

PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

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

To:

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Date of mailing
(day/month/year)

28.10.2025

Applicant's or agent's file reference
BP304989PC

IMPORTANT NOTIFICATION

International application No.
PCT/FI2024/050459

International filing date (day/month/year)
03.09.2024

Priority date (day/month/year)
08.09.2023

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:



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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 BP304989PC	FOR FURTHER ACTION		See Form PCT/IPEA/416
International application No. PCT/FI2024/050459	International filing date (<i>day/month/year</i>) 03.09.2024	Priority date (<i>day/month/year</i>) 08.09.2023	
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>5</u> sheets, including this cover sheet. 3. This report is also accompanied by ANNEXES, comprising: a. ☒ a total of <u>7</u> sheets, as follows: ☒ sheets of the description, claims and/or drawings which have been amended and/or sheets containing rectifications authorized by this Authority, unless those sheets were superseded or cancelled, and any accompanying letters (see Rules 46.5, 66.8, 70.16, 91.2, and Section 607 of the Administrative Instructions). ☐ sheets containing rectifications, where the decision was made by this Authority not to take them into account because they were not authorized by or notified to this Authority at the time when this Authority began to draw up this report, and any accompanying letters (Rules 66.4bis, 70.2(e), 70.16 and 91.2). ☐ superseded sheets and any accompanying letters, where this Authority either considers that the superseding sheets contain an amendment that goes beyond the disclosure in the international application as filed, or the superseding sheets were not accompanied by a letter indicating the basis for the amendments in the application as filed, as indicated in item 4 of Box No. I and the Supplemental Box (see Rule 70.16(b)). b. ☐ a separate electronic file containing a sequence listing (<i>sent to the International Bureau only</i>)			
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 25.06.2025		Date of completion of this report 28.10.2025	
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		Authorized officer Witasse-Moreau, C Telephone No. +31 70 340-4370	



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) and (b))
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

1-12 as originally filed

Claims, Numbers

1-16 filed in electronic form on 27-08-2025

Drawings, Sheets

1/4-4/4 as originally filed

- ☐ a sequence listing - 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*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since either they are considered to go beyond the disclosure as filed, or they were not accompanied by a letter indicating the basis for the amendments in the application as filed, as indicated in the Supplemental Box (Rules 70.2(c) and (c-bis)):
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
5. ☐ This report has been established:
- ☐ taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rules 66.1(d-bis) and 70.2(e)).
 - ☐ without taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91(Rules 66.4bis and 70.2(e)).

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/FI2024/050459

6. ☒ With regard to top-up searches (Rules 66.1 *ter* and 70.2(f)):
- ☒ A top-up search was carried out by this Authority on 16.10.2025 (all discovered documents are listed in the Supplemental Box Relating to Top-up Search).
 - ☐ Additional relevant documents have been discovered during the top-up search.
 - ☐ No top-up search was carried out by this Authority because it would serve no useful purpose.
7. ☐ Supplementary international search report(s) from Authority(ies) has/have been received and taken into account in establishing this report (Rule 45bis.8(b) and (c)).

* *If item 4 applies, some or all of those sheets may be marked "superseded".*

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>1-16</u>
	No: Claims	
Inventive step (IS)	Yes: Claims	<u>1-16</u>
	No: Claims	
Industrial applicability (IA)	Yes: Claims	<u>1-16</u>
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

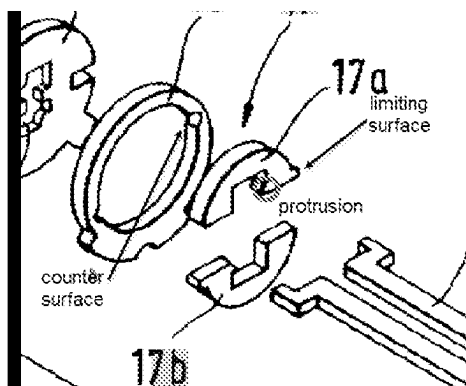
1 Reference is made to the following documents:

D1 EP 0 617 184 B1 (ABLOY SECURITY LTD OY) 18 November 1998;

D2 US 2023/235594 A1 (LIN YU-PIN) 27 July 2023.

2 D1 is regarded as being the prior art closest to the subject-matter of claim 1, and discloses:

A disc tumbler cylinder lock (1) and key (12) combination, wherein the disc tumbler cylinder lock (1) comprises rotation limiting means (15-17) for the key, which rotation limiting means comprise a body (15) having a key profile opening (32), a guiding element (14) connected to the body, and the key (12) comprises guiding grooves (25) at both sides of the key in a longitudinal direction of a key shank, and a transversal groove (31), which is transverse in relation to a longitudinal axis of the shank of the key (12), wherein the rotation limiting means (15-17) comprises a plate (17), which is in moveable connection with the body (15), the plate comprising projections (see figure below) towards each other, the projections being in the guiding grooves (25) when the key (12) being inserted into the cylinder lock, the plate also having a limiting surface (see figure below), and the disc tumbler cylinder lock comprises a counter surface (notches in 16), the rotation limiting means being arranged to be in its locking position wherein the limiting surface is against the counter surface, and the rotation limiting means being arranged to rotate in case the key (12) is inserted into the cylinder lock and turned (16) [col. 5, l. 47-55].



Regarding the feature "transversal groove, which is transverse in relation to a longitudinal axis of the shank of the key":

There are at least two axis, which can define a transverse direction with respect to a longitudinal axis. Since in D1 the groove (31) extends in a direction perpendicular to the flank (perpendicular to the head plane of the key), it can be seen as a transversal groove.

Regarding the feature "the plate comprising projections towards each other":

Although this might not be the first interpretation of claim 1, the elements 17a, 17b can be seen as half-plates building a plate 17 together, because they are in the same plane and build a flat disc-shaped element. Both elements 17a, 17b have a side with two protrusions, one interior and one exterior protrusion. The two interior protrusions of the half-plates 17a, 17b are towards one another.

The subject-matter of claim 1 therefore differs from this known cylinder lock in that when the transversal groove is in line with the projections, the plate is allowed to move along the transversal groove parallel to the side where the transversal groove is, and the turning the key moves the limiting surface away from the counter surface.

The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

The problem to be solved by the present invention may be regarded as providing an alternative rotation limiting means while improving the operational reliability and the safety of a disc tumbler cylinder lock and key combination.

The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

Starting from the arrangement of D1, wherein two half plates moves radially towards the key, the skilled person has not hint to provide a single plate, moving parallel to the flange of the key along the transversal groove.

D2 discloses a rotation limiting element (25) made of a single plate. The plate (25) however does not have projections cooperating with the guiding and transversal grooves.

The sliding of the projections in the guiding and transverse groove improve the correct guiding of the elements and thus the reliability of the cylinder lock.

- 3 Claims 1-16 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

27 August 2025

European Patent Office
D-80298 Munich
Germany

To the International Preliminary Examining Authority

Our ref: BP304989PC

Re: Written Opinion of the IPEA

**INTERNATIONAL PATENT APPLICATION PCT/FI2024/050459
“DISC TUMBLER CYLINDER LOCK AND KEY COMBINATION”
APPLICANT: ABLOY OY**

Dear Sirs

In response to the Written Opinion of the IPEA issued on 4 July 2025 we submit the following.

The examiner states that claim 1 is not novel. D1 (EP 0617184) is discussed in the Written Opinion. It seems that D1 should be explained more in order to clarify the invention. D1 is explained below utilizing figures, which have been attached to the response.

D1

The attachment shows two figures, which show a key and a lock cylinder of D1. The first figure shows a locked position and the second figure an open position where the lock cylinder can be opened. The reference numbers used in the figures are the same as in D1. Some features are marked by additional references, because D1 does not have reference signs for these features.

The key 12 of D1 has guiding grooves 25 on both sides of the key. The guiding element 14 is located in the grooves when the key is inserted into the lock cylinder. When the key is fully inserted into the cylinder, recesses 31 of the key are aligned with limiting plates 17a, 17b, and also an inner projection Pr1, Pr2 of each limiting plate. Outer projections Outp1, Outp2 are situated in the recesses R1, R2 of a sleeve 16 in the situation of the first figure.

The inner projections Pr1, Pr2 are towards the recesses 31 of the key in the first figure. Further, the limiting plates are on opposite sides of the guiding element.

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When the key is turned from the position of the first figure to the position of the second figure, the inner projections Pr1, Pr2 move into the recesses 31 of the key. Motion lines of the inner projections are towards the key when opening the lock cylinder. The lines, Line 1, Line 1 are different and adjacent, and the guiding element 14 is between them.

Differences between D1 and Claim 1

D1 differs from Claim 1. Claim 1 says that the projections (31, 133) are in the guiding grooves (21, 211) when the key (2, 2B) is inserted into the cylinder lock. This is not possible in D1. The guiding element 14 is in the guiding grooves 25, and the inner projections Pr1, Pr2 are not aligned with the guiding grooves 25.

Claim 1 further says that the claimed combination comprises a plate (14, 14A), which is in moveable connection with the body, and the plate comprises projections (31, 133) towards each other. D1 has two separate plates 17a, 17b. They are situated on the opposite sides of the guiding element 14, and they have no direct connection with each other. Indeed, these two plates are separate. Each plate has one inner projection, so it cannot be towards another, non-existing, inner projection of the same plate. Further the inner projection Pr1 of one plate 17a is not towards the inner projection Pr2 of the other plate 17b. As said, and illustrated in the second figure, the projections of D1 are in separate lines, Line 1, Line2 and the guiding element 14 is between the lines. So, the projections Pr1, Pr2 are not towards each other.

Further, the applicant still argues that the recesses 13 of D1 are short bores, not grooves.

In addition, the functioning of the invention is arranged differently than in D1. When opening the cylinder lock of D1, the inner protections of the plates 17a, 17b move towards the key into the recesses 31, in other words, towards the centre area of the key 12. In the invention, the projections move farther away from the centre area of the key.

Amendments

In order to clarify the invention, the applicant amends claim 1 by adding “... *the transversal groove (19, 191) is in line with the projections (31, 133) allowing the plate (14, 14A) to move along the transversal groove (19, 191) parallel to the side where the transversal groove is...*” The support can be found on page 9, lines 3 – 7, lines 10 – 12; on page 11 lines 21 – 30, for example. The amendment makes it more clear how the transversal groove is positioned on the key, which can also be seen in the figures.

The invention is new, and it is alternative solution than D1. Further the invention utilizes the projections of the plate efficiently when the cylinder lock is in the locked position, being near the central of the key opening. Therefore, the invention has an inventive step.

Conclusion

The applicant respectfully submits that the independent claim is novel and involve an inventive step over what was known before the date of filing of the application.

Yours faithfully,
BERGGREN OY

Timo Pitkänen
Patent Attorney

Enclosures Amended set of claims (marked-up and clean versions)
Attachment figures

Claims

1. A disc tumbler cylinder lock (3, 3A) and key (2, 2B) combination, wherein the disc tumbler cylinder lock (3, 3A) comprises rotation limiting means (10, 10A) for the key, which rotation limiting means comprise a body (13, 131) having a key profile opening (34, 341), a guiding element (12, 12A) connected to the body, and the key (2, 2A) comprises guiding grooves (21, 211) at both sides of the key in a longitudinal direction of a key shank (2A, 2A1), and a transversal groove (19, 191), which is transverse in relation to a longitudinal axis of the shank (2A, 2A1) of the key (2, 2B), **characterized** in that the rotation limiting means (10, 10A) comprises a plate (14, 14A), which is in moveable connection with the body, the plate comprising projections (31, 133) towards each other, the projections (31, 133) being in the guiding grooves (21, 211) when the key (2, 2B) being inserted into the cylinder lock, the plate also having a limiting surface (40, 32A), and the disc tumbler cylinder lock comprises a counter surface (41, 25A),

the rotation limiting means (10, 10A) being arranged to be in its locking position wherein the limiting surface (40, 32A) is against the counter surface (41, 25A), and the rotation limiting means being arranged to rotate in case the key (2, 2B) being inserted into the cylinder lock and turned, and when the transversal groove (19, 191) is in line with the projections (31, 133) allowing the plate (14, 14A) to move along the transversal groove (19, 191) parallel to the side where the transversal groove is, and the turning the key moving the limiting surface (40, 32A) away from the counter surface (41, 25A).

2. A combination according to claim 1, **characterized** in that the transversal groove (19) has a bottom (19A), which is at the same level than the highest section (21A) of a bottom of the guiding groove (21).

3. A combination according to claim 1, **characterized** in that the transversal groove (191) has a concave bottom.

4. A combination according to claim 1, 2 or 3, **characterized** in that it comprises a casing (11), which at least partially surrounds the body, and the rotation limiting means (10) comprises one or two plates (14) having an U-form comprising two side parts (29) and a connecting part (33) connecting the side parts, the connecting part having a tap (32), and the side parts (29) having the projections (31) towards each other, the tap (32) having the limiting surface (32A),

the body (13) comprising one or two slots (35) on an outer edge (13A) of the body, and guiding projections (37) on a side of the body, said plate/s (14) being between the guiding projections (37), and the tap/s (32) being through the slots (35),

10 the casing (11) comprising a central hole (22), and a circle groove (24) around the central hole, the circle groove having one or two sectors (27) being nearer the central hole (22) than the rest of the circle groove, at said sector/s (27) an outer edge of the circle groove having a projection (25) towards the central hole (22), and an inner edge of the circle groove (24) having a cavity (26), the projection (25) having the counter surface (25A),

the rotation limiting means (10) being arranged to be in its locking position wherein the tap/s (32) is/are in said sector/s (27) against the projection/s (25) and the cavity/s (26), and the rotation limiting means being arranged to rotate in case the key (2) being inserted into the cylinder lock and turned, and when the transversal groove (19) is in line with the projections (31) allowing the plates (14) to move along the transversal groove (19), and the turning the key moving the tap/s in the circle groove (24) away from said sector/s (27).

5. A combination according to claim 4, **characterized** in that the connecting part (33) of the plate has an internal side (33A), which provides a bottom of a slot (30), which slot is between said two side parts (29), the internal side (33A) being arranged to be at the same level with an edge (34A) of the key profile opening (34), or near enough.

6. A combination according to claim 4 or 5, **characterized** in that side edges (29A) of the side parts (29) are arranged to be against the guiding projections (37), and the projections (31) being at internal corners (29B) of the side parts (29).

7. A combination according to any of claims 4 - 6, **characterized** in that the transversal grooves (19) on the sides of the key shank are at a place of a combination cut (20).

8. A combination according to any of claims 4 - 7, **characterized** in that the projection (25) comprises a minor recess (28) in the middle of the projection, and the cavity (26) comprises a minor protrusion (28A) in the middle of the cavity.

9. A combination according to any of claims 4 - 8, **characterized** in that the rotation limiting means (10) comprises a drilling cover (15) placed on another side of the plate/s (14) than the guiding element (12).

10. A combination according to any of claims 4 - 9, **characterized** in that the casing (11) is connected to an inner cylinder (5) of the disc tumbler cylinder lock in a nonrotatable manner.

11. A combination according to claim 1, 2 or 3, **characterized** in that the body (131) is a circle plate comprising a key hole (341), and the guiding element has two rods (12A) having narrow ends (12B), the circle plate further comprising two holes (132) where to the narrow ends (12B) are connected, the plate (14A) comprising a center hole (42) for the key (2B) and two second holes (43), the narrow ends (12B) being through the second holes, the center hole and the second holes being arranged to allow the movement of the plate (14A) along the transversal groove (191) when turning the key (2B).

12. A combination according to claim 11, **characterized** in that the plate (14A) comprises a return surface (44), and an inner cylinder (60) of the disc tumbler cylinder lock comprises the counter surface (41) and a counter return surface (45), which return surface and counter return surface are arranged to guide the movement of the plate back to the locking position when turning the key in the opposite direction, the counter return surface (45) and the counter surface (41) being end of a cutting sector (46) of an inner cylinder of the disc tumbler cylinder lock.

13. A combination according to claim 12, **characterized** in that the plate (14A) has a stopper (47), which is arranged to be against the limiting surface (40) when the plate (14A) is in an 90 degrees turned position, the plate further comprising a slope surface

(48) being in connection with the return surface (44) at a deeper end of the slope surface.

14. A combination according to claim 13, **characterized** in that the plate (14A) has a projection sector (49) between the stopper (47) and the return surface (44).

5 15. A combination according to claim 12, 13 or 14, **characterized** in that the plate (14A) has an indentation for a locking bar.

16. A combination according to claim 15, **characterized** in that it comprises a zero tumbler (50) having a central hole (51) and two second holes (52), the narrow ends (12B) of the rods (12A) being through the two second holes (52), the zero tumbler (50)
10 being against the plate (14A).

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