylindrical portion of the plug so that the cam member is rotated when the plug is rotated in the housing.

[0007] The cam member may preferably extend radially from the cylindrical, i.e. curved surface of the cylindrical portion of the plug, for instance, it may form a right angle with the axis of the key path into the plug. This is advantageous in relation to a lock where the cam or thrower may actuate a locking bolt or other locking mechanism.

[0008] In a preferred embodiment of the cylinder lock, the cam member is adapted to be fixed to the plug. When the cam member is fixed to the plug, it basically rotates with the same rotation rate of the plug. However, it is realised that the cam member may also be mounted so that the cam is rotated at another angular rate than the plug when the plug is rotated by the insertion of a proper key.

[0009] In a first embodiment of the invention, the cam member is positioned on a central portion of the cylindrical portion. This may be advantageous because the locking bolt, or other locking mechanism, is often provided in the middle part of the end face of a door, window or the like. However, in a related embodiment, the cam member is not positioned at the central portion of the plug. Instead it is fixed to a portion close to one of the ends of the plug. This may be advantageous in cases where the locking bolt, or other locking mechanism is provided closer to the edge where the front or back face meets with the end face of a door, window or the like. An advantage with the cylinder lock according to the invention is that the lock may easily be manufactured irrespective of the cam member position on the plug since this does not require a redesign of many of the components.

[0010] In one embodiment, the cylindrical portion of the plug has an outer diameter and the cam member has an annular portion with an inner diameter, so that the cylindrical portion is adapted to engage with the annular portion of the cam member. Further, the cam member may be adapted for slidable engagement with a portion of the plug. The cam member may hereby easily be attached to the plug.

[0011] In another embodiment, the lock system is a pin tumbler lock system wherein the plug comprises plug channels and the housing comprises housing channels. A pin tumbler lock system may comprise at least one driver pin, at least one key pin, and at least one spring member arranged in a first housing channel and a first plug channel, such that the plug is in a locked position, wherein rotation of the plug is disallowed, when the driver pin extends into the first plug channel and the plug is in a unlocked position, wherein rotation of the plug is allowed, when the gap between the key pin and the driver pin is aligned with the shear line, which can be realized by insertion of a proper key. In a related embodiment, the cam member has at least one opening, said at least one opening and at least one of the plug channels being adapted for engagement with at least one associated engagement member. The engagement may, for instance, comprise screwing engagement. This is advantageous because the cam member may be applied to any of the plug channels in an existing plug. In addition, the cam member may be fabricated to match existing plugs.

[0012] In a related embodiment, the plug comprises a number of plug channels arranged in a pattern, such as a line, wherein the at least one opening of the cam member and at least one of the plug channels in the centre of the pattern is adapted for engagement with at least one associated engagement member. By providing the cam member in one of the plug channels in the centre of the plug, the cam member may easily actuate a locking bolt, or other locking mechanism, which is often provided in the middle part of the end face of a door, a window or

the like.

[0013] In another embodiment, the plug comprises a second end opening for a second key opposite the first end opening for the first key, said second opening being aligned with a common axis with the first opening, and wherein only one of the first and second keys can be inserted fully in the plug at the same time. In case of a pin tumbler lock, the first end opening for a first key and the second end opening for a second key may be arranged so that the first and second key are adapted for engagement with the same pins in the same plug channels when inserted fully into the plug. Hereby, there is provided a single plug with a key opening in each end so that a first and a second key may be used with the same plug from opposite sides. Further to this embodiment, the first key may have a portion which mirrors a corresponding portion of the second key. For instance the first key may simply be a mirrored version of the second key.

[0014] Further, in another embodiment, the plug comprises a plug assembly having a cylindrical member with the cylindrical portion and a longitudinal key slot therein, and at least one end member with a keyhole opening.

Brief description of the drawings

[0015] The invention is disclosed in more detail with reference to the accompanying drawings, in which:

Fig. 1	is a cross section side view of a cylindrical lock according to a first embodiment of the invention,
Fig. 2	is a perspective view of said cylindrical lock in fig. 1,
Fig. 3	is a perspective view of the plug and cam assembly of the cylindrical lock according to a preferred embodiment of the invention, and
Fig. 4	is an exploded perspective view of the plug and cam assembly of fig. 3,
Fig. 5	is a cross-section side view of a cylindrical lock according to a second embodiment of the invention,
Figs. 6 and 7	are perspective front and rear views, respectively, of the cylindrical lock of fig. 5, and
Figs. 8 to 10	are cross section, front and rear perspective views, respectively, of a third embodiment of the invention.

Detailed description of the drawings

[0016] With reference to Fig. 1 and Fig. 2, the cylindrical lock comprises a housing 9 with key pin housing channels 10 with springs 11 and tumbler pins 12 mounted therein, a cam opening 13 allowing the cam member 4 to swing through the housing 9, and a mounting opening 14, preferably internally threaded for receiving a fastening member, such as a mounting screw for securing the lock to the end face of a door or the like. In this first embodiment, the cam member 4 is mounted on the central section of a plug 1 preferably at a position above a key pin channel 2 in the plug below the first cam housing channel 24 of the housing 9, which contains no springs or tumbler pins. In order for the distal portion 20 of the cam member 4 to fit into the pin tumbler lock system, there may be provided a shorter spring 21 and a shorter tumbler pin 22 in a second cam housing channel 23 next to the first cam housing channel 24 above the plug channel wherein the cam member 4 is mounted. The associated opening 13 for the cam member 4 and the mounting opening 14 are provided in the housing 9 above the cam opening 13 transverse the two housing channels 23, 24.

[0017] With reference to figures 3 and 4, the plug and cam assembly of the lock is shown. The cylindrical plug 1 is provided with a number of plug channels 2 and a first end opening 3 for a first key. In this embodiment, a cam member 4 is provided with a distal end portion 20 and an annular mounting portion 41 with a mounting hole 42. The distal end portion 20 of the cam member 4 is preferably provided with standard dimensions, so that it may cooperate with an associated locking bolt for the locking of the door, window or the like.

[0018] The cam member 4 is mounted on the cylindrical section of the plug 1 by sliding the annular portion 41 over the cylindrical surface of the plug 1 and fixing the cam member 4 by a cam member screw 5, which - when mounted in the mounting hole 42 - extends into a plug channel hole 2 and thereby fix the cam member 4 to the plug 1. Preferably, the mounting hole 42 is internally threaded so the mounting screw 5 engages this threaded portion. Hereby, any threading in the plug channel holes 2 in the plug 1 is not required which facilitates the manufacturing of the plug. By the invention, it is realised that the fixation of the cam member 4 is not necessarily required in the axial direction, and for instance a notch and groove assembly of the cam and plug could alternatively be provided. Another alternative design of the cam member would be without the annular ring but instead the cam member could be directly mounted on the plug.

[0019] When assembling the lock, the cam member 4 is provided in the cam opening 13 in the housing 9 and the plug 1 is then inserted through the cylindrical bore in the housing 9 and through the annular portion 41 of the cam member 4. The plug is provided with a first end opening having a flange 31 and when the plug 1 is fully inserted in the cylindrical bore of the housing 9, the plug is secured in this axial position by fitting a snap ring 6 and a key end piece 7 at the opposite end of the first end 3. In an advantageous embodiment of the invention, the second end piece 7 is provided with a second keyhole opening 8 adapted for receiving a second key thereby making the cylindrical lock a double lock. In the housing 9, a thin slot 16 is provided for receiving the snap ring 6. The second end piece 7 is provided with one or more protruding assembly members 71 which fit into corresponding recesses 72 in the end section of the plug 1 (see fig. 4). In the

end section of the plug 1, an annular groove 73 is provided and corresponding grooves 74 are provided in the assembly members 71. When the second end piece 7 is provided with the assembly members 71 resting in the recesses 72 of the plug, the groove 73 of the plug and the grooves 74 of the members 71 are aligned and the snap ring 6 is inserted in the groove whereby the plug is assembled. In order not to block the key slot (not shown) in the plug, the plug is turned approx. 180° in the housing compared to the orientation shown in the figures before the snap ring 6 is inserted through the radial slot 16. The snap ring 6 thus retains the plug 1 assembled and is freely rotatable in the slot 16 of the housing 9.

[0020] As shown in figures 1-4, the cam member 4 is mounted to the plug 1 in a central section of the plug 1 at the position of one of the central plug channels 2. However, the cam member 4 may also be mounted at other positions on the plug, such as close to one of the ends of the plug, as shown in the embodiments in the figures 5 to 7 and figures 8 to 10, which may be advantageous for instance in a door or window design where the lock member preferably should be provided close to either the front or the back side of the door or window e.g. due to the design and material strength at the frame.

[0021] In the embodiment shown in figures 5 to 7, the cam member 4 is arranged at the front of the cylinder lock adjacent the first two of the housing channels 10, i.e. the housing channels 23 and 24, i.e. adjacent the first keyhole 3. The threaded mounting hole 14 is provided above the cam opening 13 and the housing channels 23 and 24 are provided in a configuration similar to the configuration shown in relation to the first embodiment described above.

[0022] In a further embodiment, shown in figures 8 to 10, the cam member 4 is positions in the lock as shown in the previously described embodiment. However, according to this embodiment, the mounting opening 14 is central as in the first embodiment. Accordingly, the two central housing channels 25 are provided with somewhat shorter springs or tumbler pins.

[0023] The invention is described above with reference to some preferred embodiments. However, it is realised that variants to these embodiments may be provided without departing from the scope of the invention as set forth in the accompanying claims. For instance, the terms 'upper', 'above' and 'below' are used in the detailed description of the drawings only to illustrate the relative arrangement of elements of the invention, and it is realised that embodiments of the invention may be provided, wherein the invention is rotated in any angular direction.

Claims

1. A cylinder lock comprising
a cylinder housing having a plug receiving opening and a lock cam opening extending substantially perpendicular to said plug receiving opening, and
a plug comprising
a cylindrical portion;
at least a first end opening for a first key, and
a cam member mounted on the cylindrical portion of the plug so that the cam member is rotated when the plug is rotated in the housing.

2. A cylinder lock according to claim 1, wherein the cam member is fixed to the plug.

3. A cylinder lock according to any of the preceding claims, wherein the cam member is positioned on a central portion of the cylindrical portion.

4. A cylinder lock according to any of the preceding claims, wherein the cylindrical portion has an outer diameter and wherein the cam member has an annular portion with an inner diameter, which is at least the same as the outer diameter of the cylindrical portion, so that the annular portion of the cam member is mounted by encompassing the cylindrical plug surface.

5. A cylinder lock according to any of the preceding claims, wherein a portion of the cam member is adapted for slidable engagement with a portion of the plug.

6. A cylinder lock according to any of the preceding claims, wherein the cylindrical lock is a pin tumbler lock wherein the plug comprises plug channel openings and the housing comprises corresponding housing lock pin channels.

7. A cylinder lock according to claim 6, wherein the cam member has a mounting hole, which is adapted to cooperate with one of the plug channel opening for fixing mounting engagement by a fixation member, such as a screw.

8. A cylinder lock according to any of the preceding claims, wherein the plug comprises a number of plug channels arranged in a pattern, such as a line, wherein the at least one opening of the cam member and at least one of the plug channels in the centre of the pattern is adapted for engagement with at least one associated engagement member.

9. A cylinder lock according to any of the preceding claims, wherein the plug comprises a second end opening for a second key opposite the first end opening for the first key, said second end opening being aligned with a common axis with the first end opening, and wherein only one of the first and second keys can be inserted fully in the plug at the same time.

10. A cylinder lock according to claim 9, wherein the first end opening for a first key and the second end open-

ing for a second key are arranged so that the first and second key are adapted for engagement with the same pins in the same plug channels when inserted fully into the plug.

11. A cylinder lock according to claims 9 or 10, wherein the first key has a portion which mirrors a corresponding portion of the second key.

12. A cylinder lock according to any of the preceding claims, wherein the plug comprises a plug assembly having a cylindrical member with the cylindrical portion and a longitudinal key slot therein, and at least one end member with a keyhole opening.

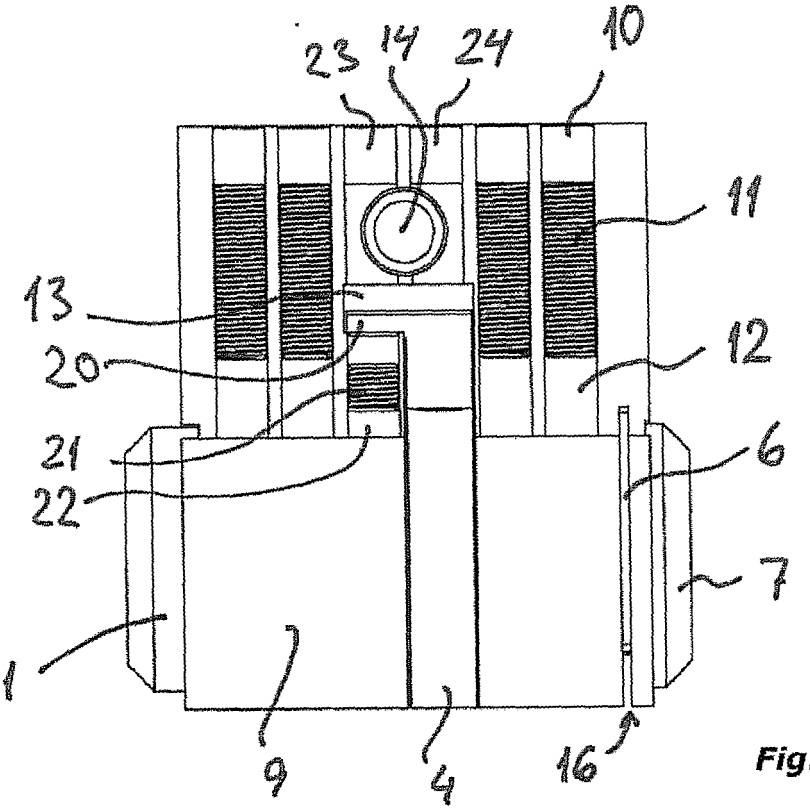

Fig. 1

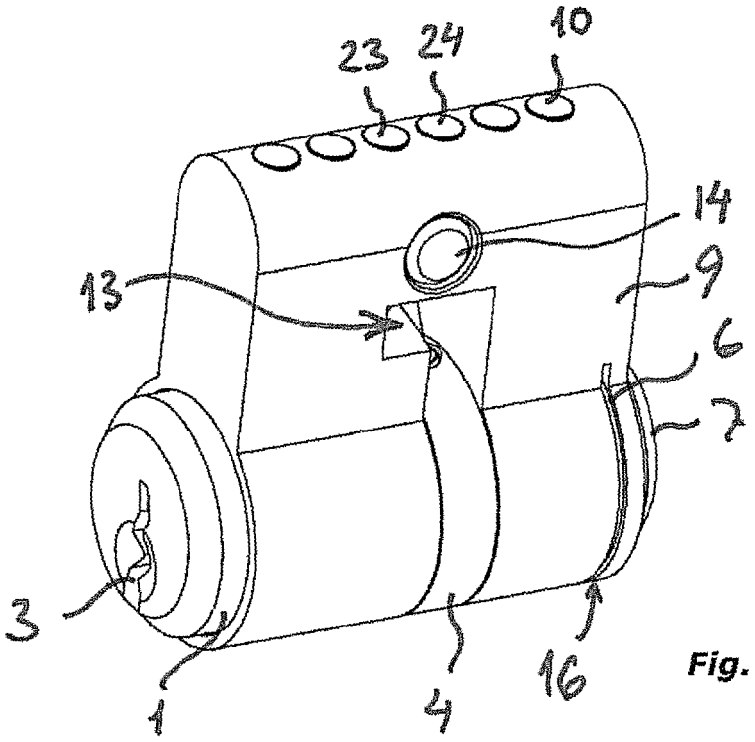

Fig. 2

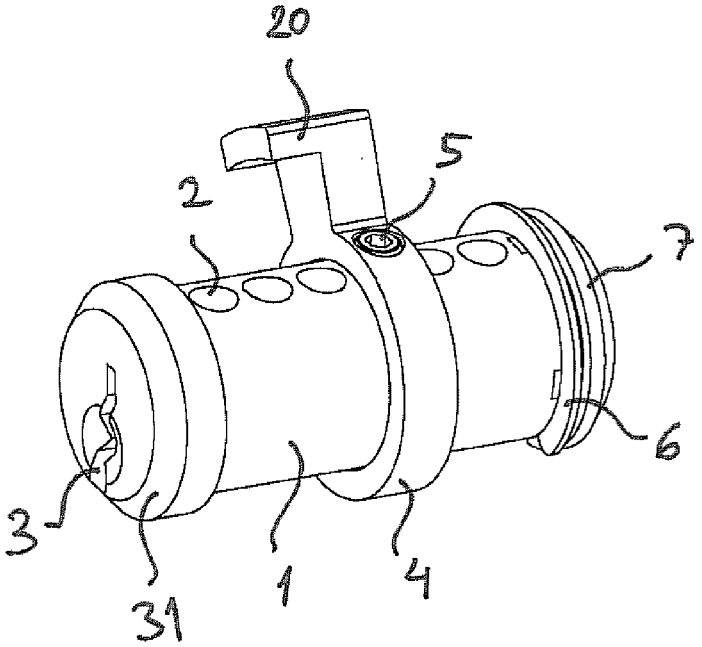

Fig. 3

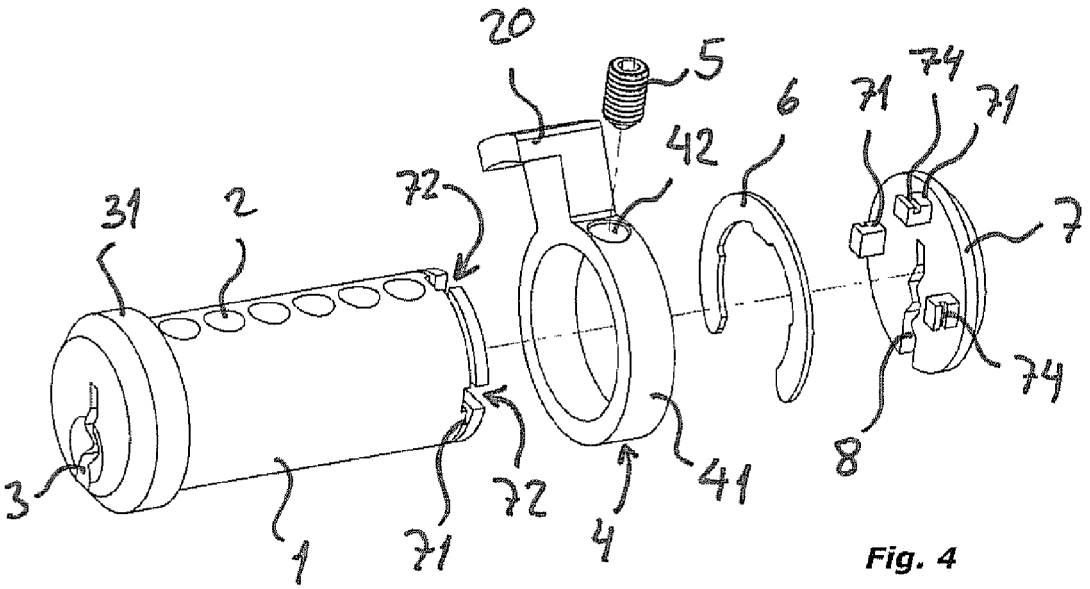

Fig. 4

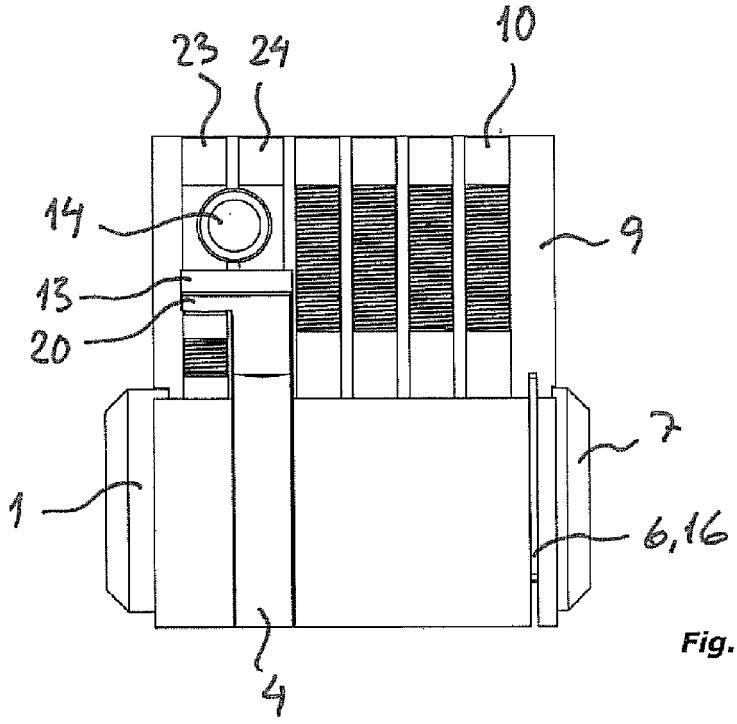

Fig. 5

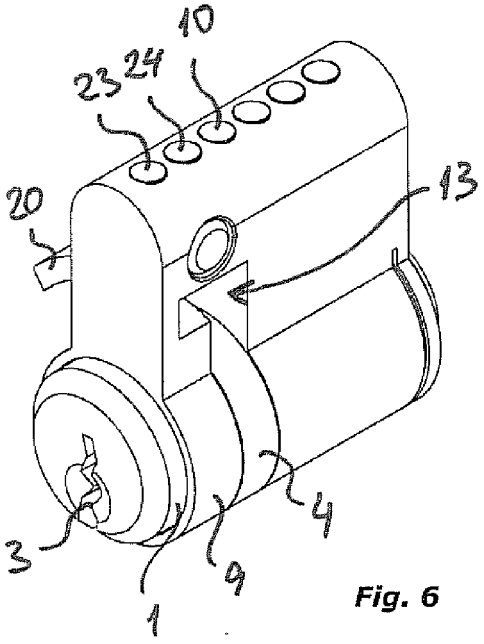

Fig. 6

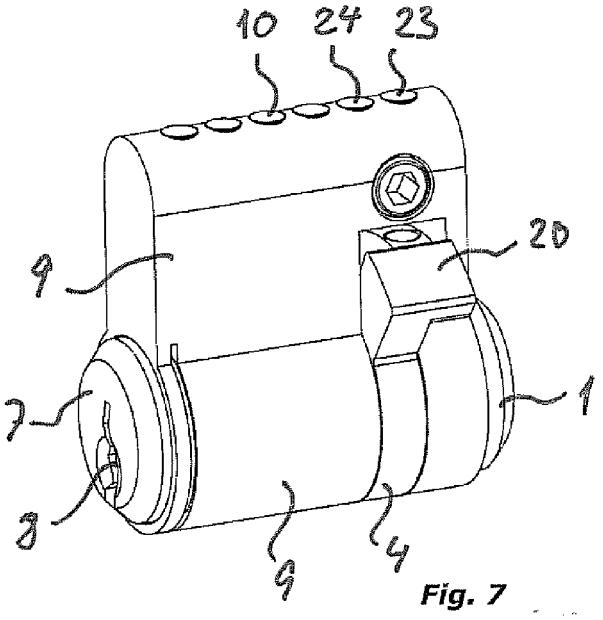

Fig. 7

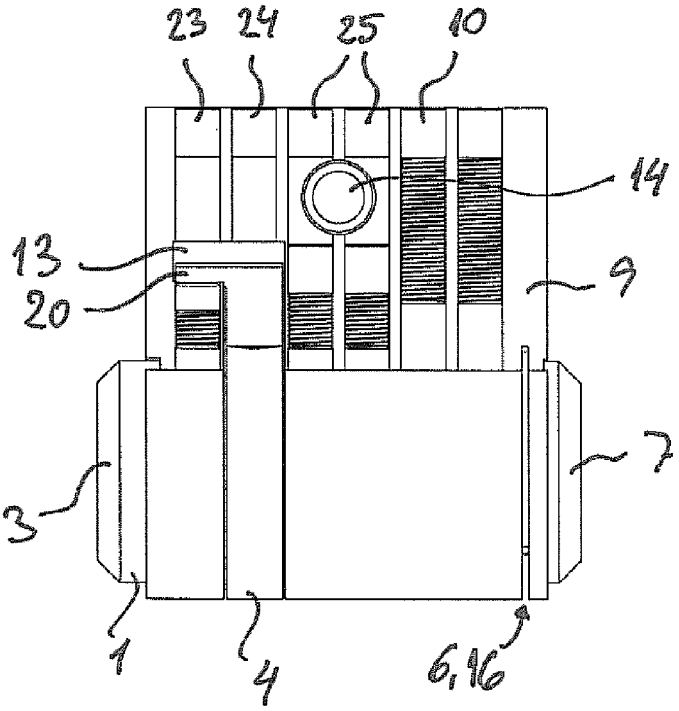

Fig. 8

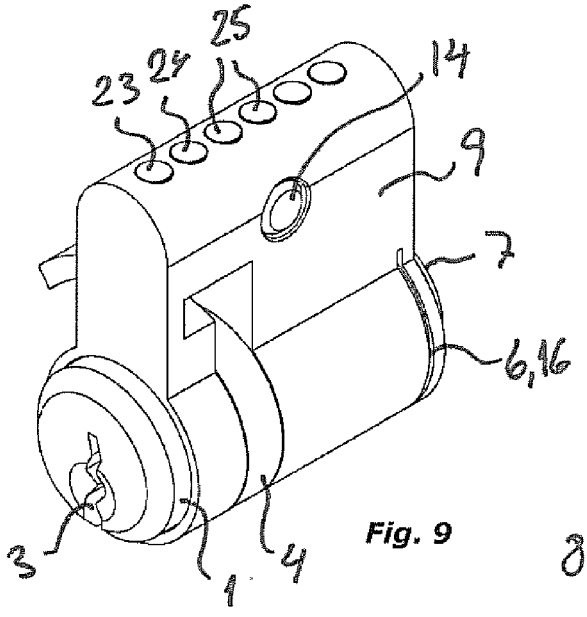

Fig. 9

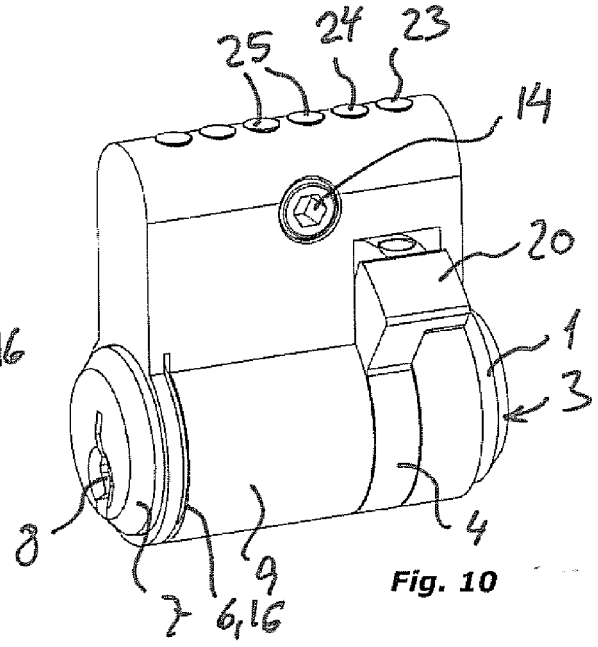

Fig. 10

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EUROPEAN SEARCH REPORT

Application Number
EP 09 16 5959

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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	9 December 2009	Westin, Kenneth

CATEGORY OF CITED DOCUMENTS

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