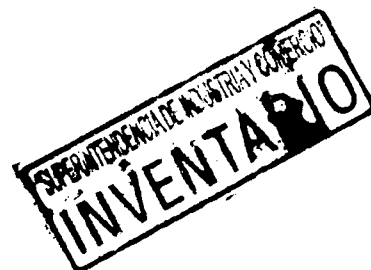


SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



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DOMICILIO JOENSUU, FINLANDIA

74. APODERADO JUAN PABLO CADENA SARMIENTO

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1

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Patente de Modelo de Utilidad.



Capítulo I.



Capítulo II.

2

SOLICITANTE

Nombre: **ABLOY OY**

Dirección: Wahlforssinkatu 20, FI-80100 Joensuu, Finlandia

Nacionalidad o Domicilio: Finlandia

Lugar de Constitución: Finlandia

Teléfono:

Fax:

E-mail

IDENTIFICACIÓN

C.C.



NIT



C.E.



Otro



Cual

Número

3

REPRESENTANTE
O APODERADO

Nombre: **JUAN PABLO CADENA SARMIENTO**

Dirección: Cra. 7 No. 71-21 Torre B – Piso 4, Bogotá, Colombia.

Teléfono: 744-2200

Fax: 742-2200

E-mail:

IDENTIFICACIÓN

C.C.



NIT



C.E.



Otro



Cual

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4

INVENTOR (ES)
(72)

Nombre: **Kaarlo MARTIKAINEN.**

Dirección: Mastotie 4 A 1, FI-80160 Joensuu, Finlandia

Nacionalidad o Domicilio: Finlandia

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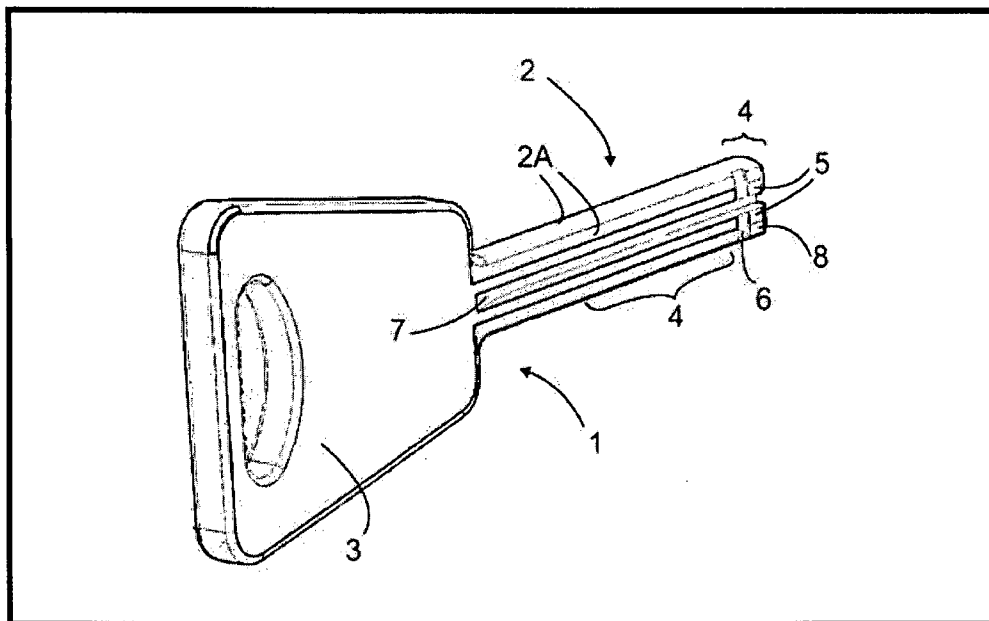
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10

ANEXOS

- ☒ Comprobante de pago de la tasa de presentación de la solicitud. \$ 540.000
- ☐ Documento que acredita la existencia y representación legal cuando el solicitante sea persona jurídica.
- ☐ Poderes, si fuere el caso. **Fotocopia autenticada**
- ☐ Documento de cesión del inventor al solicitante o a su causante.
- ☒ Traducción de la solicitud internacional al castellano. (Resumen, descripción, reivindicaciones, dibujos)
- ☒ Copia del examen preliminar internacional efectuado por la Autoridad Internacional de Examen preliminar (IPEA)
- ☐ Traducción de examen preliminar internacional efectuado por la IPEA.
- ☐ De ser el caso, copia del contrato de acceso.
- ☐ De ser el caso, documento que acredite la licencia o autorización de uso de conocimientos tradicionales de las comunidades indígenas.
- ☐ De ser el caso, certificado de depósito del material biológico.
- ☐ Arte final 12x12.
- ☐ De ser el caso, información sobre otras solicitudes de patente o títulos obtenidos en el extranjero por el mismo titular o su causante, relacionadas parcial o totalmente con la invención de esta solicitud.
- ☐ De ser el caso, modificaciones efectuadas a la solicitud internacional.
- ☒ Otros: Tarjeta de Propietarios
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11 FIGURA CARACTERÍSTICA:



12 Solicito la concesión de la patente,

NOMBRE: JUAN PABLO CADENA SARMIENTO

FIRMA:

[Handwritten Signature]

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PCT/FI2007/050340

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SOLICITANTE/S. RAZON SOCIAL O APELLIDOS Y NOMBRES ABLOY OY

DOMICILIO JOENSUU, FINLANDIA

APODERADO JUAN PABLO CADENA SARMIENTO

TITULO LLAVE Y CERRADURA DE CILINDRO DE DISCOS GIRATORIOS

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INVENTOR (ES) KAARLO MARTIKAINEN.

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- (71) Applicant (for all designated States except US): **ABLOY OY** [FI/FI]; Wahlforssinkatu 20, FI-80100 Joensuu (FI).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): **MARTIKAINEN, Kaarlo** [FI/FI]; Mastotie 4 A 1, FI-80160 Joensuu (FI).
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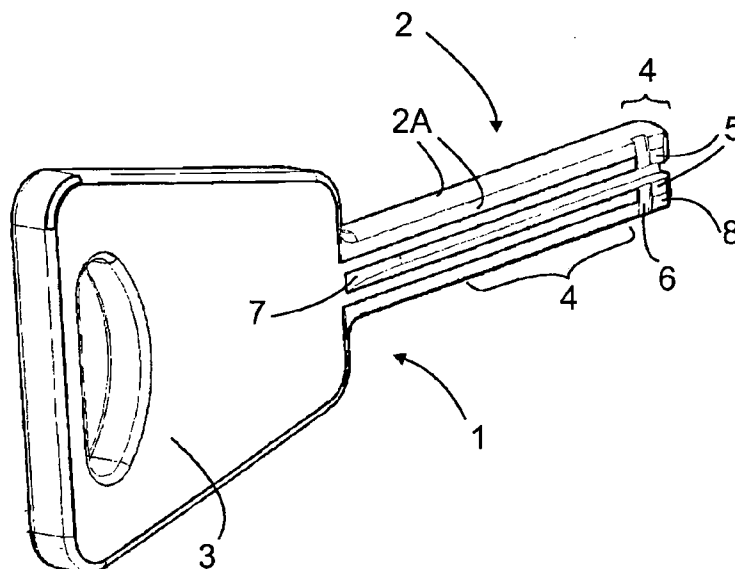
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(54) Title: KEY AND DISC TUMBLER CYLINDER LOCK



(57) Abstract: The invention relates to a disc tumbler cylinder lock and a key for it. The key according to the invention comprises a groove (6) that is transverse to the key shank (2). The groove comprises a bottom section (6A) and side sections (6B) that are transverse to the bottom section between the bottom section and the outer surface (2A) of the key shank. The bottom section of the groove is the key's main driving surface used to transfer turning force to the disc tumbler cylinder lock. This reduces wear on the O-surfaces of the key because the O-surfaces do not transfer the majority or any of the key turning force to the disc tumbler cylinder lock.

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Key and disc tumbler cylinder lock

Field of technology

The invention relates to a cylinder lock and to its key. The invention particularly relates to a cylinder lock with disc tumblers – that is, a disc tumbler cylinder lock – and to its key.

Prior art

In known disc tumbler cylinder locks, such as publication FI 74320, the tumblers are brought to the opening position by turning the key. Different combination surfaces have been cut onto the key, and when the key is turned, they guide the tumblers to turn to a position in which the recesses on the outer edge of the tumblers are aligned on a straight line. This allows the detent pin to move into the recesses in the tumblers, and the lock can be turned open.

The publication FI 74320 presents a key with four series of combination surfaces, allowing the key to be inserted into the corresponding cylinder in two positions (turning the key 180 degrees around its longitudinal axis). The publication FI 94452 presents another disc tumbler cylinder and its key. The key in this publication has two series of combination surfaces on opposite sides of the key profile – that is, the cross-section of the key shank.

The surfaces of keys wear in use. Wear on the surfaces impair the operation of the key and lock, which causes malfunctions and may further increase wear on the lock cylinder. The extreme outer surfaces of the key are particularly prone to wear caused by the environment. Furthermore, the surfaces used for turning the lock elements wear due to both the environment and resistance caused by the parts of the tumbler lock. The wearing of the key is quicker in heavier use, such as that of security guards, maintenance workers and caretakers.

Short description of invention

The objective of the invention is to reduce problems due to wear on the key. The objective will be achieved as presented in the independent claims. The dependent claims describe various embodiments of the invention. The inventive idea aims to achieve the smallest possible wear on the surfaces of the key known as the O-surfaces. O-surfaces refer to the surfaces that are the outermost surfaces of the key shank and that have been arranged to operate with the parts of the disc tumbler cylinder lock every time the key is turned in the key channel of the lock. If the O-surface is worn enough, it causes malfunction of the disc tumbler cylinder lock. Malfunctions can in turn impose additional wear on the lock parts.

The key according to the invention comprises a groove that is transverse to the key shank. The groove comprises a bottom section 6A and side sections 6B that are transverse to the bottom section between the bottom section and the outer surface 2A of the key shank. The bottom section of the groove is the key's main driving surface that is used to transfer turning force from the key to the disc tumbler cylinder lock. This reduces wear on the O-surfaces of the key because the O-surfaces do not transfer the majority or any of the force turning the key to the disc tumbler cylinder lock. Because the main driving surface that transfers the majority or the entire force turning the key to the inner cylinder of the cylinder lock is on the bottom of the groove 6, it is not very much exposed to wear caused by environmental factors. The wear on the key's driving surface 6A is practically entirely caused by contact between it and a transmission disc located in the inner cylinder of the lock.

List of figures

In the following, the invention is described in more detail by reference to the figures of the enclosed drawings, where

- Figure 1 illustrates an example of a key according to the invention,
- Figure 2 illustrates an example of a key groove according to the invention,
- Figure 3 illustrates an example of a key and a transmission disc according to the invention with the key in the basic position,
- Figure 4 illustrates an example of a key and a transmission disc according to the invention with the key turned against the transmission disc,
- Figure 5 illustrates an example of a key and a transmission disc according to the invention with the key turned so that the transmission disc is against the mating surface in the inner cylinder of the lock,
- Figure 6 illustrates an example of a transmission disc in a disc tumbler cylinder lock according to the invention,
- Figure 7 illustrates an example of an inner cylinder in a disc tumbler cylinder lock according to the invention,
- Figure 8 illustrates an example of a key and the parts of a disc tumbler cylinder lock according to the invention with the key in the basic position,
- Figure 9 illustrates an example of a key and the parts of a disc tumbler cylinder lock according to the invention with the key turned,
- Figure 10 illustrates another example of a key and a transmission disc according to the invention with the key in the basic position,
- Figure 11 illustrates another example of a key and a transmission disc according to the invention with the key turned against the transmission disc,
- Figure 12 illustrates another example of a key and a transmission disc according to the invention with the key turned so that the

transmission disc is against the mating surface in the inner cylinder of the lock.

Description of the invention

Figure 1 illustrates an example of a key 1 according to the invention, more precisely a key blank on which a series of combination surfaces compatible with a particular disc tumbler cylinder lock has not yet been formed. (The blank can also operate as an actual key if the lock cylinder is arranged to operate with the blank.) The key shank 2 is turned using the end 3 of the key to open the disc tumbler cylinder lock. The shank 2 comprises a combination area 4 in the direction of the shank in which a series of combination surfaces can be established. The combination surfaces are cut onto the combination area. Usually these are referred to as the combination cuts. The example key in Figure 1 has four combination areas. These are the short sides of the key shank profile and part of the ends of the long sides within a certain section of the length of the shank 2. The number of combination areas on the key shank depends on the key profile. However, the key shank comprises at least one combination area in the direction of the shank.

The shank 2 of the key 1 also comprises an outer surface 2A formed by the key blank and at least one groove 6 transverse to the direction of the shank. The groove comprises a bottom section 6A and side sections 6B that are transverse to the bottom section between the bottom section and the outer surface 2A of the shank. The bottom section 6A of the groove is the main driving surface through which turning force is transferable from the key 1 to the disc tumbler cylinder lock. The side sections 6B protect the bottom section 6A against wear caused by environmental factors. The groove 6 is illustrated in more detail in Figure 2. When the bottom section 6A of the groove 6 has an even shape, it is easy to manufacture. It is preferred that the side sections 6B of the groove are at a right angle to the bottom section 6A. This way the groove 6 takes the least possible space on the key shank 2. Other shapes of the bottom section 6A and

other transverse directions of the side sections against the axis of the key shank are also possible. In principle, the groove 6 can be placed in any appropriate location on the key shank. However, the recommended location is at the open end of the key shank as illustrated in Figure 1. It is also possible that the groove 6 is (at least partially) in the combination area of the key shank.

The outer surface of the key also comprises the O-surfaces 5 through which the force turning the key interacts with the O-tumblers of the disc tumbler cylinder lock. The O-tumblers always follow the turning of the key.

The combination area on the shank of a key according to the invention can optionally comprise a groove 8 parallel to the key shank, with the middle section of the groove being deeper than the edges of the groove. The groove 8 forms the lowest, i.e. the outermost, combination surfaces for the series of combination surfaces to be formed, so that the middle section of the groove forms a contact surface for the disc tumbler cylinder lock's tumbler. This is also aimed to reduce wear imposed on the outermost combination surfaces. The example key in Figure 1 also comprises a rectangular groove 7 at the centre of the long sides of the key shank.

Figure 3 illustrates an example of a key 1 and a disc tumbler cylinder lock according to the invention. Figure 8 illustrates the inner cylinder of the lock in partial cross-section. The disc tumbler cylinder lock comprises a cylinder body 9 (shown in Figure 3) and, within it, an inner cylinder 11. The inner cylinder has a stack of discs comprising tumblers 25 to be turned with the key 1 (Figure 8). Figure 8 only illustrates one of the tumblers in the stack of discs. At least one tumbler is a O-tumbler. A O-tumbler refers to a tumbler that always turns with the key and is intended to contact the outermost surface of the key, which is called the O-surface. Correspondingly, reference is made to the 1-tumbler, 2-tumbler etc. depending on the correspondingly numbered surface of the combination surface that the tumbler is intended to contact. Different alternatives for the combination surface are created by cutting. The tumblers comprise a key channel 26 and an edge groove 27 at the outer edge of each

tumbler. The cylinder lock also comprises a detent pin 12 for locking the lock. The detent pin can be arranged into the edge grooves 27 of the tumblers by turning the tumblers with the key 1 to open the lock.

It is clear that the disc tumbler cylinder lock normally also comprises other parts that are excluded from this description of the invention for the sake of clarity.

Figures 3 to 5 illustrate examples of the mutual operation of the key and the transmission disc of a disc tumbler cylinder lock according to the invention. The shank 2 of the key is illustrated in the direction of the shank axis, making the profile of the shank (the cross-sectional area of the key blank) visible. The cross-section of the key is at the groove 6. The inner cylinder 11 and the transmission disc 10 are viewed from the end of the axis of the inner cylinder. This also clearly shows the shape of the key channel 14 in the transmission disc.

Figure 3 illustrates a key and a transmission disc according to the invention with the key in the basic position. The basic position refers to the key position in which the key can be inserted into the disc tumbler cylinder lock. The transmission disc 10 comprises a key channel 14 and an edge groove 13 on the outer edge of the disc. The edge 15 of the key channel comprises at least one mating surface 21 for the bottom section of the groove 6. The required number of mating surfaces depends on the key profile used. The mating surface is shaped to follow the shape of the bottom section of the groove 6. The cylinder lock also comprises a detent pin 12. The transmission disc also has a transmission element 19 that is arrangeable against a mating surface in the inner cylinder. Figure 6 illustrates the transmission disc of the example in Figure 1, and Figure 7 illustrates the inner cylinder 11.

In the example of Figure 3, the disc tumbler cylinder lock comprises two return pins 18 with the purpose of returning the tumblers in the stack within the inner cylinder to the basic position when the key is turned to the basic position after the lock is opened. The inner surface of the inner cylinder 11 has recesses

20 for the detent pins. A disc tumbler cylinder lock of this type will thus open by turning the key in either direction. For this reason, the transmission disc in this type of a disc tumbler cylinder lock also has another edge groove 13A and an edge cutting 16 for the return pins 18. The ends of the edge cutting also have extended cutting areas 17.

Figure 4 illustrates the example of Figure 3 with the key turned against the transmission disc 10. The key profile of this example has four grooves 6. When the key is turned to open the lock, the bottom sections 6A of grooves on opposite surface sections of the key profile form a contact surface for the corresponding mating surfaces 21 of the edge 15 of the transmission disc's key channel. If the key is turned further clockwise from the situation of Figure 4, the edge groove 13 on the transmission disc 10 can be turned to the position of the detent pin 12. Furthermore, when all of the tumblers in the stack within the inner cylinder 11 have been turned to the corresponding position, the detent pin is able to settle into the edge grooves of the tumblers and the transmission disc, making it possible to open the lock. In this situation, the key shank 2 is in the position shown in Figure 5. In this position, the transmission element 19 on the transmission disc is in contact with the inner cylinder's mating surface 22, forming a transmission connection from the key 1 to the inner cylinder 11. When the key is turned further clockwise from the position of Figure 5, the lock opens. The bottom section 6A of the groove is a driving surface from the key to the transmission disc.

Figure 6 illustrates an embodiment of the transmission element 19 having a projection in the direction of the inner cylinder's axis. In other words, the projection is positioned transversely against the plane formed by the main surface of the transmission disc. Figure 7 illustrates an embodiment of the inner cylinder 11 that accommodates the transmission element illustrated in Figure 6. In this embodiment of the inner cylinder, the bottom of the inner cylinder has a movement area 23 for the transmission element 19. The movement area is a cutting on the inner bottom of the inner cylinder, and the edges of said cutting

constitute mating surfaces 22 for the transmission element. Another alternative is that a cut recess is on the transmission disc and a projection is on the inner bottom of the inner cylinder, in which case the transmission element is either of the end edges of the cut recess and the movement area is the space remaining on the sides of the projection. The mating surfaces are the sides of the projection that are located transversely against the circumference of the transmission disc.

It can be seen from Figures 2 to 5 that the bottom section 6A of the groove is even, and this is also the case with the mating surfaces 21 of the transmission disc. An even shape of the mating surface is preferred because it forms an even and extensive contact surface for the key's main driving surface and is easy to manufacture. Other shapes are naturally possible but also in this case it must be observed that the contact shape created is as extensive as possible. Furthermore, it can be seen that the groove can have different depths in relation to the outer surface 2A of the key at different points of the bottom section 6A in the longitudinal direction of the groove. This feature aims to create an extensive contact surface.

Figure 8 illustrates a key 1 according to the invention and the parts of the inner cylinder 11 when the key is in normal position in the key channel of the disc tumbler cylinder lock. Figure 9 illustrates a situation in which the key has been turned so that the edge groove 13 of the transmission disc 10 (and simultaneously the edge grooves 27 of the tumblers 25) are aligned in line at the detent pin.

Figure 10 illustrates another example of a key and a transmission disc 30 according to the invention with the key shank 35 in the basic position. In this example, the key has two transverse grooves, the bottom sections 36 of which can be arranged against the mating surface 34 of the edge 33 of the key channel 37 of the transmission disc 30. In addition to the edge groove 38, the edge of the transmission disc has a radial projection that constitutes the transmission element 31.

The movement area 29 of the transmission element is a cutting on the wall of the inner cylinder, and the edges 39A, 39B of the cutting constitute mating surfaces for the transmission element 31. The projection is arranged to be in contact with one of the mating surfaces 39A when the key is turned to open the lock so that the edge groove 38 of the transmission disc is at the detent pin 12 and so that the edge groove of the 0-tumbler within the stack of tumblers is arranged to turn to the position of the detent pin 12 at the same time the edge groove 38 of the transmission disc turns to the position of the detent pin. The edge grooves of the other tumblers have also been arranged to simultaneously turn to the position of the detent pin. The lock in this example can only be opened by turning the key in one direction.

Figure 11 illustrates the example of Figure 10 with the key turned against the transmission disc 30. When the key is turned to open the lock, the bottom sections 36 of grooves on opposite surface sections of the key profile form a contact surface for the corresponding mating surfaces 34 of the edge 33 of the transmission disc's key channel. If the key is turned further clockwise from the situation of Figure 11, the edge groove 38 on the transmission disc 30 can be turned to the position of the detent pin 12. Furthermore, when all of the tumblers in the stack within the inner cylinder 11 have been turned to the corresponding position, the detent pin is able to settle into the edge grooves of the tumblers and the transmission disc, making it possible to open the lock. In this situation, the key shank 35 is in the position shown in Figure 12. In this position, the transmission element 31 on the transmission disc is in contact with the inner cylinder's mating surface 39A, forming a transmission connection from the key 1 to the inner cylinder 28. When the key is turned further clockwise from the position of Figure 12, the lock opens. When the key is turned counter-clockwise again, the detent pin 12 is allowed to rise out of the edge grooves with the help of a spring arrangement in the cylinder lock. At this time the lock returns to the locked state. One of the sides of the edge groove 38 in the transmission disc (in the figure, the right side of the groove in relation to the

centre of the disc) can also be inclined in order to facilitate the detent pin rising from the groove 38.

As illustrated by the examples, in a key/lock combination according to the invention, the main transmission of force – that is, the transmission of the majority or the entire force from the key to the lock cylinder – takes place through the bottom section 6A of the transverse groove 6 in the key shank. The edges 6B of the groove protect the bottom section from external wear caused by environmental factors. Because there is no transmission of force (mainly or not at all) through the O-surfaces of the key, the wear imposed on them is reduced in comparison to previous implementations in which the O-surfaces were involved in the transmission of force from the key to the lock cylinder. However, the operation between the transmission groove 6 and the lock cylinder should be arranged so that the O-surfaces of the key are still utilised, for example for guiding the return pins and as a possible combination alternative. Thus the edge grooves of the tumblers and the transmission disc must be aligned in line at the detent pin to open the lock. The tumbler(s) can be arranged so that they do not transfer force between the key and the inner cylinder of the lock cylinder, or so that only a small share of the total force turning the key is transferred through the tumbler or tumblers.

A key according to the invention can be implemented for different profiles of a key for a disc tumbler cylinder lock, for example so that the basic shape of the profile of the key shank 2 (the key blank profile) is a rectangle having long sides and short sides, the short sides being rounded to form convex surfaces. Another example is that the basic shape of the profile of the key shank 2 is a rectangle having long sides and short sides, two opposite corners of the rectangle being rounded. There may also be a rectangular groove 7 in the middle of the long sides of said example profiles.

It is evident from the examples presented above that an embodiment of the invention can be created using a variety of different solutions. It is also evident that the invention is not limited to the examples mentioned in this text but can

Claims

1. A key (1) of a disc tumbler cylinder lock, a shank (2) of the key comprising an outer surface (2A) formed by the key blank and at least one combination area (4) in the direction of the shank, in which section a series of combination surfaces is establishable, **characterised** in that the shank (2) also comprises at least one groove (6) transverse to the shank direction, said groove comprising a bottom section (6A) and side sections (6B) transverse to the bottom section between the bottom section and the outer surface (2A) of the shank, and the bottom section of the groove being a main driving surface through which force turning the key is transferable to a disc tumbler cylinder lock.
2. A key according to Claim 1, **characterised** in that the bottom section (6A) of the groove (6) has an even shape.
3. A key according to Claim 2, **characterised** in that the side sections (6B) of the groove are at a right angle to the bottom section (6A).
4. A key according to Claim 2 or 3, **characterised** in that the bottom section (6A) of the groove has different depths in relation to the outer surface (2A) at different points of the groove in the longitudinal direction of the groove.
5. A key according to Claim 1, 2, 3 or 4, **characterised** in that the groove (6) is at the open end of the key shank.
6. A key according to Claim 1, 2, 3 or 4, **characterised** in that the groove is within the combination area (4) of the key shank.
7. A key according to any of the Claims from 1 to 6, **characterised** in that the combination area comprises a groove (8) parallel to the key shank, with the middle section of the groove being deeper than the edge sections of the groove, and said groove forms the outermost combination surfaces for the series of combination surfaces to be formed, so that the middle section of the groove forms a contact surface for the disc tumbler cylinder lock's tumbler.
8. A key according to any of the Claims from 1 to 7, **characterised** in that the basic shape of the profile of the key shank (2) is a rectangle having long sides and short sides, the short sides being rounded to form convex surfaces.

9. A key according to any of the Claims from 1 to 7, **characterised** in that the basic shape of the profile of the key shank (2) is a rectangle having long sides and short sides, two opposite corners of the rectangle being rounded.

10. A key according to Claim 8 or 9, **characterised** in that there is a rectangular groove (7) in the middle of the long sides.

11. A disc tumbler cylinder lock comprising a cylinder body (9) and within it an inner cylinder (11, 28), the inner cylinder containing a stack of tumblers that comprises tumblers (25) to be turned with a key (1), at least one of the tumblers being a 0-tumbler, said tumblers comprising a key channel (26) and an edge groove (27) at the outer edge of each tumbler, and said cylinder lock also comprising a detent pin (12) for locking the lock, said detent pin being able to be arranged into the edge grooves (27) of the tumblers by turning the tumblers (25) with the key (1) to the position of the detent pin for opening the lock, **characterised** in that the stack of tumblers also comprises a transmission disc (10, 30) comprising a key channel (14, 37), the edge (15, 33) of which comprises a mating surface (21, 34) for the main driving surface of a key according to any of the Claims from 1 to 9, an edge groove (13, 38) and a transmission element (19, 31), and

the inner cylinder (11) comprises a movement area (23, 29) for the transmission element and mating surfaces (22, 39A, 39B) at the ends of the movement area to transmit force turning the transmission disc to the inner cylinder (11, 28),

the edge groove (13, 38) of said transmission disc (10, 30) being able to be set at the position of the detent pin (12) and the transmission element (19, 31) being able to be set against the mating surfaces (22, 39A) when turning the key (1) for opening the lock so that the edge grooves (27) of the tumblers (25) simultaneously settle at the position of the detent pin (12).

12. A disc tumbler cylinder lock according to Claim 11, **characterised** in that the mating surface (21, 34) of the transmission disc (10, 30) is even and forms an even contact surface for the main driving surface of the key.

13. A disc tumbler cylinder lock according to Claim 11 or 12, **characterised** in that the transmission element (19) is a projection in the direction of the inner cylinder's axis and that the movement area (23) for the transmission element is a cutting on the bottom of the inner cylinder, the edges (22) of said cutting constituting mating surfaces for the transmission element.

14. A disc tumbler cylinder lock according to Claim 13, **characterised** in that the cylinder lock comprises return pins (18) and that the tumblers have a second edge groove (13A).

15. A disc tumbler cylinder lock according to Claim 11 or 12, **characterised** in that the transmission element (31) is a radial projection on the edge of the transmission disc (30) and that the movement area (29) for the transmission element is a cutting on the wall of the inner cylinder (28), the edges (39A, 39B) of the cutting constituting mating surfaces for the transmission element (31), said projection being arranged to be in contact with one of the mating surfaces (39A) when the key is turned for opening the lock so that the edge groove (38) of the transmission disc is at the position of the detent pin (12) and so that the edge groove of the O-tumbler within the stack of tumblers is arranged to turn to the position of the detent pin (12) at the same time the edge groove (38) of the transmission disc turns to the position of the detent pin.

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FIG. 1

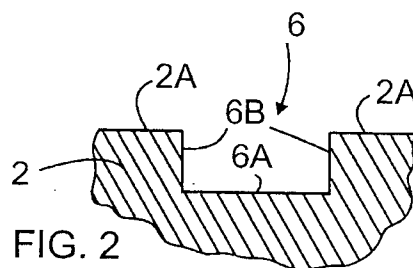
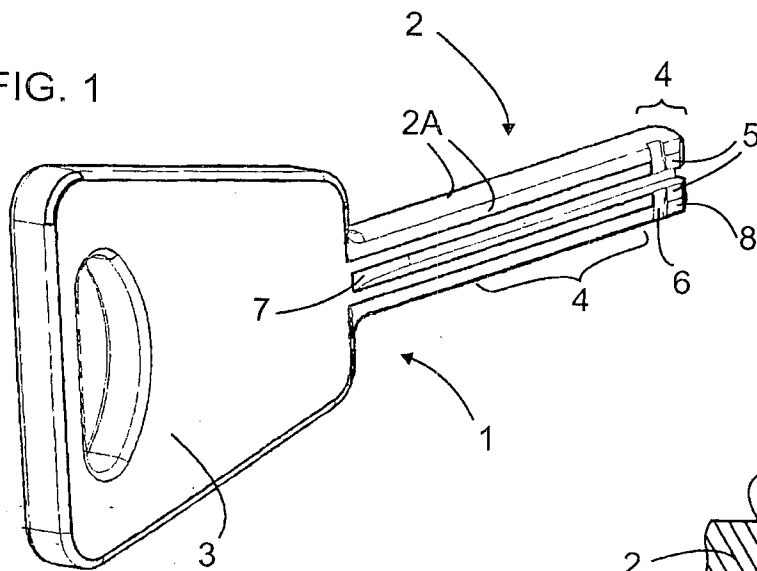
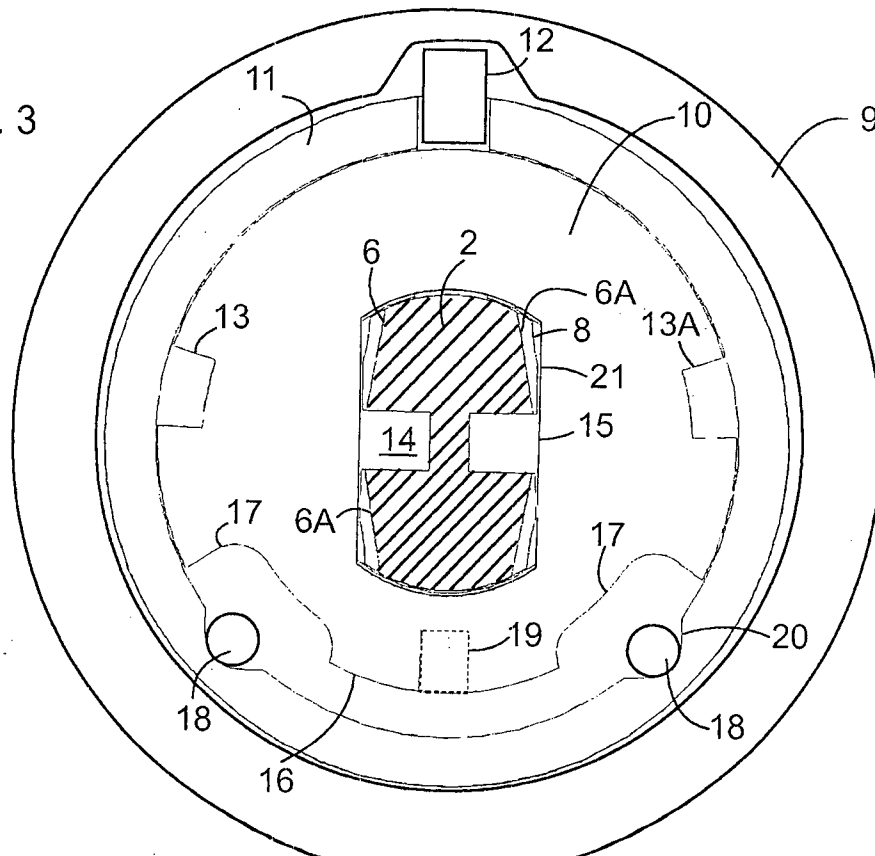


FIG. 3



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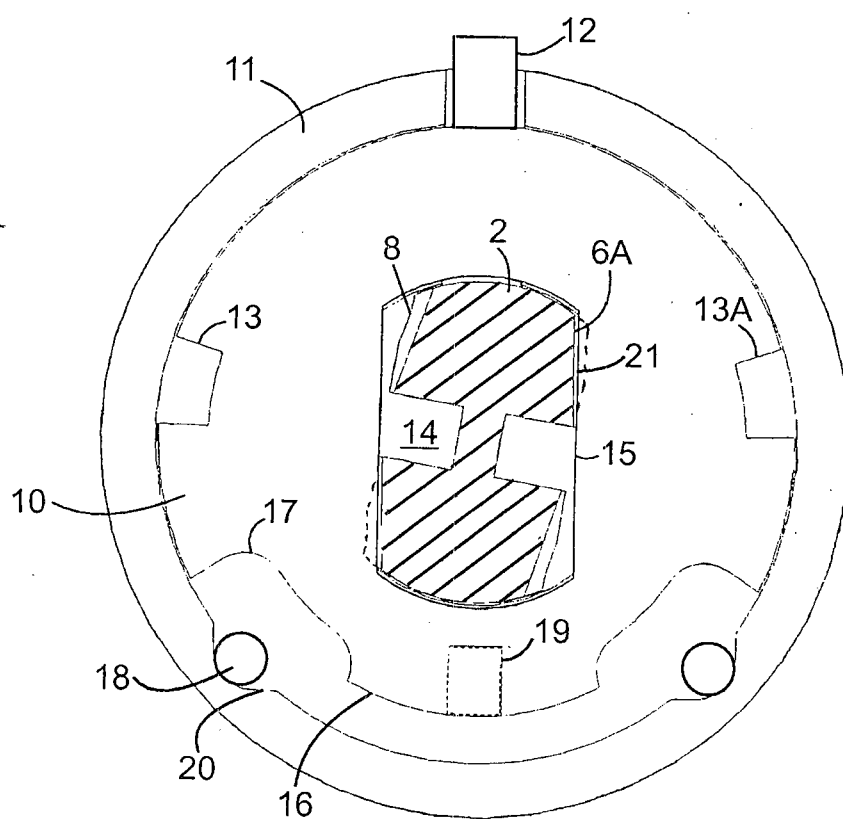


FIG. 4

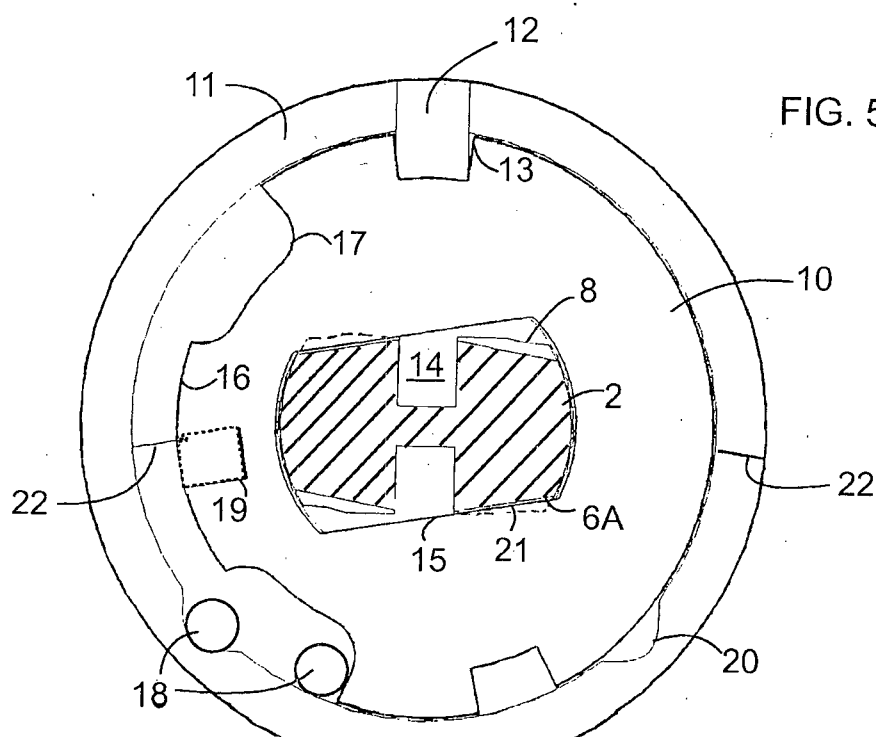
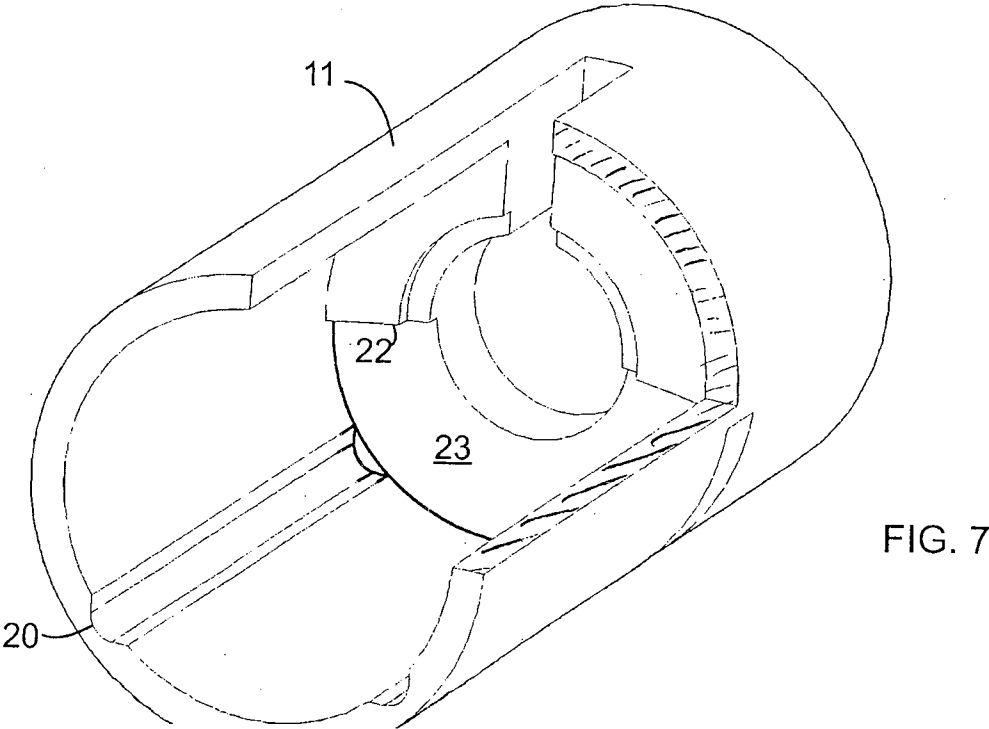
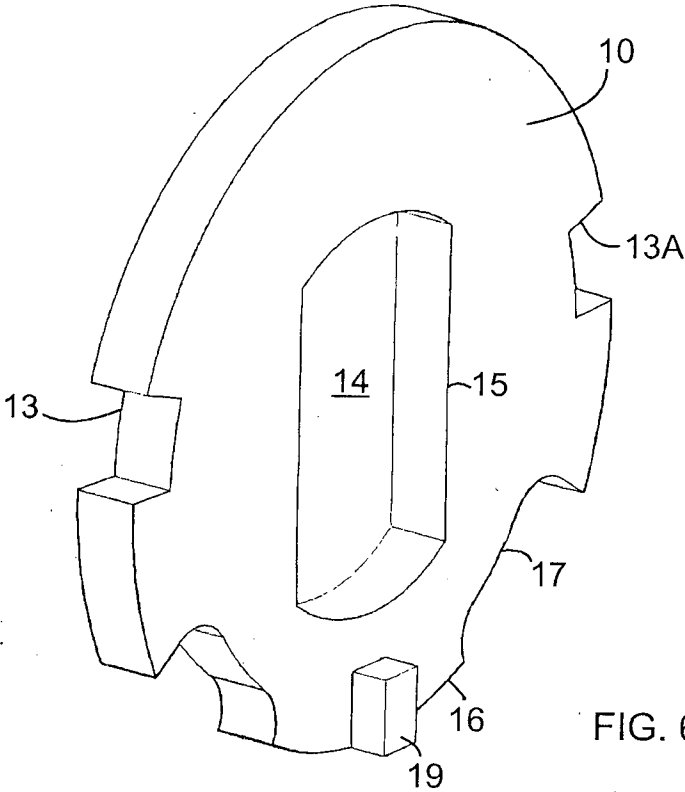
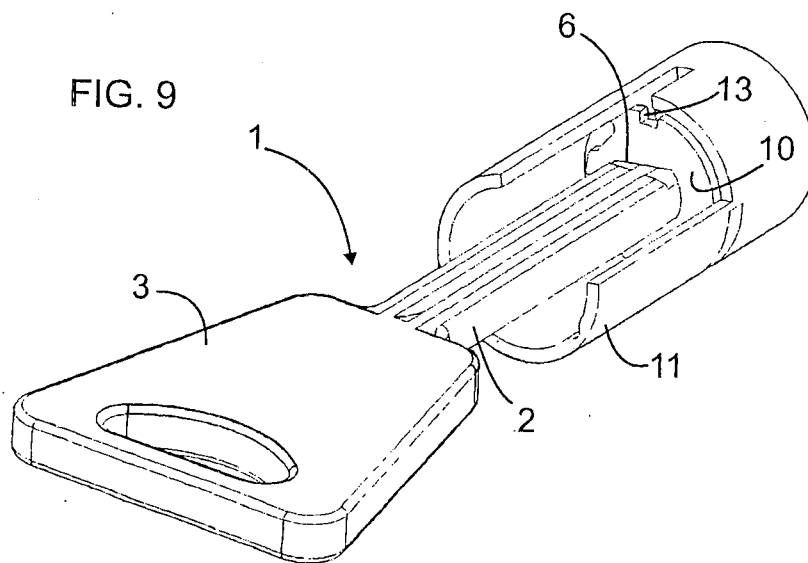
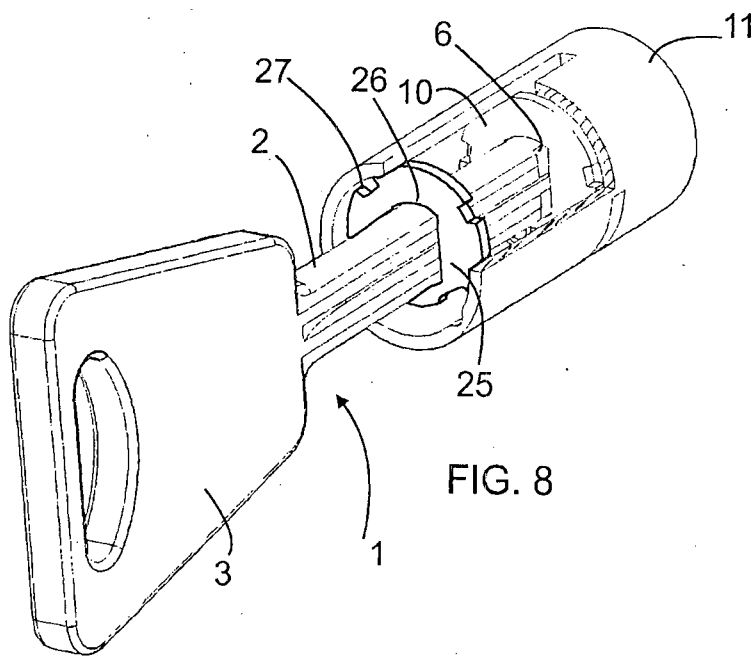


FIG. 5



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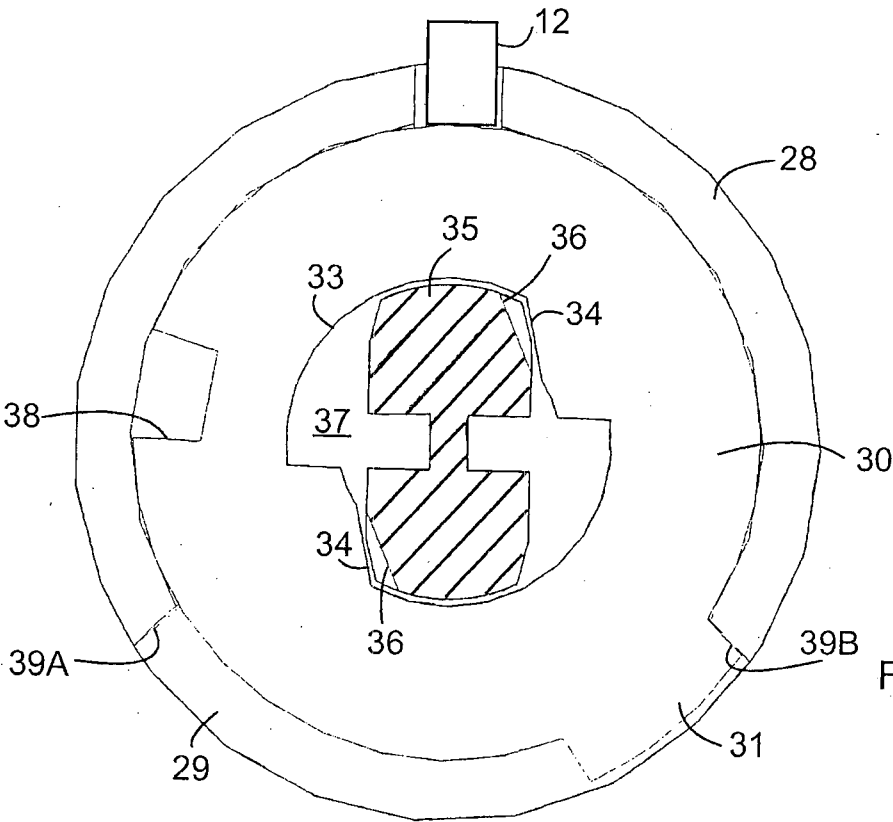


FIG. 10

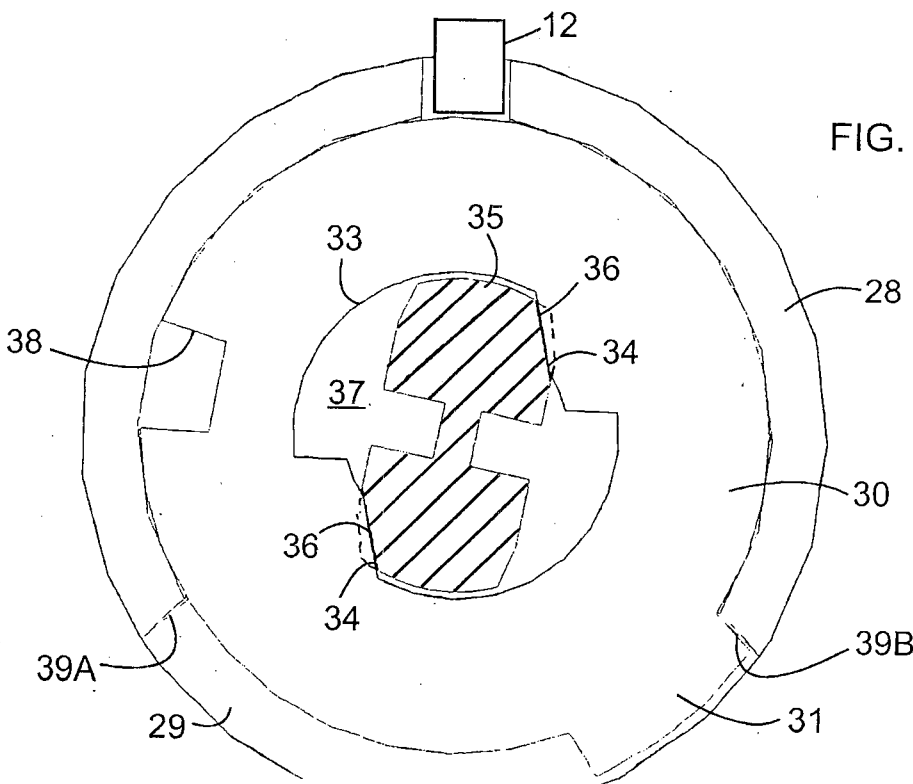


FIG. 11

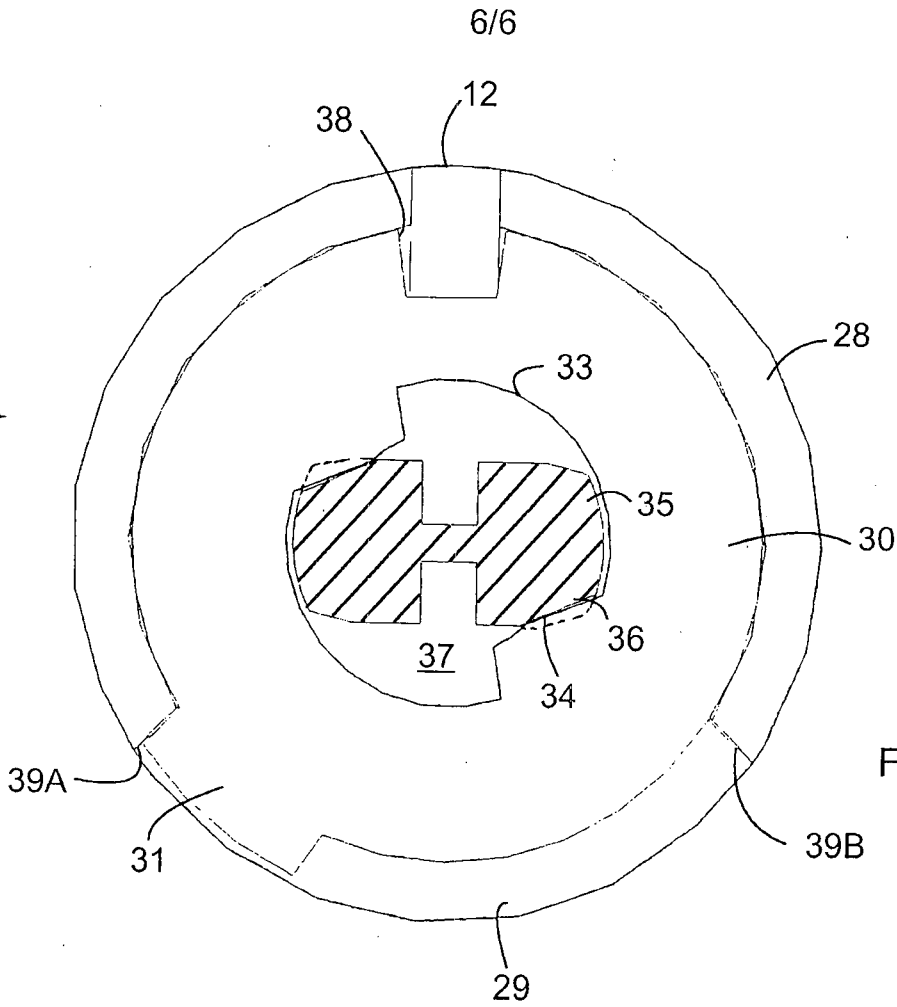


FIG. 12

INTERNATIONAL SEARCH REPORT

International application No

PCT/FI2007/050340

A. CLASSIFICATION OF SUBJECT MATTER
INV. E05B21/06 E05B19/00

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)
E05B

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

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

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	US 3 789 638 A (WARD J ET AL) 5 February 1974 (1974-02-05) column 3, line 37 - line 50; figures 1-14 column 4, line 59 - column 5, line 31	1-6 11,12,14
X	DE 44 04 137 A1 (GRÜNIG AG ROBUSTE PRÄZISION) 10 August 1995 (1995-08-10) column 2, line 30 - column 6, line 47; figures 1-3C	1-6,11, 12,15
X A	US 4 127 996 A (MALMINEN HENRIKKI ET AL) 5 December 1978 (1978-12-05) column 2, line 34 - column 5, line 37; figures 1-27	1-7 11
	-/--	

☒ Further documents are listed in the continuation of Box C.

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Date of the actual completion of the international search

14 November 2007

Date of mailing of the international search report

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NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

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INTERNATIONAL SEARCH REPORT

International application No
PCT/FI2007/050340

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 351 172 A (MARTIKAINEN KAARLO) 28 September 1982 (1982-09-28) cited in the application	1-6,8,10
Y	the whole document	9
A	& FI 74 320 B (WAERTSILAE OY AB) 30 September 1987 (1987-09-30) -----	11,12,14
Y	EP 0 617 184 A (ABLOY SECURITY LTD OY) 28 September 1994 (1994-09-28) cited in the application	9
A	column 7, line 20 - line 32; figure 5 & FI 94 452 B (ABLOY SECURITY LTD OY) 31 May 1995 (1995-05-31) -----	1-6, 10-12

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/FI2007/050340

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 3789638	A	05-02-1974	AU 5862373 A	30-01-1975
			CA 1004493 A1	01-02-1977
			DE 2338152 A1	07-02-1974
			FR 2195246 A5	01-03-1974
			GB 1434386 A	05-05-1976
			IT 991439 B	30-07-1975
			JP 49133196 A	20-12-1974
DE 4404137	A1	10-08-1995	NONE	
US 4127996	A	05-12-1978	AT 354293 B	27-12-1979
			AT 700277 A	15-05-1979
			AU 506925 B2	31-01-1980
			AU 2903977 A	29-03-1979
			BE 859334 A1	01-02-1978
			CA 1067308 A1	04-12-1979
			DE 2744144 A1	06-04-1978
			DK 434677 A	05-04-1978
			FI 762819 A	05-04-1978
			FR 2366428 A1	28-04-1978
			GB 1590185 A	28-05-1981
			HK 24382 A	11-06-1982
			IT 1087733 B	04-06-1985
			JP 1423303 C	15-02-1988
			JP 53044298 A	20-04-1978
			JP 62031149 B	07-07-1987
			MY 19483 A	31-12-1983
			NL 7710833 A	06-04-1978
			NO 773365 A	05-04-1978
			SE 7710989 A	05-04-1978
			SE 437856 B	18-03-1985
			SE 8403605 A	06-07-1984
US 4351172	A	28-09-1982	AT 366139 B	10-03-1982
			AT 447980 A	15-07-1981
			AU 539153 B2	13-09-1984
			AU 6209380 A	12-03-1981
			BE 885056 A1	31-12-1980
			BR 8005764 A	18-08-1981
			CA 1172868 A1	21-08-1984
			DE 3033247 A1	19-03-1981
			DK 380480 A	08-03-1981
			FI 792797 A	08-03-1981
			FR 2473095 A1	10-07-1981
			GB 2061368 A	13-05-1981
			HK 37984 A	11-05-1984
			IT 1194690 B	22-09-1988
			JP 56046073 A	27-04-1981
			MY 34585 A	31-12-1985
			NL 8004950 A	10-03-1981
			NO 802637 A	09-03-1981
			SE 450024 B	01-06-1987
			SE 8006217 A	08-03-1981
			SG 7784 G	08-02-1985
			SU 1409134 A3	07-07-1988
FI 74320	B	30-09-1987	AT 366139 B	10-03-1982
			AT 447980 A	15-07-1981

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/FI2007/050340

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FI 74320	B	AU 539153 B2	13-09-1984
		AU 6209380 A	12-03-1981
		BE 885056 A1	31-12-1980
		BR 8005764 A	18-08-1981
		CA 1172868 A1	21-08-1984
		DE 3033247 A1	19-03-1981
		DK 380480 A	08-03-1981
		FI 792797 A	08-03-1981
		FR 2473095 A1	10-07-1981
		GB 2061368 A	13-05-1981
		HK 37984 A	11-05-1984
		IT 1194690 B	22-09-1988
		JP 56046073 A	27-04-1981
		MY 34585 A	31-12-1985
		NL 8004950 A	10-03-1981
		NO 802637 A	09-03-1981
		SE 450024 B	01-06-1987
		SE 8006217 A	08-03-1981
		SG 7784 G	08-02-1985
		SU 1409134 A3	07-07-1988
		US 4351172 A	28-09-1982
EP 0617184	A	28-09-1994	
		AT 173521 T	15-12-1998
		AU 673891 B2	28-11-1996
		AU 5901494 A	29-09-1994
		CA 2116605 A1	26-09-1994
		CN 1098469 A	08-02-1995
		DE 69414624 D1	24-12-1998
		DE 69414624 T2	24-06-1999
		DK 617184 T3	02-08-1999
		EE 3164 B1	15-02-1999
		ES 2125404 T3	01-03-1999
		FI 931340 A	26-09-1994
		HK 1005558 A1	17-03-2000
		JP 2744198 B2	28-04-1998
		JP 6346639 A	20-12-1994
		LT 1903 A	25-10-1994
		LV 11358 A	20-06-1996
		PL 172800 B1	28-11-1997
		RU 2120015 C1	10-10-1998
		SG 50691 A1	20-07-1998
		US 5490405 A	13-02-1996
FI 94452	B	31-05-1995	
		AT 173521 T	15-12-1998
		AU 673891 B2	28-11-1996
		AU 5901494 A	29-09-1994
		CA 2116605 A1	26-09-1994
		CN 1098469 A	08-02-1995
		DE 69414624 D1	24-12-1998
		DE 69414624 T2	24-06-1999
		DK 617184 T3	02-08-1999
		EE 3164 B1	15-02-1999
		EP 0617184 A2	28-09-1994
		ES 2125404 T3	01-03-1999
		FI 931340 A	26-09-1994
		HK 1005558 A1	17-03-2000
		JP 2744198 B2	28-04-1998

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(71) Solicitante (para todos los Estados designados menos los Estados Unidos): ABLOY OY [FI/FI]; Wahlforssinkatu 20, FI-80100 Joensuu (FI).

(72) Inventores; e

(75) Inventores/Solicitantes (solo para los Estados Unidos): MARTIKAINEN, Kaarlo [FI/FI]; Mastotie 4 A 1, FI-80160 Joensuu (FI).

(74) Agente: AWEK INDUSTRIAL PATENTS LTD OY; P.O.Box 230 (Lautatarhankatu 6), FI-00101 Helsinki (FI).

(81) Estados Designados (a menos que se indique lo contrario, para todo tipo de protección nacional disponible): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

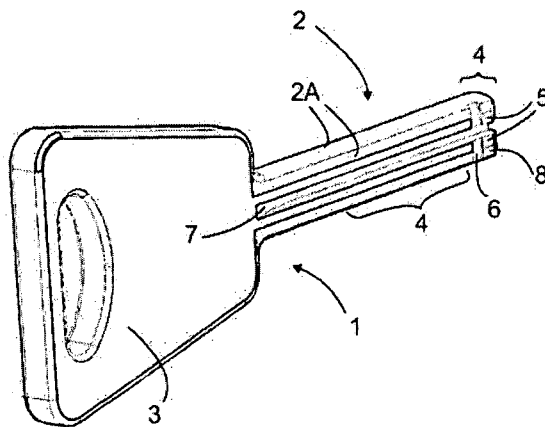
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(54) Título: LLAVE Y CERRADURA DE CILINDRO DE DISCOS GIRATORIOS



(57) Resumen: La invención se refiere a una cerradura de cilindro con discos giratorios y a una llave para la misma. La llave de acuerdo con la invención comprende una ranura (6) que es transversal con respecto al cuerpo (2) de la llave. La ranura comprende una sección inferior (6A) y secciones laterales (6B) que son transversales con respecto a la sección inferior entre la sección inferior y la superficie exterior (2A) del cuerpo de la llave. La sección inferior de la ranura es la superficie principal de accionamiento de la llave utilizada para transferir la fuerza de giro a la cerradura de cilindro con discos giratorios. Esto reduce el desgaste en las superficies 0 de la llave porque las superficies 0 no transfieren parte alguna de la fuerza que hace girar la llave a la cerradura de cilindro con discos giratorios.

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LLAVE Y CERRADURA DE CILINDRO DE DISCOS GIRATORIOS

Campo de tecnología

La invención se refiere a una cerradura de cilindro y a su llave. La invención se refiere particularmente a una cerradura de cilindro con discos giratorios – es decir, a una cerradura de cilindro de discos giratorios – y a su llave.

Arte previo

En las cerraduras de cilindro de discos giratorios conocidas, tales como las que constan en la publicación FI 74320, los discos giratorios son llevados a la posición de abertura mediante el giro de la llave. Sobre la llave se han recortado diferentes superficies de combinación, y cuando se hace girar la llave, éstas guían los discos giratorios de modo que giren hacia una posición en la cual las entrantes situadas sobre el borde exterior de los discos giratorios se alinean en una línea recta. Esto permite que la espiga de retén se mueva hacia el interior de las entrantes de los discos giratorios, y sea posible abrir la cerradura mediante el giro.

La publicación FI 74320 presenta una llave con cuatro series de superficies de combinación, lo que permite que la llave sea insertada en el correspondiente cilindro en dos posiciones (para lo cual se hace girar la llave en 180 grados alrededor de su eje longitudinal). La publicación FI 94452 presenta otro cilindro de discos giratorios, y su llave. En esta publicación, la llave tiene dos series de superficies de combinación sobre lados opuestos del perfil de la llave – es decir, en la sección transversal del cuerpo de la llave.

Las superficies de las llaves se desgastan por el uso. El desgaste sobre las superficies afecta desfavorablemente la operación de la llave y de la cerradura, lo cual ocasiona un funcionamiento deficiente y puede además incrementar el desgaste sobre el cilindro de la cerradura. Las superficies extremas exteriores de la llave son particularmente propensas al desgaste causado por el medio ambiente. Por otra parte, las superficies utilizadas para hacer girar los elementos de la cerradura se desgastan tanto debido al medio ambiente como a la resistencia causada por las partes de la cerradura de discos giratorios. El desgaste de la llave es más rápido en uso intensivo, tal como el uso por personal de vigilancia, operarios de mantenimiento y cuidadores.

Breve Descripción de la Invención

El objetivo de la invención es reducir los problemas debidos al desgaste de la llave. El objetivo se logrará como se presenta en las reivindicaciones independientes. Las

reivindicaciones dependientes describen diversas formas de realización de la invención. La idea inventiva apunta a lograr el menor desgaste posible sobre las superficies de la llave conocidas como las superficies 0. Las superficies 0 se refieren a las superficies que son las superficies más exteriores del cuerpo de la llave y que han sido dispuestas para operar con las partes de la cerradura de cilindro de discos giratorios cada vez que se haga girar la llave en el canal de llave de la cerradura. Si la superficie 0 está suficientemente desgastada, esto causa un funcionamiento deficiente de la cerradura de cilindro de discos giratorios. A su vez, el funcionamiento deficiente puede imponer un desgaste adicional sobre las partes de la cerradura.

La llave de acuerdo con la invención comprende una ranura que es transversal con respecto al cuerpo de la llave. La ranura comprende una sección inferior 6A y secciones laterales 6B que son transversales con respecto a la sección inferior entre la sección inferior y la superficie exterior 2A del cuerpo de la llave. La sección inferior de la ranura es la superficie principal de accionamiento de la llave que se utiliza para transferir la fuerza de giro desde la llave hasta la cerradura de cilindro de discos giratorios. Esto reduce el desgaste sobre las superficies 0 debido a que las superficies 0 no transfieren parte alguna de la fuerza que hace girar la llave a la cerradura de cilindro de discos giratorios. Debido a que la principal superficie de accionamiento que transfiere la mayor parte o la totalidad de la fuerza que hace girar la llave al cilindro interior de la cerradura de cilindro se halla en la parte inferior de la ranura 6, aquella no está muy expuesta al desgaste ocasionado por los factores ambientales. El desgaste sobre la superficie de accionamiento 6A de la llave es causado prácticamente en su totalidad por el contacto entre la misma y un disco de transmisión situado en el cilindro interior de la cerradura.

Listado de las figuras

A continuación se describe la invención con mayor detalle haciendo referencia a las figuras de los dibujos adjuntos, en los que:

la Figura 1 ilustra un ejemplo de una llave de acuerdo con la invención;

la Figura 2 ilustra un ejemplo de una ranura de llave de acuerdo con la invención;

la Figura 3 ilustra un ejemplo de una llave y de un disco de transmisión de acuerdo con la invención, estando la llave en su posición básica;

la Figura 4 ilustra un ejemplo de una llave y de un disco de transmisión de acuerdo con la invención, estando la llave girada contra el disco de transmisión;

la Figura 5 ilustra un ejemplo de una llave y de un disco de transmisión de acuerdo con la invención, estando la llave girada de manera tal que el disco de transmisión se encuentra contra la superficie que hace juego en el cilindro interior de la

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cerradura;

la Figura 6 ilustra un ejemplo de un disco de transmisión en una cerradura de cilindros giratorios de acuerdo con la invención;

la Figura 7 ilustra un ejemplo de un cilindro interior en una cerradura de cilindro de discos giratorios de acuerdo con la invención;

la Figura 8 ilustra un ejemplo de una llave y de las partes de una cerradura de cilindro de discos giratorios de acuerdo con la invención, estando la llave en su posición básica;

la Figura 9 ilustra un ejemplo de una llave y de las partes de una cerradura de cilindro con discos giratorios de acuerdo con la invención, estando la llave en posición girada;

la Figura 10 ilustra otro ejemplo de una llave y de un disco de transmisión de acuerdo con la invención, estando la llave en su posición básica;

la Figura 11 ilustra otro ejemplo de una llave y de un disco de transmisión de acuerdo con la invención, estando la llave girada contra el disco de transmisión;

la Figura 12 ilustra otro ejemplo de una llave y de un disco de transmisión, de acuerdo con la invención, estando la llave girada de manera tal que el disco de transmisión se halla contra la superficie que hace juego en el cilindro interior de la cerradura.

Descripción de la Invención

La Figura 1 ilustra un ejemplo de una llave 1 de acuerdo con la invención, más precisamente una llave ciega sobre la cual todavía no se ha formado una serie de superficies de combinación compatibles con una cerradura de cilindro con discos giratorios en particular. (La llave ciega también puede operar como una llave real si el cilindro de la cerradura está preparado para operar con la llave ciega). El cuerpo 2 de la llave se hace girar mediante el uso del extremo 3 de la llave para abrir la cerradura de cilindro con discos giratorios. El cuerpo 2 de la llave comprende un área de combinación 4 en la dirección del cuerpo de la llave en la cual es posible establecer una serie de superficies de combinación. Las superficies de combinación se cortan sobre el área de combinación. Generalmente, se los denomina como cortes de combinación. La llave de ejemplo de la Figura 1 tiene cuatro áreas de combinación. Se trata de los lados cortos del perfil del cuerpo de la llave y de parte de los extremos de los lados largos dentro de una determinada sección de la longitud del cuerpo 2 de la llave. La cantidad de áreas de combinación en el cuerpo de la llave depende del perfil de la llave. Sin embargo, el cuerpo de la llave comprende por lo menos un área de combinación en la dirección del

cuerpo de la llave.

El cuerpo 2 de la llave 1 también comprende una superficie exterior 2A formada por la llave ciega y por al menos una ranura 6 transversal con respecto a la dirección del cuerpo de la llave. La ranura comprende una sección inferior 6A y secciones laterales 6B que son transversales con respecto a la sección inferior entre la sección inferior y la superficie exterior 2A del cuerpo de la llave. La sección inferior 6A de la ranura es la superficie principal de accionamiento por medio de la cual puede transferirse la fuerza de giro desde la llave 1 hasta la cerradura de cilindro con discos giratorios. Las secciones laterales 6B protegen la sección inferior 6A contra el desgaste causado por los factores ambientales. La ranura 6 se ilustra con mayor detalle en la Figura 2. Si la sección inferior 6A de la ranura 6 tiene una forma plana, su fabricación es fácil. Se prefiere que las secciones laterales 6B de la ranura estén en ángulo recto con respecto a la sección inferior 6A. De esta manera, la ranura 6 ocupa el menor espacio posible sobre el cuerpo 2 de la llave. También son posibles otras formas de la sección inferior 6A y otras direcciones transversales de las secciones laterales contra el eje del cuerpo de la llave. En principio, es posible colocar la ranura 6 en cualquier ubicación adecuada en el cuerpo de la llave. Sin embargo, la ubicación recomendada es en el extremo abierto del cuerpo de la llave, tal como se ilustra en la Figura 1. También es posible que la ranura 6 se encuentre (por lo menos en parte) en el área de combinación del cuerpo de la llave.

La superficie exterior de la llave también comprende las superficies 0, 5, mediante las cuales la fuerza que hace girar la llave interactúa con los discos giratorios 0 de la cerradura de cilindro con discos giratorios. Los discos giratorios 0 siguen siempre el giro de la llave.

El área de combinación en el cuerpo de una llave de acuerdo con la invención, puede opcionalmente comprender una ranura 8 paralela al cuerpo de la llave, siendo la sección media de la ranura más profunda que los bordes de la ranura. La ranura 8 forma las superficies de combinación más bajas, es decir las más exteriores, para la serie de superficies de combinación a ser formadas, por lo que la sección media de la ranura forma una superficie de contacto para el disco giratorio de la cerradura de cilindro con discos giratorios. Esto apunta también a reducir el desgaste impuesto sobre las superficies de combinación más exteriores. La llave de ejemplo de la Figura 1 también comprende una ranura rectangular 7 en el centro de los lados largos del cuerpo de la llave.

La Figura 3 ilustra un ejemplo de una llave 1 y de una cerradura de cilindro con discos giratorios de acuerdo con la invención. La Figura 8 ilustra el cilindro interior de la

cerradura en sección transversal parcial. La cerradura de cilindro con discos giratorios comprende un cuerpo de cilindro 9 (mostrado en la Figura 3) y, dentro del mismo, un cilindro interior 11. El cilindro interior tiene una pila de discos (tambores) que comprenden los discos giratorios 25 a ser girados con la llave 1 (Figura 8). La Figura 8 ilustra solamente uno de los discos giratorios en la pila de discos. Por lo menos un disco giratorio es un disco giratorio 0. Un disco giratorio 0 se refiere a un disco giratorio que siempre gira junto con la llave y que está diseñado para entrar en contacto con la superficie más exterior de la llave, la cual se denomina superficie 0. En forma correspondiente, se hace referencia al disco giratorio 1, al disco giratorio 2, etc., según la superficie correspondientemente numerada de la superficie de combinación con la cual el disco giratorio está diseñado para entrar en contacto. Mediante el recortado se crean diferentes alternativas para la superficie de combinación. Los discos giratorios comprenden un canal de llave 26 y una ranura de borde 27 en el borde exterior de cada disco giratorio. La cerradura de cilindro también comprende una espiga de retén 12 para trabar la cerradura. La espiga de retén puede estar dispuesta en las ranuras de borde 27 de los discos giratorios, para lo cual se hacen girar los discos giratorios con la llave 1 para abrir la cerradura.

Es evidente que la cerradura de cilindro con discos giratorios normalmente también comprende otras partes que están excluidas de esta descripción de la invención, por razones de caridad.

Las Figuras 3 a 5 ilustran ejemplos de la operación mutua de la llave y del disco de transmisión de una cerradura de cilindro con discos giratorios de acuerdo con la invención. El cuerpo 2 de la llave se ilustra en la dirección del eje del cuerpo de la llave, lo cual hace que el perfil del cuerpo de la llave (el área de la sección transversal de la llave ciega) sea visible. La sección transversal de la llave se halla en la ranura 6. El cilindro interior 11 y el disco de transmisión 10 pueden verse desde el extremo del eje del cilindro interior. Esto también muestra claramente la forma del canal de llave 14 en el disco de transmisión.

La Figura 3 ilustra una llave y un disco de transmisión de acuerdo con la invención, con la llave en su posición básica. La expresión "posición básica" se refiere a la posición de la llave en la que es posible insertar la llave en la cerradura de cilindro con discos giratorios. El disco de transmisión 10 comprende un canal de llave 14 y una ranura de borde 13 en el borde exterior del disco. El borde 15 del canal de llave comprende por lo menos una superficie que hace juego 21 para la sección inferior de la ranura 6. La cantidad requerida de superficies que hacen juego, depende del perfil utilizado para la

llave. La superficie que hace juego está configurada para seguir la forma de la sección inferior de la ranura 6. La cerradura de cilindro también comprende una espiga de retén 12. El disco de transmisión también tiene un elemento de transmisión 19 que puede disponerse contra una superficie que hace juego en el cilindro interior. La Figura 6 ilustra el disco de transmisión del ejemplo de la Figura 1 y la Figura 7 ilustra el cilindro interior 11.

En el ejemplo de la Figura 3, la cerradura de cilindro con discos giratorios comprende dos espigas de retorno 18 destinadas a llevar de regreso los discos giratorios situados en la pila dentro del cilindro interior, hacia su posición básica cuando se hace girar la llave a su posición básica una vez que se ha abierto la cerradura. La superficie interior del cilindro interior 11 tiene entrantes 20 para las espigas de retén. Por lo tanto, una cerradura de cilindro con discos giratorios de este tipo se abrirá si se hace girar la llave en cualquier dirección. Por esta razón, el disco de transmisión en este tipo de cerradura de cilindro con discos giratorios tiene también otra ranura de borde 13A y un borde de corte 16 para las espigas de retorno 18. Los extremos del borde de corte también tienen áreas de corte ampliadas 17.

La Figura 4 ilustra el ejemplo de la Figura 3, estado la llave girada contra el disco de transmisión 10. El perfil de la llave de este ejemplo tiene cuatro ranuras 6. Cuando se hace girar la llave para abrir la cerradura, las secciones inferiores 6A de las ranuras en las secciones de superficie opuestas del perfil de la llave, forman una superficie de contacto para las correspondientes superficies que hacen juego 21 del borde 15 del canal de llave del disco de transmisión. Si se continúa girando la llave en el sentido de las agujas del reloj a partir de la situación de la Figura 4, es posible hacer girar la ranura de borde 13 en el disco de transmisión 10 hacia la posición de la espiga de retén 12. Por otra parte, cuando se ha hecho girar la totalidad de los discos giratorios situados en la pila dentro de cilindro interior 11 hacia su posición correspondiente, la espiga de retén es capaz de asentarse en las ranuras de borde de los discos giratorios y del disco de transmisión, con lo que se hace posible abrir la cerradura. En esta situación, el cuerpo 2 de la llave se halla en la posición mostrada en la Figura 5. En esta posición, el elemento de transmisión 19 en el disco de transmisión, se halla en contacto con la superficie que hace juego 22 del cilindro interior, formándose una conexión de transmisión desde la llave 1 hacia el cilindro interior 11. Si se continúa haciendo girar la llave en el sentido de las agujas del reloj a partir de la posición de la Figura 5, la cerradura se abre. La sección inferior 6A de la ranura es una superficie de accionamiento desde la llave al disco de transmisión.

La Figura 6 ilustra una forma de realización del elemento de transmisión 19 que tiene una saliente en la dirección del eje del cilindro interior. En otras palabras, la saliente está posicionada transversalmente contra el plano formado por la superficie principal del disco de transmisión. La Figura 7 ilustra una forma de realización del cilindro interior 11 que da cabida al elemento de transmisión ilustrado en la Figura 6. En esta forma de realización del cilindro interior, la parte inferior del cilindro interior tiene un área de movimiento 23 para el elemento de transmisión 19. El área de movimiento es un recorte en la parte inferior interior del cilindro interior, y los bordes de dicho recorte constituyen superficies que hacen juego 22 para el elemento de transmisión. Otra alternativa es que haya una entrante de corte en el disco de transmisión y que haya una saliente sobre la parte inferior interior del cilindro interior, en cuyo caso el elemento de transmisión es cualquiera de los bordes extremos de la entrante de corte y el área de movimiento es el espacio remanente sobre los lados de la saliente. Las superficies que hacen juego son los lados de la saliente que están situados transversalmente contra la circunferencia del disco de transmisión.

En las Figuras 2 a 5 puede verse que la sección inferior 6A de la ranura es plana, y que éste es también el caso con las superficies que hacen juego 21 del disco de transmisión. Se prefiere que la superficie que hace juego tenga una forma plana, porque de esta manera se forma una superficie de contacto plana y amplia para la superficie principal de accionamiento de la llave, y porque su fabricación es fácil. Por supuesto, hay otras formas posibles, pero también en este caso cabe observar que la forma de contacto creada ha de ser lo más amplia posible. Por otra parte, puede verse que la ranura puede tener diferentes profundidades en relación con la superficie exterior 2A de la llave en diferentes puntos de la sección inferior 6A en la dirección longitudinal de la ranura. Este rasgo distintivo apunta a crear una superficie de contacto amplia.

La Figura 8 ilustra una llave 1 de acuerdo con la invención y las partes del cilindro interior 11 cuando la llave se halla en su posición normal en el canal de llave de la cerradura de cilindro con discos giratorios. La Figura 9 ilustra una situación en la que se ha girado la llave de modo tal que la ranura de borde 13 del disco de transmisión 10 (y simultáneamente las ranuras de borde 27 de los discos giratorios 25) están alineadas en línea en la espiga de retén.

La Figura 10 ilustra otro ejemplo de una llave y de un disco de transmisión 30 de acuerdo con la invención con el cuerpo de la llave 35 en su posición básica. En este ejemplo, la llave tiene dos ranuras transversales, cuyas secciones inferiores 36 pueden estar dispuestas contra la superficie que hace juego 34 del borde 33 del canal de llave 37

del disco de transmisión 30. Además de la ranura de borde 38, el borde del disco de transmisión tiene una saliente radial que constituye el elemento de transmisión 31.

El área de movimiento 29 del elemento de transmisión es un recorte en la pared del cilindro interior, y los bordes 39A, 39B del recorte constituyen superficies que hacen juego para el elemento de transmisión 31. La saliente está dispuesta para estar en contacto con una de las superficies que hacen juego 39A, cuando se hace girar la llave para abrir la cerradura, de modo tal que la ranura de borde 38 del disco de transmisión, se halla en la espiga de retén 12, y de modo tal que la ranura de borde del disco giratorio 0 dentro de la pila de discos giratorios está dispuesta para girar hacia la posición de la espiga de retén 12 al mismo tiempo que la ranura de borde, 38, del disco de transmisión gira hacia la posición de la espiga de retén. Las ranuras de borde de los otros discos giratorios también han sido dispuestas para girar simultáneamente hacia la posición de la espiga de retén. En este ejemplo, la cerradura solamente puede abrirse haciendo girar la llave en una dirección determinada.

La Figura 11 ilustra el ejemplo de la Figura 10, estando la llave girada contra el disco de transmisión 30. Cuando se hace girar la llave para abrir la cerradura, las secciones inferiores 36 de las ranuras en las secciones de superficie opuestas del perfil de la llave forman una superficie de contacto para las correspondientes superficies que hacen juego 34, del borde 33 del canal de llave del disco de transmisión. Si se continúa girando la llave en el sentido de las agujas del reloj a partir de la situación de la Figura 11, la ranura de borde, 38, en el disco de transmisión 30 puede ser girada hacia la posición de la espiga de retén 12. Por otra parte, cuando la totalidad de los discos giratorios en la pila dentro del cilindro interior 11 han sido girados hacia la posición correspondiente, la espiga de retén es capaz de asentarse en las ranuras de borde de los discos giratorios y del disco de transmisión, con lo que se hace posible abrir la cerradura. En esta situación, el cuerpo de la llave 35 se halla en la posición mostrada en la Figura 12. En esta posición, el elemento de transmisión 31 en el disco de transmisión se halla en contacto con la superficie que hace juego 39A del cilindro interior, formándose una conexión de transmisión desde la llave 1 a la cilindro interior 28. Cuando se hace girar la llave más aún en el sentido de la agujas del reloj desde la posición de la Figura 12, la cerradura se abre. Si se hace girar la llave nuevamente en contra de las agujas del reloj, se permite que la espiga de retén 12 se eleve saliendo de las ranuras de borde con ayuda de la disposición de resorte en la cerradura de cilindro. En este momento la cerradura regresa al estado trabado. Uno de los lados de la ranura de borde 38 en el disco de transmisión (en la figura, el lado derecho de la ranura con respecto al centro del disco) también puede

inclinarse a efectos de facilitar la elevación de la espiga de retén desde la ranura 38.

Tal como se ilustra mediante los ejemplos, en una combinación de llave/cerradura de acuerdo con la invención, la principal transmisión de fuerza - es decir, la transmisión de la mayor parte de la fuerza, o de la totalidad de la misma, desde la llave al cilindro de la cerradura - tiene lugar por medio de la sección inferior 6A de la ranura transversal 6 en el cuerpo de la llave. Los bordes 6B de la ranura protegen la sección inferior contra el desgaste exterior causado por factores ambientales. Dado que no hay una transmisión de fuerza (de manera predominante o de ninguna manera) a través de las superficies 0 de la llave, el desgaste impuesto sobre las mismas es reducido en comparación con implementaciones anteriores en las cuales intervenían las superficies 0 en la transmisión de la fuerza desde la llave al cilindro de la cerradura. Sin embargo, la operación entre la ranura de transmisión 6 y el cilindro de la cerradura, debería estar dispuesta de manera tal que las superficies 0 de la llave sigan utilizándose, por ejemplo para guiar las espigas de retorno y como una posible alternativa de combinación. Por lo tanto, las ranuras de borde de los discos giratorios y el disco de transmisión han de estar alineadas en línea en la espiga de retén para abrir la cerradura. El o los discos giratorios pueden estar dispuestos de manera tal que no transfieren fuerza entre la llave y el cilindro interior del cilindro de la cerradura, o de manera tal que solamente una porción pequeña de la fuerza total que hace girar la llave sea transferida por medio del o de los discos giratorios.

Es posible implementar una llave de acuerdo con la invención para diferentes perfiles de una llave, para un cerradura de cilindro con discos giratorios, por ejemplo de manera tal que la forma básica del perfil del cuerpo 2 de la llave (el perfil de la llave ciega) sea un rectángulo que tenga lados largos y lados cortos, estando los lados cortos redondeados de manera de formar superficies convexas. Otro ejemplo es que la forma básica del perfil del cuerpo 2 de la llave sea un rectángulo que tenga lados largos y lados cortos, estando redondeadas dos esquinas opuestas del rectángulo. También puede haber una ranura rectangular 7 en el medio de los lados largos de dichos perfiles dados a título de ejemplo.

De los ejemplos presentados anteriormente es evidente que es posible crear una forma de realización mediante la utilización de una variedad de diferentes soluciones. También es evidente que invención no se limita a los ejemplos mencionados en este texto sino que es posible implementarla en muchas otras formas de realización diferentes dentro del alcance de la idea de la invención.

REIVINDICACIONES

1. Una llave (1) de una cerradura de cilindro con discos giratorios, un cuerpo (2) de la llave que comprende una superficie exterior (2A) formada por la llave ciega y por lo menos una área de combinación (4) en la dirección del cuerpo de la llave, en cuya sección es posible establecer una serie de superficies de combinación, **caracterizada porque** el cuerpo (2) también comprende por lo menos una ranura (6) transversal con respecto a la dirección del cuerpo, comprendiendo dicha ranura una sección inferior (6A) y secciones laterales (6B) transversales con respecto a la sección inferior entre la sección inferior y la superficie exterior (2A) del cuerpo de la llave, y siendo la sección inferior de la ranura una superficie principal de accionamiento a través de la cual puede transferirse la fuerza que hace girar la llave hacia una cerradura de cilindro con discos giratorios .
2. Una llave de acuerdo con la reivindicación 1, **caracterizada porque** la sección inferior (6A) de la ranura (6) tiene una forma plana.
3. Una llave de acuerdo con la reivindicación 2, **caracterizada porque** las secciones laterales (6B) de la ranura se hallan en ángulo recto con respecto a la sección inferior (6A).
4. Una llave de acuerdo con la reivindicación 2 ó 3, **caracterizada porque** la sección inferior (6A) de la ranura tiene profundidades diferentes en relación con la superficie exterior (2A) en diferentes puntos de la ranura en la dirección longitudinal de la ranura.
5. Una llave de acuerdo con la reivindicación 1, 2, 3 ó 4, **caracterizada porque** la ranura (6) se halla en el extremo abierto del cuerpo de la llave.
6. Una llave de acuerdo con la reivindicación 1, 2, 3 ó 4, **caracterizada porque** la ranura se halla dentro del área de combinación (4) del cuerpo de la llave.
7. Una llave de acuerdo con cualquiera de las reivindicaciones 1 a 6, **caracterizada porque** el área de combinación comprende una ranura (8) paralela al cuerpo de la llave, siendo la sección media de la ranura más profunda que las secciones de borde de la ranura, y dicha ranura forma las superficies de combinación más exteriores para la serie de superficies de combinación a formarse, de modo tal que la sección media de la ranura forma una superficie de contacto para el disco giratorio de la cerradura con discos giratorios .
8. Una llave de acuerdo con cualquiera de las reivindicaciones 1 a 7, **caracterizada porque** la forma básica del perfil del cuerpo (2) de la llave es un rectángulo que tiene lados largos y lados cortos, estando los lados cortos redondeados de manera de formar superficies convexas.

9. Una llave de acuerdo con cualquiera de las reivindicaciones 1 a 7, **caracterizada porque** la forma básica del cuerpo (2) de la llave es un rectángulo que tiene lados largos y lados cortos, estando dos esquinas opuestas del rectángulo redondeadas.

10. Una llave de acuerdo con la reivindicación 8 ó 9, **caracterizada porque** hay una ranura rectangular (7) en el medio de los lados largos.

11. Una cerradura de cilindro con discos giratorios, que comprende un cuerpo de cilindro (9) y dentro del mismo un cilindro interior (11, 28), conteniendo el cilindro interior una pila de discos giratorios que comprenden discos giratorios (25) a ser girados mediante una llave (1), siendo por lo menos uno de los discos giratorios un disco giratorio 0, comprendiendo dichos discos giratorios un canal de llave (26) y una ranura de borde (27) en el borde exterior de cada disco giratorio, y comprendiendo dicha cerradura de cilindro también una espiga de retén (12) para trabar la cerradura en posición cerrada, siendo dicha espiga de retén también capaz de estar dispuesta en las ranuras de borde, (27) de los discos giratorios, para lo cual se hacen girar los discos giratorios (25) mediante la llave (1) hacia la posición de la espiga de retén para abrir la cerradura, **caracterizada porque** la pila de discos giratorios también comprende un disco de transmisión (10, 30) que comprende un canal de llave (14, 38), cuyo borde (15, 35), comprende una superficie que hace juego (21, 34) para la superficie principal de accionamiento de una llave de acuerdo con cualquiera de las reivindicaciones 1 a 9, una ranura de borde (13, 38), y un elemento de transmisión (19, 31), y

el cilindro interior (11) comprende un área de movimiento (23, 29) para el elemento de transmisión y superficies que hacen juego entre sí (22, 39A, 39B) en los extremos del área de movimiento, para transmitir la fuerza que hace girar el disco de transmisión hacia el cilindro interior (11, 28),

siendo la ranura de borde (13, 38) de dicho disco de transmisión (10, 30) capaz de ser colocado en la posición de la espiga de retén (12), y siendo el elemento de transmisión (19, 31), capaz de ser colocado contra la superficie que hace juego (22, 39A), cuando se haga girar la llave (1) para abrir la cerradura, de modo tal que las ranuras de borde (27) de los discos giratorios (25) se asienten simultáneamente en la posición de la espiga de retén (12).

12. Una cerradura de cilindro con discos giratorios de acuerdo con la reivindicación 11, **caracterizada porque** la superficie que hace juego (21, 34) del disco de transmisión (10, 30), es plana y forma una superficie de contacto plana para la superficie principal de accionamiento de la llave.

13. Una cerradura de cilindro con discos giratorios de acuerdo con la reivindicación

11 ó 12, **caracterizada porque** el elemento de transmisión (19) es una saliente en la dirección del eje del cilindro interior y porque el área de movimiento (23) para el elemento de transmisión es un recorte en la parte inferior del cilindro interior, constituyendo los bordes (22) de dicho recorte, superficies que hacen juego entre sí para el elemento de transmisión.

14. Una cerradura de cilindro con discos giratorios de acuerdo con la reivindicación 13, **caracterizada porque** la cerradura de cilindro comprende espigas de retorno (18) **y porque** los discos giratorios tienen una segunda ranura de borde (13A).

15. Una cerradura de cilindro con discos giratorios de acuerdo con la reivindicación 11 ó 12, **caracterizada porque** el elemento de transmisión (31) es una saliente radial sobre el borde del disco de transmisión (30) **y porque** el área de movimiento (29) para el elemento de transmisión es un recorte en la pared del cilindro interior (28), constituyendo los bordes (39A, 39B) del recorte superficies que hacen juego entre sí para el elemento de transmisión (31), estando dicha saliente dispuesta para estar en contacto con una de las superficies que hacen juego entre sí (39A), cuando se hace girar la llave para abrir la cerradura de modo tal que la ranura de borde (38) del disco de transmisión se halle en la posición de la espiga de retén (12), y de modo tal que la ranura de borde del disco giratorio 0 situado dentro de la pila de discos giratorios esté dispuesta para girar hacia la posición de la espiga de retén (12) en el mismo momento en que la ranura de borde (38) del disco de transmisión gira hacia la posición de la espiga de retén.

RESUMEN

La invención se refiere a una cerradura de cilindro con discos giratorios y a una llave para la misma. La llave de acuerdo con la invención comprende una ranura (6) que es transversal con respecto al cuerpo (2) de la llave. La ranura comprende una sección inferior (6A) y secciones laterales (6B) que son transversales con respecto a la sección inferior entre la sección inferior y la superficie exterior (2A) del cuerpo de la llave. La sección inferior de la ranura es la superficie principal de accionamiento de la llave utilizada para transferir la fuerza de giro a la cerradura de cilindro con discos giratorios. Esto reduce el desgaste en las superficies 0 de la llave porque las superficies 0 no transfieren parte alguna de la fuerza que hace girar la llave a la cerradura de cilindro con discos giratorios.

(Figura 3)

FIG. 1

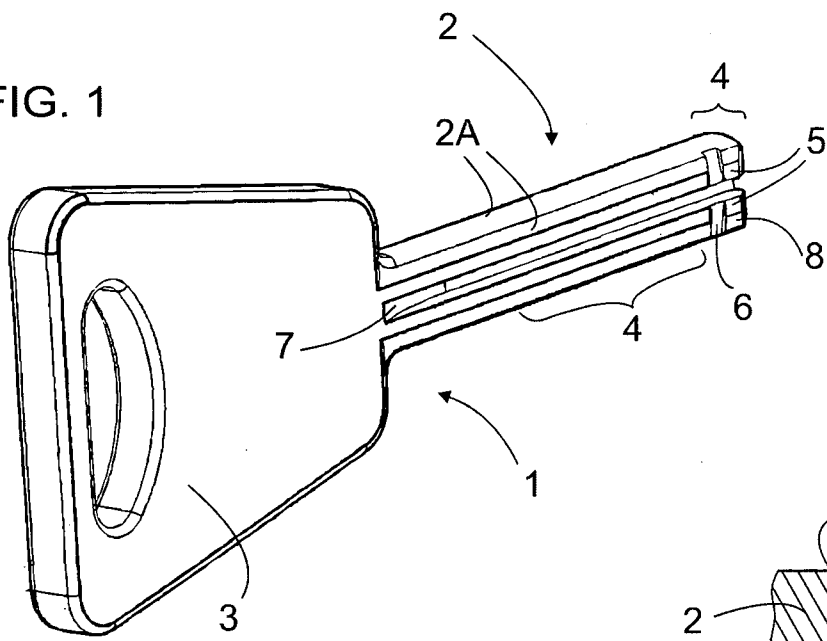


FIG. 2

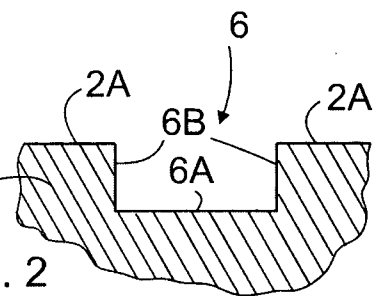
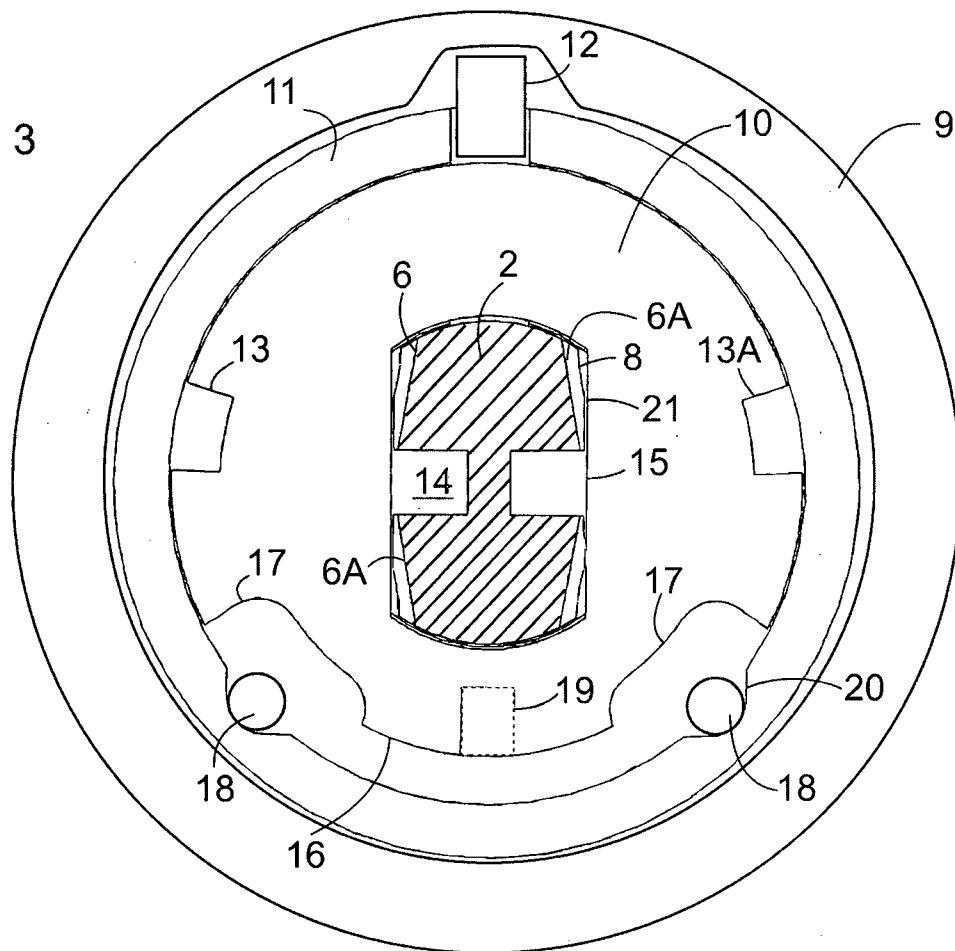


FIG. 3



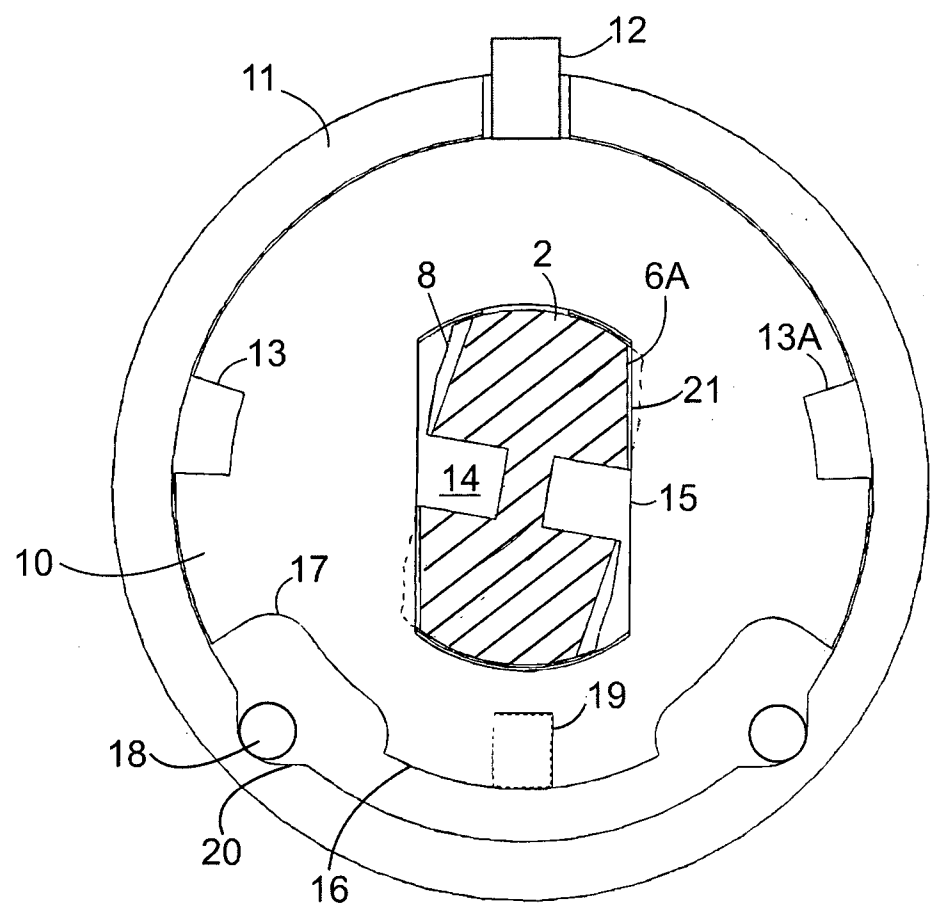


FIG. 4

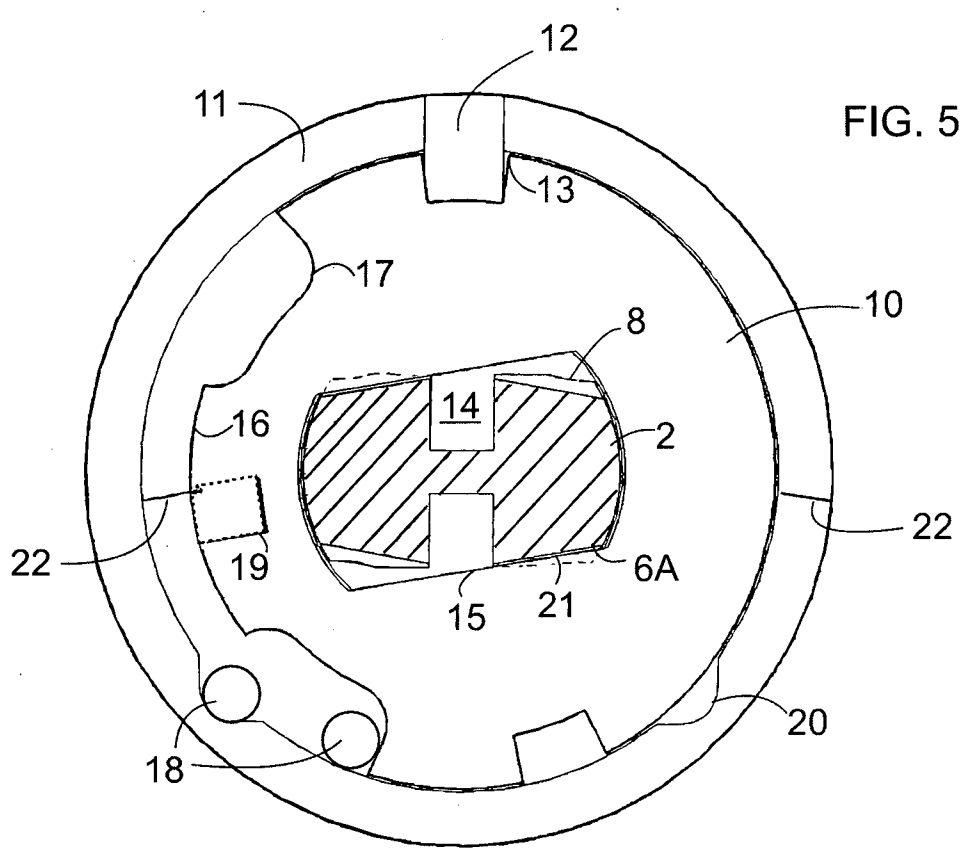


FIG. 5

27

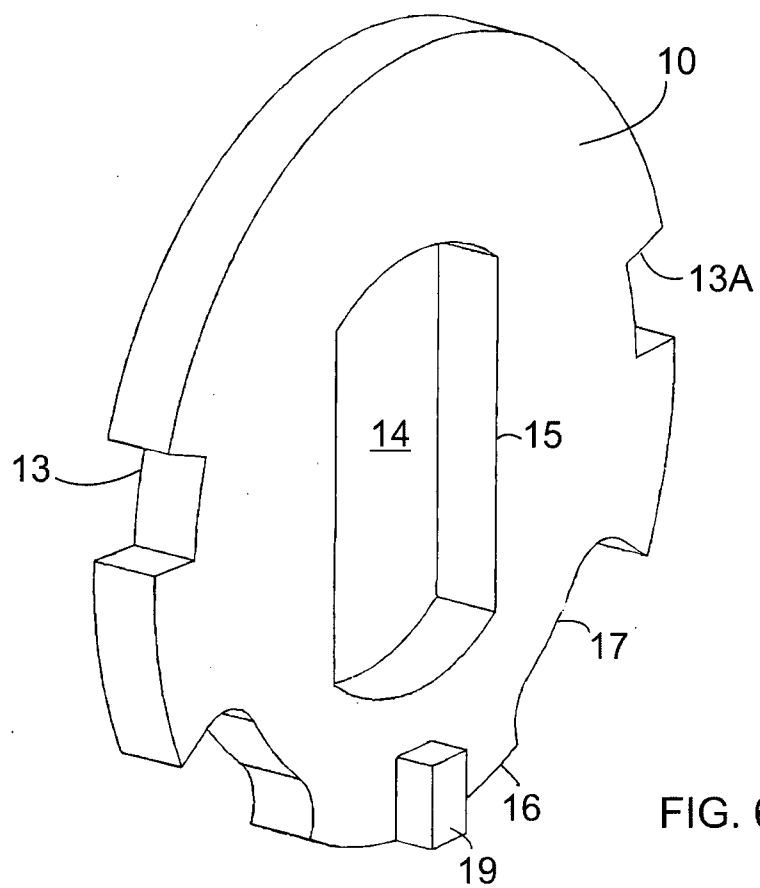


FIG. 6

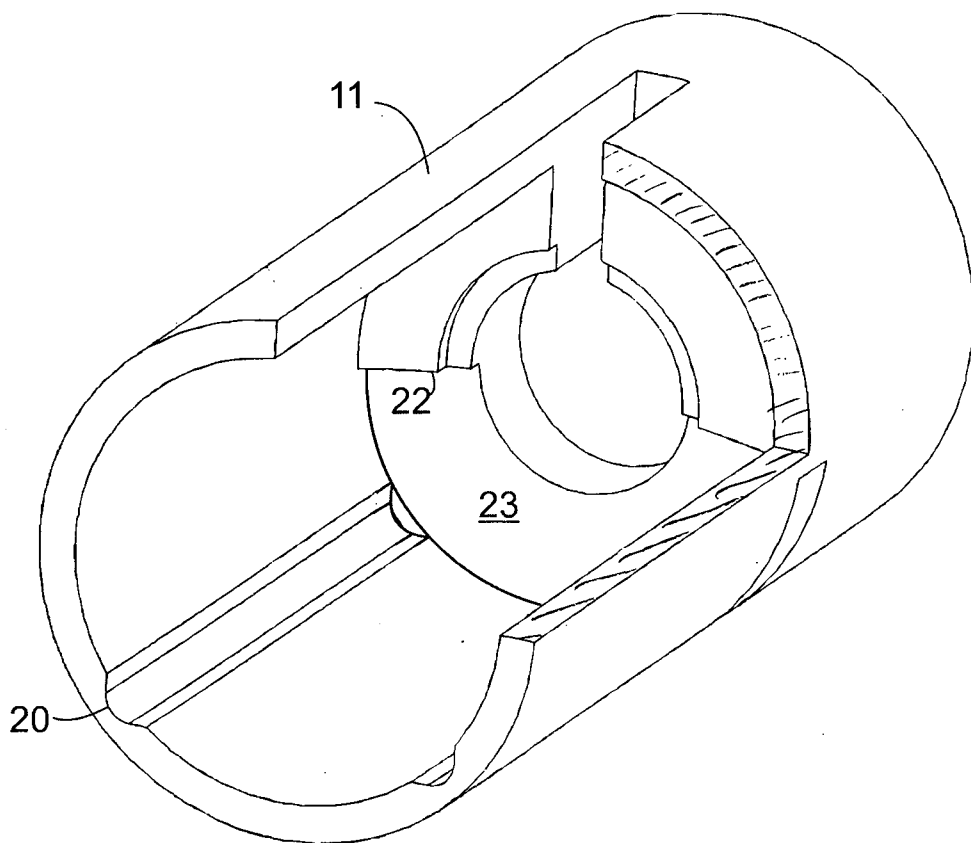
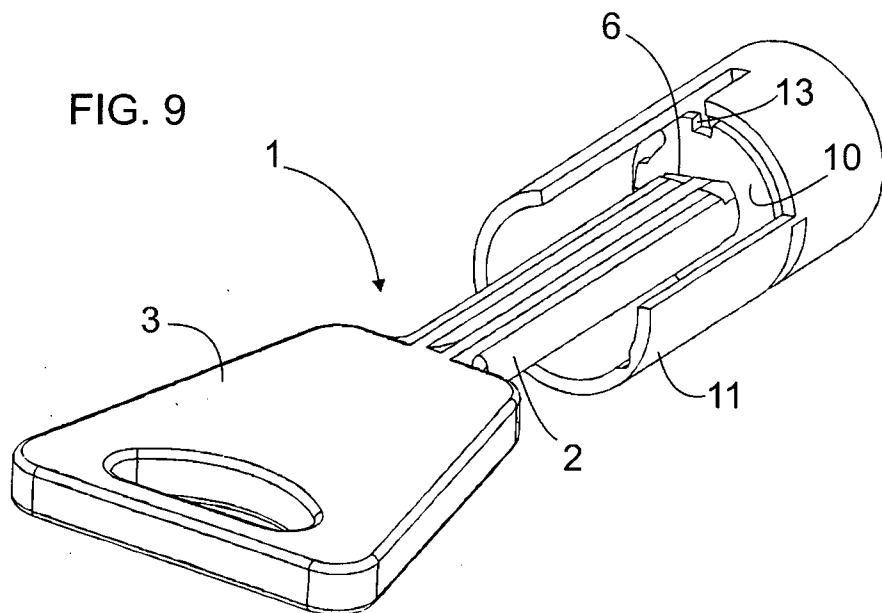
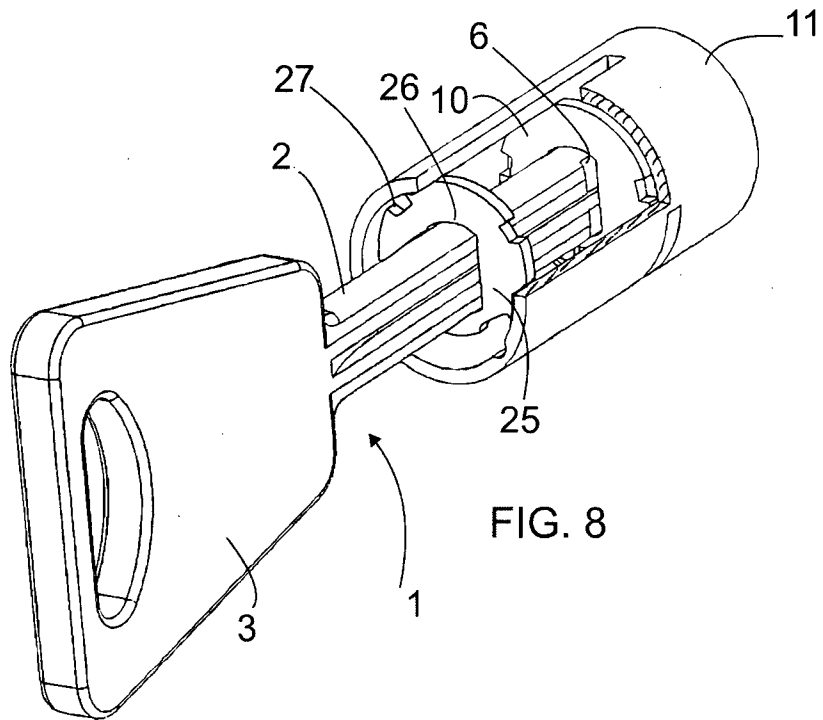


FIG. 7

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05

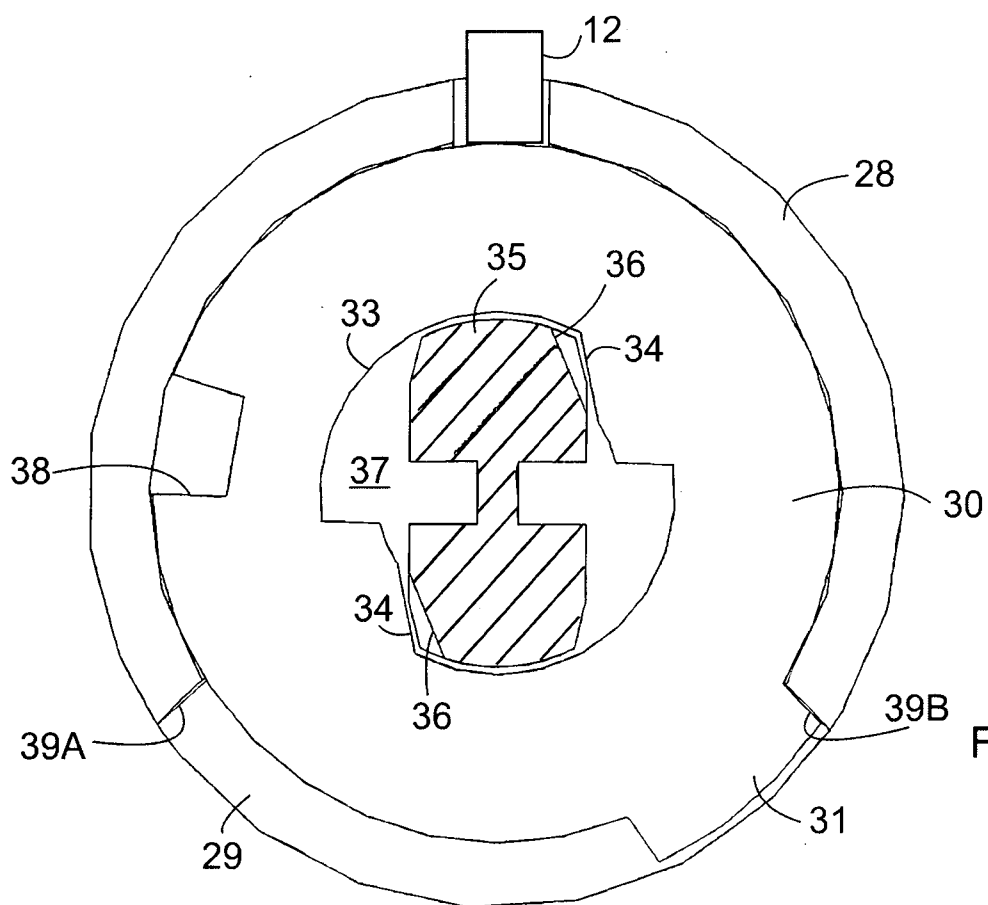


FIG. 10

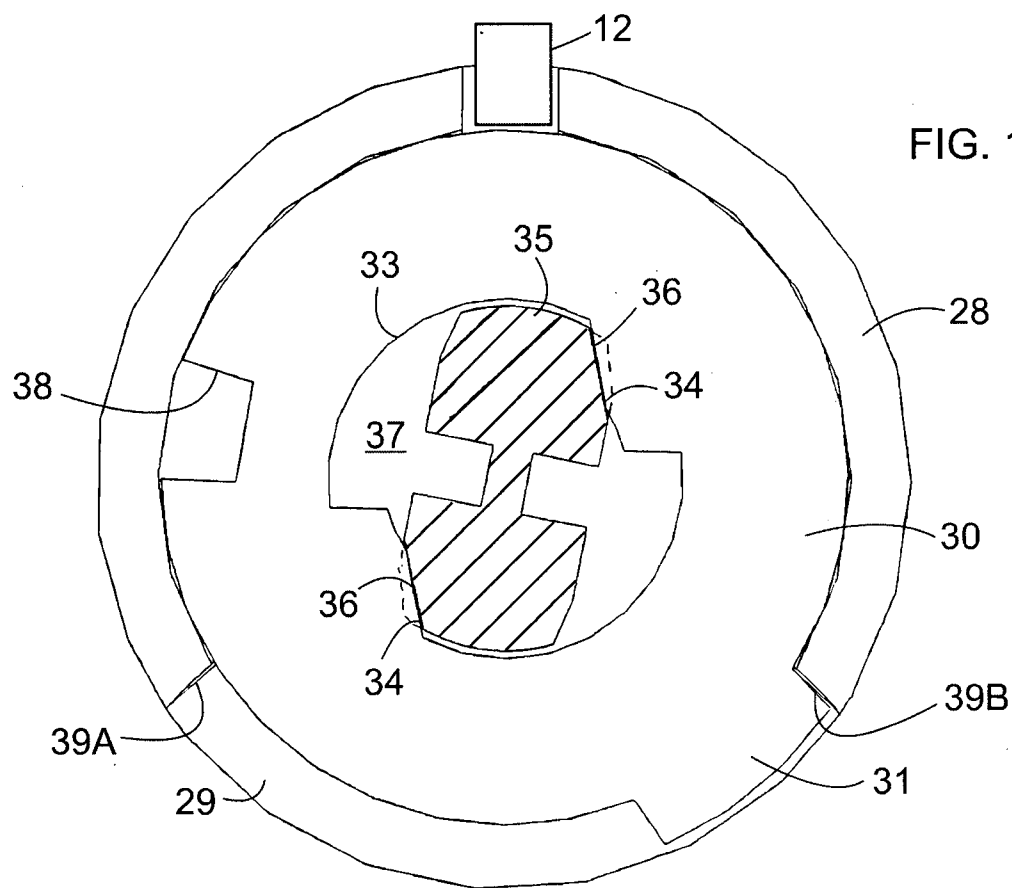
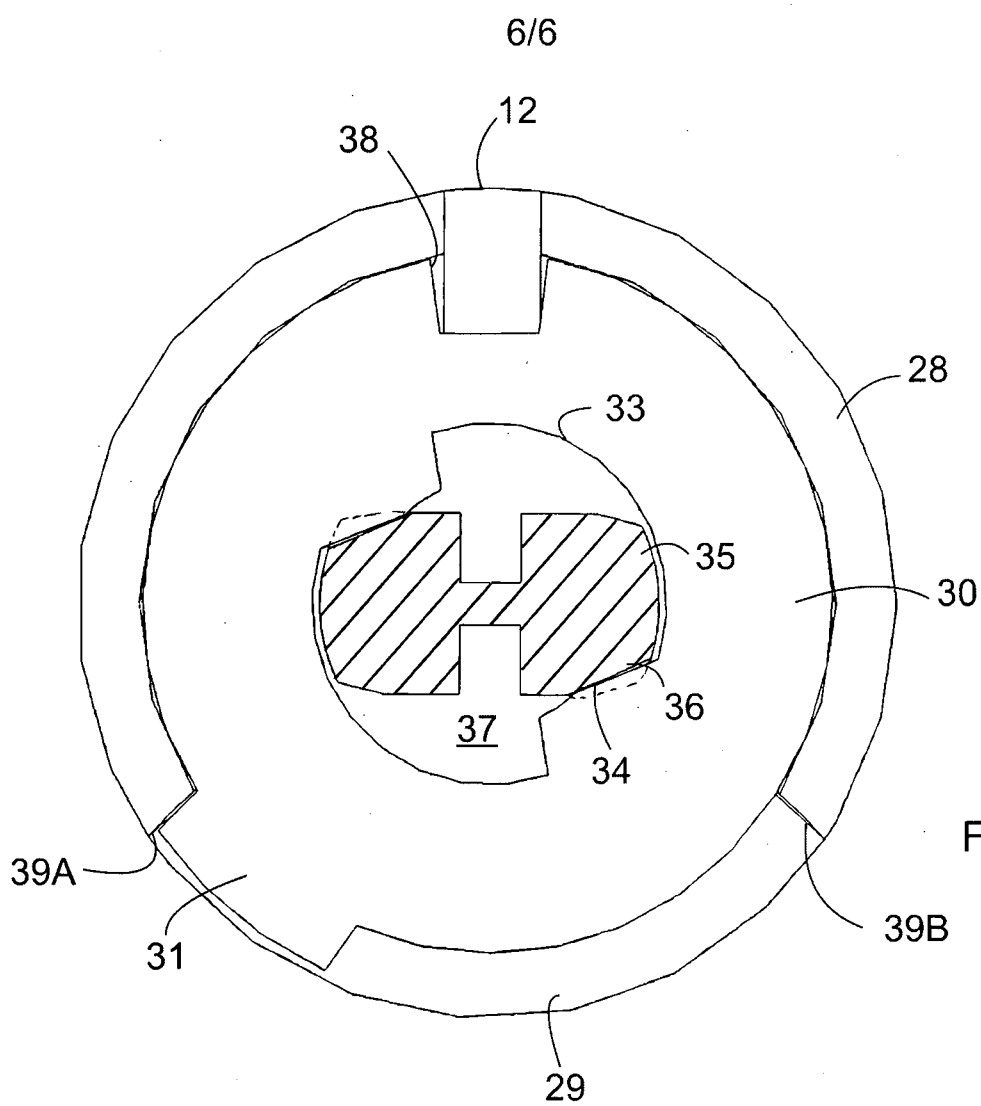


FIG. 11

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PATENT COOPERATION TREATY

PCT

From the INTERNATIONAL SEARCHING AUTHORITY

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT AND
THE WRITTEN OPINION OF THE INTERNATIONAL
SEARCHING AUTHORITY, OR THE DECLARATION

To:
AWEK INDUSTRIAL PATENTS LTD OY
P.O. Box 230
(Lautatarhankatu 6)
FIN-00101 Helsinki
FINLANDE

(PCT Rule 44.1)

Date of mailing
(day/month/year) 22/11/2007

Applicant's or agent's file reference P4111PC00	FOR FURTHER ACTION See paragraphs 1 and 4 below
International application No. PCT/FI2007/050340	International filing date (day/month/year) 11/06/2007
Applicant ABLOY OY	

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:
The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the International Search Report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes
1211 Geneva 20, Switzerland, Fascimile No.: (41-22) 338.82.70

For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to the protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Internet site.

Name and mailing address of the International Searching Authority  European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,	Authorized officer María Rodríguez Blanco
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PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY
(PCT Rule 43bis.1)

To:

see form PCT/ISA/220

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No. PCT/FI2007/050340	International filing date (day/month/year) 11.06.2007	Priority date (day/month/year) 19.06.2006
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International Patent Classification (IPC) or both national classification and IPC
INV. E05B21/06 E05B19/00

Applicant
ABLOY OY

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 2045	Date of completion of this opinion see form PCT/ISA/210	Authorized Officer PEREZ MENDEZ, J Telephone No. +31 70 340 4001
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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/FI2007/050340

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:
- ☒ the international application in the language in which it was filed
 - ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
- a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ on paper
 - ☐ in electronic form
 - c. time of filing/furnishing:
 - ☐ contained in the international application as filed.
 - ☐ filed together with the international application in electronic form.
 - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/FI2007/050340

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	<u>9,13,14</u>
	No: Claims	<u>1-8,10-12,15</u>
Inventive step (IS)	Yes: Claims	<u>13,14</u>
	No: Claims	<u>1-12,15</u>
Industrial applicability (IA)	Yes: Claims	<u>1-15</u>
	No: Claims	

2. Citations and explanations

see separate sheet

Re Item V.

1. Reference is made to the following documents:

- D1: US-A-3 789 638 (WARD J ET AL) 5 February 1974
- D2: DE 44 04 137 A1 (GRÜNIG AG ROBUSTE PRÄZISION) 10 August 1995
- D3: US-A-4 127 996 (MALMINEN HENRIKKI ET AL) 5 December 1978
- D4: US-A-4 351 172 (MARTIKAINEN KAARLO) 28 September 1982, cited in the application
- D5: EP-A-0 617 184 (ABLOY SECURITY LTD OY) 28 September 1994, cited in the application

2. INDEPENDENT CLAIM 1

2.1 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 1 is not new in the sense of Article 33(2) PCT for the following reasons:

Document D1 (see col. 3, lines 37-51; Figs. 8, 10, 10A) discloses (the references in parentheses applying to this document):

- a key (26) of a disc tumbler cylinder lock (14), a shank (28) of the key (26) comprising an outer surface formed by the key blank (52) and at least one combination area in the direction of the shank (28), in which section a series of combination surfaces (27, 27a) is establishable, wherein the shank (28) also comprises at least one groove (27a) [see e.g. the second bit "27a" or the fourth bit "27a" starting from the key shank tip in Fig. 8] transverse to the shank direction, said groove (27a) comprising a bottom section and side sections transverse to the bottom section between the bottom section and the outer surface of the shank (28), and the bottom section of the groove (27a) being a main driving surface through which force turning the key (26) is transferable to a disc tumbler cylinder lock (14) (see col. 5, lines 6-31).

Consequently, the features of claim 1 are known from D1.

2.2 Also the keys described in D2-D4 comprise all the features of independent claim 1, and are thus novelty destroying documents for claim 1.

3. INDEPENDENT CLAIM 11

- 3.1 The subject-matter of claim 11 is not new in the sense of Article 33(2) PCT for the following reasons:

Document D2 (see col. 2, line 30 - col. 6, line 47; Figs. 1-3C) discloses (the references in parentheses applying to this document):

- a disc tumbler cylinder lock (10) comprising a cylinder body (1) and within it an inner cylinder (2), the inner cylinder containing a stack of tumblers that comprises tumblers (5) to be turned with a key (20), at least one of the tumblers being a 0-tumbler [e.g. the tumbler having a 0 degree inclined surface 25 in Fig. 3C, and corresponding to key bit "1" in Figs. 3A and 3B], said tumblers comprising a key channel (5A) and an edge groove (5C) at the outer edge of each tumbler, and said cylinder lock also comprising a detent pin (4) for locking the lock, said detent pin being able to be arranged into the edge grooves (5C) of the tumblers by turning the tumblers (25) with the key (20) to the position of the detent pin (4) for opening the lock, wherein the stack of tumblers also comprises a transmission disc (5) [i.e. those tumblers (5) comprising the protrusion (5B), see col. 4, lines 50-54; Fig. 2] comprising a key channel (5A), the edge of which comprises a mating surface (25) for the main driving surface (24) of a key (20) according to claim 1, an edge groove (5C) and a transmission element (5B), and the inner cylinder (2) comprises a movement area (2B) for the transmission element (5B) and mating surfaces at the ends of the movement area (2B) to transmit force turning the transmission disc to the inner cylinder (2), the edge groove (5C) of said transmission disc (5) being able to be set at the position of the detent pin (4) and the transmission element (5B) being able to be set against the mating surfaces when turning the key (20) for opening the lock (10) so that the edge grooves (5C) of the tumblers (5) simultaneously settle at the position of the detent pin (4).

Consequently, the features of claim 11 are known from D2.

4. DEPENDENT CLAIMS 2-10, 12, 15

Dependent claims 2-10, 12, 15 do not appear to contain any additional features which, in combination with the features of any claim to which they refer, meet the

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING
AUTHORITY (SEPARATE SHEET)**

International application No.

PCT/FI2007/050340

requirements of the PCT with respect to novelty and/or inventive step (Article 33(2) and (3) PCT), because the subject-matter of these claims is known from the cited documents (see D1-D5 and the corresponding passages cited in the search report) or are merely a matter of normal design procedure.

5. DEPENDENT CLAIMS 13, 14

- 5.1 The combination of the features of dependent claim 13 is neither known from, nor rendered obvious by, the available prior art. In particular, the axial arrangement of the transmission projection (19) in the transmission disc (30) provides a compact arrangement in which the transmission disc has a smaller radial dimension, since the projection (19) extends in the direction of the inner cylinder's axis and not in the radial direction, as this is the case in the transmission disc (5) of D2 (see Fig. 2), where the projection (5B) extends in said radial direction.
- 5.2 Claim 14 depend on claim 13, and as such also meet the requirements of the PCT with respect to novelty and inventive step.

6. INDUSTRIAL APPLICATION

Claims 1-15 are industrially applicable (Art. 33(4) PCT) in the field of locks.

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Possible steps after receipt of the international search report (ISR) and written opinion of the International Searching Authority (WO-ISA)

General information	For all international applications filed on or after 01/01/2004 the competent ISA will establish an ISR. It is accompanied by the WO-ISA. Unlike the former written opinion of the IPEA (Rule 66.2 PCT), the WO-ISA is not meant to be responded to, but to be taken into consideration for further procedural steps. This document explains about the possibilities.
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Amending claims under Art. 19 PCT	Within 2 months after the date of mailing of the ISR and the WO-ISA the applicant may file amended claims under Art. 19 PCT directly with the International Bureau of WIPO. The PCT reform of 2004 did not change this procedure. For further information please see Rule 46 PCT as well as form PCT/ISA/220 and the corresponding Notes to form PCT/ISA/220.
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Filing a demand for international preliminary examination	In principle, the WO-ISA will be considered as the written opinion of the IPEA. This should, in many cases, make it unnecessary to file a demand for international preliminary examination. If the applicant nevertheless wishes to file a demand this must be done before expiry of 3 months after the date of mailing of the ISR/ WO-ISA or 22 months after priority date, whichever expires later (Rule 54bis PCT). Amendments under Art. 34 PCT can be filed with the IPEA as before, normally at the same time as filing the demand (Rule 66.1 (b) PCT). If a demand for international preliminary examination is filed and no comments/amendments have been received the WO-ISA will be transformed by the IPEA into an IPRP (International Preliminary Report on Patentability) which would merely reflect the content of the WO-ISA. The demand can still be withdrawn (Art. 37 PCT).
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Filing informal comments	After receipt of the ISR/WO-ISA the applicant may file informal comments on the WO-ISA directly with the International Bureau of WIPO. These will be communicated to the designated Offices together with the IPRP (International Preliminary Report on Patentability) at 30 months from the priority date. Please also refer to the next box.
--------------------------	--

End of the international phase	At the end of the international phase the International Bureau of WIPO will transform the WO-ISA or, if a demand was filed, the written opinion of the IPEA into the IPRP, which will then be transmitted together with possible informal comments to the designated Offices. The IPRP replaces the former IPEA (international preliminary examination report).
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Relevant PCT Rules and more information	Rule 43 PCT, Rule 43bis PCT, Rule 44 PCT, Rule 44bis PCT, PCT Newsletter 12/2003, OJ 11/2003, OJ 12/2003
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PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference P4111PC00	FOR FURTHER ACTION see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. PCT/FI2007/050340	International filing date (day/month/year) 11/06/2007	(Earliest) Priority Date (day/month/year) 19/06/2006
Applicant ABLOY OY		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 7 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of:

- ☒ the international application in the language in which it was filed
☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.

2. ☐ Certain claims were found unsearchable (See Box No. II)

3. ☐ Unity of invention is lacking (see Box No. III)

4. With regard to the title,

- ☒ the text is approved as submitted by the applicant
☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

- ☒ the text is approved as submitted by the applicant
☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the drawings,

- a. the figure of the drawings to be published with the abstract is Figure No. 1
☐ as suggested by the applicant
☐ as selected by this Authority, because the applicant failed to suggest a figure
☒ as selected by this Authority, because this figure better characterizes the invention
- b. ☐ none of the figures is to be published with the abstract

INTERNATIONAL SEARCH REPORT

International application No
PCT/FI2007/050340

A. CLASSIFICATION OF SUBJECT MATTER INV. E05B21/06 E05B19/00		
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) E05B		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 789 638 A (WARD J ET AL) 5 February 1974 (1974-02-05)	1-6
A	column 3, line 37 - line 50; figures 1-14 column 4, line 59 - column 5, line 31	11,12,14
X	DE 44 04 137 A1 (GRÜNIG AG ROBUSTE PRÄZISION) 10 August 1995 (1995-08-10)	1-6,11, 12,15
X	US 4 127 996 A (MALMINEN HENRIKKI ET AL) 5 December 1978 (1978-12-05)	1-7
A	column 2, line 34 - column 5, line 37; figures 1-27	11
----- -/--		
☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
* Special categories of cited documents : *A* document defining the general state of the art which is not considered to be of particular relevance *E* earlier document but published on or after the international filing date *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) *O* document referring to an oral disclosure, use, exhibition or other means *P* document published prior to the international filing date but later than the priority date claimed *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. *Z* document member of the same patent family		
Date of the actual completion of the international search 14 November 2007		Date of mailing of the international search report 22/11/2007
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax. (+31-70) 340-2018		Authorized officer PEREZ MENDEZ. J

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INTERNATIONAL SEARCH REPORT

International application No
PCT/FI2007/050340

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 351 172 A (MARTIKAINEN KAARLO) 28 September 1982 (1982-09-28) cited in the application	1-6,8,10
Y	the whole document	9
A	& FI 74 320 B (WAERTSILAE OY AB) 30 September 1987 (1987-09-30)	11,12,14
Y	EP 0 617 184 A (ABLOY SECURITY LTD OY) 28 September 1994 (1994-09-28) cited in the application	9
A	column 7, line 20 - line 32; figure 5 & FI 94 452 B (ABLOY SECURITY LTD OY) 31 May 1995 (1995-05-31)	1-6, 10-12

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/FI2007/050340

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 3789638	A	05-02-1974	AU 5862373 A CA 1004493 A1 DE 2338152 A1 FR 2195246 A5 GB 1434386 A IT 991439 B JP 49133196 A	30-01-1975 01-02-1977 07-02-1974 01-03-1974 05-05-1976 30-07-1975 20-12-1974
DE 4404137	A1	10-08-1995	NONE	
US 4127996	A	05-12-1978	AT 354293 B AT 700277 A AU 506925 B2 AU 2903977 A BE 859334 A1 CA 1067308 A1 DE 2744144 A1 DK 434677 A FI 762819 A FR 2366428 A1 GB 1590185 A HK 24382 A IT 1087733 B JP 1423303 C JP 53044298 A JP 62031149 B MY 19483 A NL 7710833 A NO 773365 A SE 7710989 A SE 437856 B SE 8403605 A	27-12-1979 15-05-1979 31-01-1980 29-03-1979 01-02-1978 04-12-1979 06-04-1978 05-04-1978 05-04-1978 28-04-1978 28-05-1981 11-06-1982 04-06-1985 15-02-1988 20-04-1978 07-07-1987 31-12-1983 06-04-1978 05-04-1978 05-04-1978 18-03-1985 06-07-1984
US 4351172	A	28-09-1982	AT 366139 B AT 447980 A AU 539153 B2 AU 6209380 A BE 885056 A1 BR 8005764 A CA 1172868 A1 DE 3033247 A1 DK 380480 A FI 792797 A FR 2473095 A1 GB 2061368 A HK 37984 A IT 1194690 B JP 56046073 A MY 34585 A NL 8004950 A NO 802637 A SE 450024 B SE 8006217 A SG 7784 G SU 1409134 A3	10-03-1982 15-07-1981 13-09-1984 12-03-1981 31-12-1980 18-08-1981 21-08-1984 19-03-1981 08-03-1981 08-03-1981 10-07-1981 13-05-1981 11-05-1984 22-09-1988 27-04-1981 31-12-1985 10-03-1981 09-03-1981 01-06-1987 08-03-1981 08-02-1985 07-07-1988
FI 74320	B	30-09-1987	AT 366139 B AT 447980 A	10-03-1982 15-07-1981

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/FI2007/050340

Patent document cited in search report	Publication date	Patent family member(s)	Publication date	
FI 74320	B	AU 539153 B2	13-09-1984	
		AU 6209380 A	12-03-1981	
		BE 885056 A1	31-12-1980	
		BR 8005764 A	18-08-1981	
		CA 1172868 A1	21-08-1984	
		DE 3033247 A1	19-03-1981	
		DK 380480 A	08-03-1981	
		FI 792797 A	08-03-1981	
		FR 2473095 A1	10-07-1981	
		GB 2061368 A	13-05-1981	
		HK 37984 A	11-05-1984	
		IT 1194690 B	22-09-1988	
		JP 56046073 A	27-04-1981	
		MY 34585 A	31-12-1985	
		NL 8004950 A	10-03-1981	
		NO 802637 A	09-03-1981	
		SE 450024 B	01-06-1987	
		SE 8006217 A	08-03-1981	
		SG 7784 G	08-02-1985	
		SU 1409134 A3	07-07-1988	
		US 4351172 A	28-09-1982	
EP 0617184	A	28-09-1994	AT 173521 T	15-12-1998
		AU 673891 B2	28-11-1996	
		AU 5901494 A	29-09-1994	
		CA 2116605 A1	26-09-1994	
		CN 1098469 A	08-02-1995	
		DE 69414624 D1	24-12-1998	
		DE 69414624 T2	24-06-1999	
		DK 617184 T3	02-08-1999	
		EE 3164 B1	15-02-1999	
		ES 2125404 T3	01-03-1999	
		FI 931340 A	26-09-1994	
		HK 1005558 A1	17-03-2000	
		JP 2744198 B2	28-04-1998	
		JP 6346639 A	20-12-1994	
		LT 1903 A	25-10-1994	
		LV 11358 A	20-06-1996	
		PL 172800 B1	28-11-1997	
		RU 2120015 C1	10-10-1998	
		SG 50691 A1	20-07-1998	
		US 5490405 A	13-02-1996	
FI 94452	B	31-05-1995	AT 173521 T	15-12-1998
		AU 673891 B2	28-11-1996	
		AU 5901494 A	29-09-1994	
		CA 2116605 A1	26-09-1994	
		CN 1098469 A	08-02-1995	
		DE 69414624 D1	24-12-1998	
		DE 69414624 T2	24-06-1999	
		DK 617184 T3	02-08-1999	
		EE 3164 B1	15-02-1999	
		EP 0617184 A2	28-09-1994	
		ES 2125404 T3	01-03-1999	
		FI 931340 A	26-09-1994	
		HK 1005558 A1	17-03-2000	
		JP 2744198 B2	28-04-1998	

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/FI2007/050340

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FI 94452	B	JP 6346639 A	20-12-1994
		LT 1903 A	25-10-1994
		LV 11358 A	20-06-1996
		PL 172800 B1	28-11-1997
		RU 2120015 C1	10-10-1998
		SG 50691 A1	20-07-1998
		US 5490405 A	13-02-1996

NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the *PCT Applicant's Guide*, a publication of WIPO.

In these Notes, "Article", "Rule", and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions, respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report and the written opinion of the International Searching Authority, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only (see *PCT Applicant's Guide*, Volume I/A, Annexes B1 and B2).

The attention of the applicant is drawn to the fact that amendments to the claims under Article 19 are not allowed where the International Searching Authority has declared, under Article 17(2), that no international search report would be established (see *PCT Applicant's Guide*, Volume I/A, paragraph 296).

What parts of the international application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When?

Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

How?

Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments?

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

To:

AWEK INDUSTRIAL PATENTS LTD OY
P.O. Box 230 (Lautarhankatu 6)
FI-00101 Helsinki
FINLANDE

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (PCT Rule 71.1)

Date of mailing
(day/month/year) 29.09.2008

Applicant's or agent's file reference
P4111PCOO

IMPORTANT NOTIFICATION

International application No.
PCT/FI2007/050340

International filing date (day/month/year)
11.06.2007

Priority date (day/month/year)
19.06.2006

Applicant
Abloy Oy

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary report on patentability and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.
4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary report on patentability. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed inventions is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

Name and mailing address of the international
preliminary examining authority:



European Patent Office - P.B. 5818 Patentlaan 2
NL-2280 HV Rijswijk - Pays Bas
Tel. +31 70 340 - 2040 Tx: 31 651 epo nl
Fax: +31 70 340 - 3016

Authorized Officer

Ter Haar, Heidi

Tel. +31 70 340-3817



PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P4111PCOO	FOR FURTHER ACTION	See Form PCT/PEA/416
International application No. PCT/FI2007/050340	International filing date (day/month/year) 11.06.2007	Priority date (day/month/year) 19.06.2006
International Patent Classification (IPC) or national classification and IPC INV. E05B21/06		
Applicant Abloy Oy		
1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36. 2. This REPORT consists of a total of <u>7</u> sheets, including this cover sheet. 3. This report is also accompanied by ANNEXES, comprising: a. ☒ sent to the applicant and to the International Bureau) a total of <u>3</u> sheets, as follows: ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions). ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box. b. ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).		
4. This report contains indications relating to the following items: ☒ Box No. I Basis of the report ☐ Box No. II Priority ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability ☐ Box No. IV Lack of unity of invention ☒ Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement ☐ Box No. VI Certain documents cited ☐ Box No. VII Certain defects in the international application ☐ Box No. VIII Certain observations on the international application		
Date of submission of the demand 2008-01-25	Date of completion of this report 29.09.2008	
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized officer Perez Mendez, J Telephone No. +31 70 340-4091 	

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/FI2007/050340

Box No. I Basis of the report

1. With regard to the **language**, this report is based on
 - ☒ the international application in the language in which it was filed
 - ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of:
 - ☐ international search (under Rules 12.3(a) and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4(a))
 - ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a))
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

Description, Pages

1-11 as originally filed

Claims, Numbers

1-15 filed with telefax on 25.01.2008

Drawings, Sheets

1/6-6/6 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing
3. ☐ The amendments have resulted in the cancellation of:
 - ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):
 4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
 - ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):
 5. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 70.2 (e)).

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**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/FI2007/050340

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	<u>9,13,14</u>
	No: Claims	<u>1-8,10-12,15</u>
Inventive step (IS)	Yes: Claims	<u>13,14</u>
	No: Claims	<u>1-12,15</u>
Industrial applicability (IA)	Yes: Claims	<u>1-15</u>
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Re Item V.

1. Reference is made to the following documents:

- D1: US-A-3 789 638 (WARD J ET AL) 5 February 1974
- D2: DE 44 04 137 A1 (GRÜNIG AG ROBUSTE PRÄZISION) 10 August 1995
- D3: US-A-4 127 996 (MALMINEN HENRIKKI ET AL) 5 December 1978
- D4: US-A-4 351 172 (MARTIKAINEN KAARLO) 28 September 1982, cited in the application
- D5: EP-A-0 617 184 (ABLOY SECURITY LTD OY) 28 September 1994, cited in the application

2. INDEPENDENT CLAIM 1

2.1 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 1 is not new in the sense of Article 33(2) PCT for the following reasons:

The following expressions in claim 1:

- "A key (1) of a **disc tumbler cylinder lock**" (cf. line 1);
- "... the bottom section of the groove being a main driving surface through which force turning the key is transferable to an inner cylinder of a disc tumbler cylinder lock" (cf. last two lines)

refer to the **intended used** of the key. These features are not technical features of the key, since neither the "disc tumbler cylinder lock" nor the "inner cylinder" make part of the claimed subject matter of claim 1.

In particular, the key of D1 (see Fig. 8) includes at least one groove (27a) [see e.g. the second bit "27a" or the fourth bit "27a" starting from the key shank tip in Fig. 8] having a bottom section, which is suitable for being a main driving surface through which force turning the key (26) is transferable to an appropriate inner cylinder of a disc tumbler cylinder lock (see col. 5, lines 6-31).

Indeed, document D1 (see col. 3, lines 37-51; Figs. 8, 10, 10A) discloses (the

references in parentheses applying to this document):

- a key (26) **for** a disc tumbler cylinder lock (14), a shank (28) of the key (26) comprising an outer surface formed by the key blank (52) and at least one combination area in the direction of the shank (28), in which section a series of combination surfaces (27, 27a) is establishable, wherein the shank (28) also comprises at least one groove (27a) [see e.g. the second bit "27a" or the fourth bit "27a" starting from the key shank tip in Fig. 8] transverse to the shank direction, said groove (27a) comprising a bottom section and side sections transverse to the bottom section between the bottom section and the outer surface of the shank (28), and the bottom section of the groove (27a) **is suitable for** being a main driving surface through which force turning the key (26) is transferable to a disc tumbler cylinder lock (see col. 5, lines 6-31).

Consequently, the features of the key of claim 1 are known from D1, and the key of D1 can also be used as stated in claim 1.

- 2.2 Also the keys described in D2-D4 comprise all the features of independent claim 1, and can be used as stated in claim 1, so documents D2-D4 are also novelty destroying documents for the key as defined in claim 1.

3. INDEPENDENT CLAIM 11

- 3.1 The subject-matter of claim 11 is not new in the sense of Article 33(2) PCT for the following reasons:

The subject-matter of claim 11 is a "**disc tumbler cylinder lock**", and the following expression in claim 11:

- "...for the main driving surface of a key according to any of the claims 1 to 9"

refers to the intended use of the cylinder lock, i.e. the lock should be suitable for being used with a key according to at least claim 1. Indeed the claimed subject matter of claim 11 is **not** a combination of a cylinder lock and a key, but only the cylinder lock itself, and thus claim 11 as formulated is **not** a dependent on claim 1.

Thus, the disc tumbler cylinder lock disclosed in D2 comprises all the technical features of claim 1, furthermore, it can be used with a key according to claim 1.

Indeed, document D2 (see col. 2, line 30 - col. 6, line 47; Figs. 1-3C) discloses (the references in parentheses applying to this document):

- a disc tumbler cylinder lock (10) comprising a cylinder body (1) and within it an inner cylinder (2), the inner cylinder containing a stack of tumblers that comprises tumblers (5) to be turned with a key (20), at least one of the tumblers being a 0-tumbler [e.g. the tumbler having a 0 degree inclined surface 25 in Fig. 3C, and corresponding to key bit "1" in Figs. 3A and 3B], said tumblers comprising a key channel (5A) and an edge groove (5C) at the outer edge of each tumbler, and said cylinder lock also comprising a detent pin (4) for locking the lock, said detent pin being able to be arranged into the edge grooves (5C) of the tumblers by turning the tumblers (25) with the key (20) to the position of the detent pin (4) for opening the lock, wherein the stack of tumblers also comprises a transmission disc (5) [i.e. those tumblers (5) comprising the protrusion (5B), see col. 4, lines 50-54; Fig. 2] comprising a key channel (5A), the edge of which comprises a mating surface (25) **which is suitable for being operated with** the main driving surface (24) of a key (20) according to claim 1, an edge groove (5C) and a transmission element (5B), and the inner cylinder (2) comprises a movement area (2B) for the transmission element (5B) and mating surfaces at the ends of the movement area (2B) to transmit force turning the transmission disc to the inner cylinder (2), the edge groove (5C) of said transmission disc (5) being able to be set at the position of the detent pin (4) and the transmission element (5B) being able to be set against the mating surfaces when turning the key (20) for opening the lock (10) so that the edge grooves (5C) of the tumblers (5) simultaneously settle at the position of the detent pin (4).

Consequently, the features of claim 11 are known from D2.

4. DEPENDENT CLAIMS 2-10, 12, 15

Dependent claims 2-10, 12, 15 do not appear to contain any additional features which, in combination with the features of any claim to which they refer, meet the

requirements of the PCT with respect to novelty and/or inventive step (Article 33(2) and (3) PCT), because the subject-matter of these claims is known from the cited documents (see D1-D5 and the corresponding passages cited in the search report) or are merely a matter of normal design procedure.

5. DEPENDENT CLAIMS 13, 14

5.1 The combination of the features of dependent claim 13 is neither known from, nor rendered obvious by, the available prior art. In particular, the axial arrangement of the transmission projection (19) in the transmission disc (30) provides a compact arrangement in which the transmission disc has a smaller radial dimension, since the projection (19) extends in the direction of the inner cylinder's axis and not in the radial direction, as this is the case in the transmission disc (5) of D2 (see Fig. 2), where the projection (5B) extends in said radial direction.

5.2 Claim 14 depends on claim 13, and as such also meets the requirements of the PCT with respect to novelty and inventive step.

6. INDUSTRIAL APPLICATION

Claims 1-15 are industrially applicable (Art. 33(4) PCT) in the field of locks.

SF

Claims

1. A key (1) of a disc tumbler cylinder lock, a shank (2) of the key comprising an outer surface (2A) formed by the key blank and at least one combination area (4) in the direction of the shank, in which section a series of combination surfaces is establishable, **characterised** in that the shank (2) also comprises at least one groove (6) transverse to the shank direction, said groove comprising a bottom section (6A) and side sections (6B) transverse to the bottom section between the bottom section and the outer surface (2A) of the shank, and the bottom section of the groove being a main driving surface through which force turning the key is transferable to an inner cylinder of a disc tumbler cylinder lock.

2. A key according to Claim 1, **characterised** in that the bottom section (6A) of the groove (6) has an even shape.

3. A key according to Claim 2, **characterised** in that the side sections (6B) of the groove are at a right angle to the bottom section (6A).

4. A key according to Claim 2 or 3, **characterised** in that the bottom section (6A) of the groove has different depths in relation to the outer surface (2A) at different points of the groove in the longitudinal direction of the groove.

5. A key according to Claim 1, 2, 3 or 4, **characterised** in that the groove (6) is at the open end of the key shank.

6. A key according to Claim 1, 2, 3 or 4, **characterised** in that the groove is within the combination area (4) of the key shank.

7. A key according to any of the Claims from 1 to 6, **characterised** in that the combination area comprises a groove (8) parallel to the key shank, with the middle section of the groove being deeper than the edge sections of the groove, and said groove forms the outermost combination surfaces for the series of combination surfaces to be formed, so that the middle section of the groove forms a contact surface for the disc tumbler cylinder lock's tumbler.

8. A key according to any of the Claims from 1 to 7, **characterised** in that the basic shape of the profile of the key shank (2) is a rectangle having long sides and short sides, the short sides being rounded to form convex surfaces.

9. A key according to any of the Claims from 1 to 7, **characterised** in that the basic shape of the profile of the key shank (2) is a rectangle having long sides and short sides, two opposite corners of the rectangle being rounded.

10. A key according to Claim 8 or 9, **characterised** in that there is a rectangular groove (7) in the middle of the long sides.

11. A disc tumbler cylinder lock comprising a cylinder body (9) and within it an inner cylinder (11, 28), the inner cylinder containing a stack of tumblers that comprises tumblers (25) to be turned with a key (1), at least one of the tumblers being a 0-tumbler, said tumblers comprising a key channel (26) and an edge groove (27) at the outer edge of each tumbler, and said cylinder lock also comprising a detent pin (12) for locking the lock, said detent pin being able to be arranged into the edge grooves (27) of the tumblers by turning the tumblers (25) with the key (1) to the position of the detent pin for opening the lock, **characterised** in that the stack of tumblers also comprises a transmission disc (10, 30) comprising a key channel (14, 37), the edge (15, 33) of which comprises a mating surface (21, 34) for the main driving surface of a key according to any of the Claims from 1 to 9, an edge groove (13, 38) and a transmission element (19, 31), and

the inner cylinder (11) comprises a movement area (23, 29) for the transmission element and mating surfaces (22, 39A, 39B) at the ends of the movement area to transmit force turning the transmission disc to the inner cylinder (11, 28),

the edge groove (13, 38) of said transmission disc (10, 30) being able to be set at the position of the detent pin (12) and the transmission element (19, 31) being able to be set against the mating surfaces (22, 39A) when turning the key (1) for opening the lock so that the edge grooves (27) of the tumblers (25) simultaneously settle at the position of the detent pin (12).

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12. A disc tumbler cylinder lock according to Claim 11, **characterised** in that the mating surface (21, 34) of the transmission disc (10, 30) is even and forms an even contact surface for the main driving surface of the key.

13. A disc tumbler cylinder lock according to Claim 11 or 12, **characterised** in that the transmission element (19) is a projection in the direction of the inner cylinder's axis and that the movement area (23) for the transmission element is a cutting on the bottom of the inner cylinder, the edges (22) of said cutting constituting mating surfaces for the transmission element.

14. A disc tumbler cylinder lock according to Claim 13, **characterised** in that the cylinder lock comprises return pins (18) and that the tumblers have a second edge groove (13A).

15. A disc tumbler cylinder lock according to Claim 11 or 12, **characterised** in that the transmission element (31) is a radial projection on the edge of the transmission disc (30) and that the movement area (29) for the transmission element is a cutting on the wall of the inner cylinder (28), the edges (39A, 39B) of the cutting constituting mating surfaces for the transmission element (31), said projection being arranged to be in contact with one of the mating surfaces (39A) when the key is turned for opening the lock so that the edge groove (38) of the transmission disc is at the position of the detent pin (12) and so that the edge groove of the O-tumbler within the stack of tumblers is arranged to turn to the position of the detent pin (12) at the same time the edge groove (38) of the transmission disc turns to the position of the detent pin.

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO



No. 09-003496- -00000-0000

Fecha: 2009-01-16 16:46:51 Dep. 2020 NUECREACIONI
Tra. 11 PATENTEIYII Eve: 379 FASENACIONALI
Act. 411 PRESENTACION Folios: 77

OTIC
ICIA

REQUISITOS MINIMOS

PCT

PATENTE DE INVENCION



MODELO DE UTILIDAD



- ♦ Indicación de que se solicita la concesión de una patente ☒
- ♦ Datos de identificación del solicitante o de la persona que presenta la solicitud ☒
- ♦ Descripción de la invención ☒
- ♦ Dibujos de ser estos pertinentes ☒
- ♦ Comprobante de pago de las tasas establecidas ☒

COMPLETA ☐

INCOMPLETA ☐

DISEÑO INDUSTRIAL ☐

- ♦ Indicación de que se solicita el registro de Diseño Industrial ☐
- ♦ Datos de identificación del solicitante o de la persona que presenta la solicitud ☐
- ♦ Representación gráfica y fotográfica del Diseño Industrial o muestra del material que incorpora el diseño ☐
- ♦ Comprobante de pago de las tasas establecidas ☐

COMPLETA ☐

INCOMPLETA ☐

ESQUEMA DE TRAZADO ☐

- ♦ Indicación de que se solicita el registro de un Esquema de Trazado ☐
- ♦ Datos de identificación del solicitante o de la persona que presenta la solicitud ☐
- ♦ Representación gráfica del esquema trazado ☐
- ♦ Comprobante de pago de las tasas establecidas ☐

COMPLETA ☐

INCOMPLETA ☐

Sandoval
Firma Responsable

Fecha ene 16-09

Carrera 13 No. 27-00 Piso 5, 7 y 10
Corrutador: 3 82 08 40
Fax: 350 52 20
E-mail: info@sic.gov.co
www.sic.gov.co
Bogotá, D.C., Colombia