(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 520 901 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
12.03.2025 Bulletin 2025/11

(21) Application number: **23306488.0**

(22) Date of filing: **07.09.2023**

(51) International Patent Classification (IPC):
E05C 19/16 *(2006.01)* ***E05B 47/00*** *(2006.01)*

(52) Cooperative Patent Classification (CPC):
E05C 19/163; E05B 63/0056; E05B 9/002; E05B 47/0038

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
KH MA MD TN

(71) Applicant: **Cemax**
93250 Villemomble (FR)

(72) Inventors:
- **CIOPPI, Simone**
  61022 Vallefoglia (IT)
- **KONIECKA, Pawel**
  64-917 Skorka (PL)
- **MOATTI, Jean-Louis**
  75011 Paris (FR)

(74) Representative: **Cabinet Beau de Loménie**
158, rue de l'Université
75340 Paris Cedex 07 (FR)

(54) MAGNETIC LATCH OPERATION MECHANISM, LOCKSET AND DOOR

(57) The present invention concerns a magnetic latch operation mechanism (100) comprising a latch body (110) and a slider (120). The latch body (110) is guided in a first direction (X) between a retracted position and an extended position, magnetically attracted towards the extended position when aligned with a magnetic striker (141), and has an opening (111) partially delimited by an inclined actuation surface (112), which is inclined with respect to the first direction (X). The slider (120) is guided in a second direction (Z) substantially perpendicular to the first direction (X) and comprises a first pin (124) received, substantially perpendicularly to said first and second directions (X,Z), in said opening (111), and operatively engaging the inclined actuation surface (112) to move the latch body (110) towards the retracted position. The present invention further concerns a lockset (10) comprising the magnetic latch operation mechanism (100) received within a housing (200), and a door assembly comprising a frame (600) and a leaf (500) connected by one or more hinges (700), as well as the lockset (10).

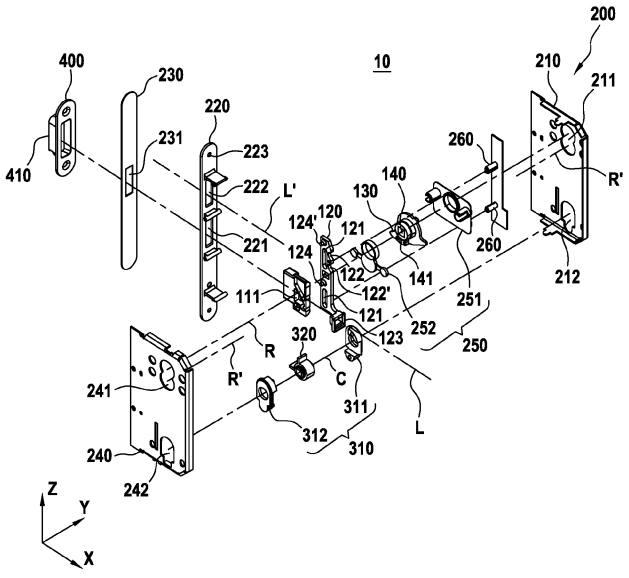

FiG.1

EP 4 520 901 A1

Description

TECHNICAL FIELD

[0001] The disclosure relates to a magnetic latch operation mechanism, as well as to a lockset and door incorporating such a magnetic latch operation mechanism.

BACKGROUND

[0002] In order to improve the reliability and reduce the cost of locksets, it has been generally sought to simplify latch operation mechanisms and reduce their number of parts while maintaining or even increasing their functionalities. For that purpose, magnetically actuated latch operation mechanisms have been proposed, for instance in Italian patent application publication ITMI20011504A1, which also has the advantage of being more silent than a conventional latch operation mechanism, since the latch remains in a retracted position until it is aligned with the striker cavity, and thus does not hit the door jamb or a striker plate as the door leaf closes. However, in that mechanism, the operative linkage between the operating spindle and the latch for retracting the latch, once extended, back into the retracted position, remains complex. Moreover, in that mechanism the relative vertical distance between the latch and the operating spindle is fixed, and cannot be easily adapted for different requirements in this respect.

SUMMARY

[0003] A first object of the disclosure is that of providing a magnetic latch operation mechanism with a simpler, cheaper and more reliable structure, involving a minimum number of moving parts with simple movements.

[0004] For that purpose, a magnetic latch operation mechanism according to a first aspect of the present disclosure comprises a latch body, configured to be guided in a first direction between a retracted position and an extended position and to be magnetically attracted towards the extended position when aligned with a magnetic striker, wherein the latch body has an opening partially delimited by an inclined actuation surface, which is inclined with respect to the first direction, and a slider, configured to be guided in a second direction substantially perpendicular to the first direction and comprising a first pin configured to be received, substantially perpendicularly to said first and second directions, in said opening, and to operatively engage the inclined actuation surface to move the latch body towards the retracted position along a first axis in the first direction.

[0005] With this configuration, the retraction of the latch body from its extended position can be reliably actually with few moving parts. In particular, the first direction may be a substantially horizontal direction and the second direction a substantially vertical direction, wherein "horizontal" and "vertical" should be understood as referring to directions when the magnetic latch operation mechanism is mounted within a lockset in a functional door assembly.

[0006] In order to provide the latch body with an alternative second axis between extended and retracted positions, offset in the second direction with respect to the first axis, the slider may comprise a second pin, offset from the first pin in the second direction, and configured to be received in said opening, substantially perpendicularly to said first and second directions, alternatively from the first pin. This second pin may then be received in the opening, instead of the first pin and operatively engage the inclined actuation surface, to move the latch body along the second axis in the first direction towards a retracted position. This provides greater versatility for the installation of the latch operation mechanism, which can thus be installed in a variety of different configurations, with the latch body located at different heights with respect to the slider.

[0007] The slider may have at least one actuation surface configured to be engaged by a rotary pawl to push the slider in the second direction to move the latch body towards the retracted position. Additionally, the latch operation mechanism may comprise the rotary pawl and a spindle operatively coupled to the rotary pawl and configured to be operatively coupled to at least one handle or knob. The retraction of the latch body may thus be actuated by the rotary pawl and spindle through the slider. Additionally, the slider may have not just one, but at least two actuation surfaces, offset from each other in the second direction, and each configured to be selectively engaged by the rotary pawl to push the slider to move the latch body towards the retracted position, so as to provide at least two alternative positions for a rotation axis of the rotary pawl with respect to the slider, and thus offer even greater versatility for the installation of the latch mechanism.

[0008] The slider may have a holding surface, configured to be engaged by a lock cam to lock the slider in a locking position in which the first pin is held in a pocket extending from an end of the inclined actuation surface of the latch body to retain the latch body in the extended position. A perimeter of said opening in the latch body may include an inwardly protruding detent portion between the inclined actuation surface and a bottom of the pocket, so as to secure the first pin in the pocket and provide a haptic feedback when unlocking the latch body.

[0009] A second aspect of the present disclosure relates to a lockset comprising the latch operation mechanism according to the first aspect and a housing receiving the latch operation mechanism. The housing may comprise a front plate and a front plate cover magnetically attached to the front plate. For this, the front plate may be ferromagnetic and the front plate cover comprise one or more permanent magnets. More specifically, the permanent magnet may be incorporated in a back surface of the front plate cover. It may for instance be cut from ferrite

magnet sheeting, incorporating ferrite powder into an organic polymer matrix. Other types of magnets, for instance alnico magnets or rare earth magnets, in particular neodymium magnets, may however be considered instead.

[0010] The lockset may further comprising a lock adaptor received into the housing and configured to receive a lock, which may in particular be a key lock, a cylinder lock, or a thumb turn lock. The lockset may also comprise the magnetic striker.

[0011] A third aspect of the present disclosure relates to a door assembly comprising a frame and a leaf connected by one or more hinges, and the lockset according to the second aspect.

[0012] The above summary of some example embodiments is not intended to describe each disclosed embodiment or every implementation of the invention. In particular, selected features of any illustrative embodiment within this specification may be incorporated into an additional embodiment unless clearly stated to the contrary.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] The invention may be more completely understood in consideration of the following detailed description of various embodiments in connection with the accompanying drawings, in which :

- FIG. 1 is an exploded perspective view of a lockset according to an embodiment of the present disclosure.
- FIGS. 2A and 2B are detail views of a latch body of the lockset of FIG. 1 in two alternative configurations.
- FIG. 3 is a schematic view of a door assembly equipped with the lockset of FIG. 1.
- FIGS. 4A and 4B are detail views of a spindle of the lockset of FIG. 1 in two alternative configurations.
- FIG. 5 illustrates the components of a lock module of the lockset of FIG. 1.
- FIGS. 6A to 6D illustrate successive steps in the operation of the latch operation mechanism of the lockset of FIG. 1.

[0014] While the invention is amenable to various modifications and alternative forms, specifics thereof have been shown by way of example in the drawings and will be described in detail. It should be understood, however, that the intention is not to limit aspects of the invention to the particular embodiments described. On the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the scope of the invention.

DETAILED DESCRIPTION

[0015] For the following defined terms, these definitions shall be applied, unless a different definition is given in the claims or elsewhere in this specification.

[0016] As used in this specification and the appended claims, the singular forms "a", "an", and "the" include plural referents unless the content clearly dictates otherwise. As used in this specification and the appended claims, the term "or" is generally employed in its sense including "and/or" unless the content clearly dictates otherwise.

[0017] In the present context, "substantially perpendicular", "substantially parallel", "substantially horizontal" or "substantially vertical" should be understood as meaning perpendicular, parallel, horizontal or vertical within a reasonable margin, such as, for example, $\pm 10°$ or $\pm 5°$.

[0018] The following detailed description should be read with reference to the drawings in which similar elements in different drawings are numbered the same. The detailed description and the drawings, which are not necessarily to scale, depict illustrative embodiments and are not intended to limit the scope of the invention. The illustrative embodiments depicted are intended only as exemplary. Selected features of any illustrative embodiment may be incorporated into an additional embodiment unless clearly stated to the contrary.

[0019] As shown in Fig. 1, a lockset 10 according to an embodiment of the present disclosure may comprise a magnetic latch operation mechanism 100, a housing 200, a lock module 300, and a counterplate 400. The magnetic latch operation mechanism 100 may comprise a latch body 110, a slider 120, a rotary pawl 130, and a spindle 140. The latch body 110 may be configured to be guided along a first translation axis L in a first direction X, which may in particular be a substantially horizontal direction, between an extended position, in which the latch body 110 may partially protrude out of the housing 200, and a retracted position, in which the latch body 110 may be substantially contained within the housing 200. Furthermore, the latch body 110 may alternatively be guided between corresponding extended and retracted positions along a second translation axis L', substantially parallel to the first translation axis L, but relatively offset in a second direction Z, substantially perpendicular to the first direction, as respectively shown on Figs. 2A and 2B. This second direction Z may in particular be a substantially vertical direction.

[0020] The rotary pawl 130 may be operatively connected to the spindle 140, which may in turn be configured to be operatively coupled to a handle 700 or knob, for instance through a non-rotationally symmetric bore, such as the illustrated square cross-section bore 141. The spindle 140 and rotary pawl 130 may be configured to turn around first or second rotation axes R, R' oriented in a third direction Y, substantially perpendicular to both the first and second directions X,Z, between a rest position and an operation position. The spindle 140 and rotary pawl 130 may be spring-loaded towards the rest position, so as to automatically return to this rest position after their operation.

[0021] The housing 200 may be configured to receive the magnetic latch operation mechanism 100 and be

installed within a hinged door leaf 500, as shown in Fig. 3. The counterplate 400 may be installed in a door frame 600, in particular within a door jamb 610 opposite to the door jamb 620 on which the one or more hinges 700 linking the door frame 600 to the door leaf 400 may be installed. The counterplate 400 may comprise a magnetic striker 410. The housing 200 may comprise a casing 210, a front plate 220, a front plate cover 230, and a side cover 240. Transverse columns 260 may extend, within the housing 200, between the side cover 240 and an opposite face of the casing 210, connecting them.

[0022] The front plate 220 may have two latch openings 221, 222, respectively located so as to allow passage of the latch body 110 from the retracted to the extended position on the first or second translation axes L, L'. The front plate 220 may also have fastening orifices 223 for fastening elements such as, in particular, countersunk screws. The front plate cover 230 may be magnetically attached to the front plate 220. In particular, the front plate 220 may be ferromagnetic and the front plate cover 230 comprise one or more permanent magnets, although other arrangements, for instance with a ferromagnetic front plate cover 230 and one or more permanent magnets integrated in the front plate 220, may alternatively be considered. The front plate cover 230 may comprise a single latch opening 231, aligned with one of the latch openings 221, 222 in the front plate 220, to allow passage of the latch body 110 from the retracted to the extended position on the corresponding translation axis L, L', while substantially covering the remaining surface of the front plate 220, including the other latch opening 222, 221 and the fastening orifices 221. The front plate cover 230 may be easily replaced with an alternative front plate cover having its single latch opening aligned with said other latch opening 222, 221 in the front plate 220, if the latch body 110 is to be installed on the corresponding other translation axis L', L. The front plate cover 230 may comprise a decorative outer surface 231, for instance to emulate the appearance of the surrounding area on the door leaf edge.

[0023] Both the casing 210 and side cover 240 may have respective first openings 211,241, opposite to each other, for receiving the spindle 140, as well as respective second openings 212,242, also opposite to each other, for receiving the lock module 300. The openings 211, 241 may be shaped so as to alternatively accommodate the spindle 140 in two alternative positions, respectively illustrated in Figs. 4A and 4B, and offset from each other in the second direction Z, so that the spindle 140 is rotationally supported around either the first rotation axis R or the second rotation axis R'. The housing 200 may additionally comprise a reversible insert 250, with separate first and second parts 251,252, to support the spindle 140 within the housing 200 and close up the openings 211, 241. As illustrated, the openings 211, 241 may be substantially symmetrical with respect to a symmetry plane S perpendicular to the second direction Z, so that the reversible insert 250 may be vertically flipped with respect to this symmetry plane S to alternatively support the spindle 140 in the position of Fig. 4A or in the position of Fig. 4B.

[0024] The lock module 300 may comprise a lock adaptor 310 and a lock 320. As shown in Fig. 5, the lock adaptor 310 may comprise two parts 311, 312, configured to be fastened to each other with the lock 320 held between them. Although in the illustrated embodiment the lock 320 is a simple, keyless thumb turn lock, wherein a lock cam 321 is directly operated through a lock spindle 322 in rotation around a lock cam rotation axis C, which may in particular be oriented in the third direction Y. The lock adaptor 310 may shaped complementarily to the lock 320. The housing 200 may be configured to receive multiple alternative lock modules including, alternatively to the thumb turn lock 320, a key lock, including a cylinder lock, with an appropriately shaped lock adaptor. The lockset 10 may thus be easily adapted to various types of locks by exchanging the lock adaptor 310.

[0025] Within the magnetic latch operation mechanism 100, the slider 120 may in particular comprise one or more oblong holes 121, elongated in the second direction Z, wherein one or more of the transverse columns 260 may be press-fit, in order to guide the slider 120 in the second direction Z. The slider 120 may further comprise two actuation surfaces 122,122' configured to be engaged by the rotary pawl 130 when rotating around, respectively, the first rotation axis R or the second rotation axis R', from the rest position to the operation position, to push the slider 120 in the second direction Z. The slider 120 may also comprise a holding surface 123 configured to be engaged by the lock cam 321 when the latter is rotated towards a locking position. The slider 120 may further comprise two transverse pins 124,124', protruding in the third direction Y and respectively configured to engage the latch body 110 when the latter is located on the first or second translation axes L, L'.

[0026] In particular, the latch body 110 may comprise an opening 111 configured to receive either transverse pin 123, 123' in the third direction Y. This opening 111 may be delimited by a perimeter comprising an inclined actuation surface 112, which may be inclined with respect to the first and second directions X, Z, a lower edge 113 with a pocket 114 extending from a lower end 116 of the inclined actuation surface 112, and an inwardly protruding detent portion 115 between said lower end 116 of the inclined actuation surface 112 and a bottom of the pocket 114. The magnetic striker 410 may be formed by a cavity in the counterplate 400 configured to receive a protruding end of the latch body 110 in the extended position and a permanent magnet at the bottom of this cavity. The latch body 110 may be configured to be attracted towards the extended position when aligned with the magnetic striker 410. In particular, the latch body 110 may be ferromagnetic and/or comprise one or more permanent magnets oriented so as to be attracted towards the permanent magnet of the magnetic striker 410.

[0027] Therefore, in use, when the latch body 110 is in

the retracted position, turning the spindle 140 and the rotary pawl 130 between their rest and operation positions may move the slider 120 in the second direction Z, but will not move the latch body in the first direction X, since the transverse pin 124, 124' received within the opening 111 may move in the second direction Z between the lower edge 113 of the opening 111 and an upper end 115 of the inclined actuation surface 112 without engaging said inclined actuation surface 112, as shown in Fig. 6A. Once the door is closed, bringing the latch body 110 in alignment with the magnetic striker 141, the latch body 110 may be attracted towards the extended position, with its protruding end extending into the cavity of the magnetic striker 141 to hold the door closed. When the latch body 110 is in the extended position, the transverse pin 124, 124' may rest between the lower end 116 of the inclined actuation surface 112 and the detent portion 115, as shown in Fig. 6B. In this position of the transverse pin 124, 124' and slider 120, if the lock cam 321 is turned towards the locking position, it may engage the holding surface 123 of the slider 120, pushing the latter with the transverse pin 124, 124' beyond the detent portion 115 and into the pocket 114, as shown in Fig. 6C, so as to lock the latch body 110 in the extended position. Momentarily overcoming the magnetic attraction on the latch body 110 in the first direction X as the transverse pin 124, 124' moves over the detent portion 115, laterally pushing the latch body 110 away from the magnetic striker 410, may provide a haptic feedback to the operator of the lock 320.

[0028] When the lock cam 321 is turned back into its unlocking position the transverse pin 124, 124' may be brought back out of the pocket 114, over the detent portion 115 and into engagement with the inclined actuation surface 112, as shown in Fig. 6D, to move the latch body 110 back towards its retracted position, by rotation of the spindle 130 and the rotary pawl 140 from their rest position to their operation position and engagement of the rotary pawl 140 with one of the actuation surfaces 122,122' of the slider 120. As the transverse pin 124, 124' moves over the detent portion 115, it may also provide a haptic feedback to the operator of the spindle 130. Once the latch body 110 is fully retracted out of the cavity of the magnetic striker 410, the door may be opened. With the latch body 110 again out of alignment from the magnetic striker 141, the latch body 110 may remain in its retracted position even when the spindle 130 and rotary pawl 140 rotate back to their rest position.

[0029] Those skilled in the art will recognize that the present invention may be manifested in a variety of forms other than the specific embodiments described and contemplated herein. Accordingly, departure in form and detail may be made without departing from the scope of the present invention as described in the appended claims.

Claims

1. Magnetic latch operation mechanism (100) comprising :

   a latch body (110), configured to be guided in a first direction (X) between a retracted position and an extended position and to be magnetically attracted towards the extended position when aligned with a magnetic striker (141), wherein the latch body (110) has an opening (111) partially delimited by an inclined actuation surface (112), which is inclined with respect to the first direction (X); and
   a slider (120), configured to be guided in a second direction (Z) substantially perpendicular to the first direction (X) and comprising a first pin (124) configured to be received, substantially perpendicularly to said first and second directions (X,Z), in said opening (111), and to operatively engage the inclined actuation surface (112) to move the latch body (110) towards the retracted position.

2. Magnetic latch operation mechanism (100) according to claim 1, wherein the slider (120) comprises a second pin (124'), offset from the first pin (124) in the second direction (Z), and configured to be received, substantially perpendicularly to said first and second directions (X,Z), in said opening (111), alternatively from the first pin (124).

3. Magnetic latch operation mechanism (100) according to any one of claims 1 or 2, wherein the slider (120) has at least one actuation surface (122,122') configured to be engaged by a rotary pawl (140) to push the slider (120) in the second direction (Z) to move the latch body (110) towards the retracted position.

4. Magnetic latch operation mechanism (100) according to claim 3, further comprising the rotary pawl (140) and a spindle (130) operatively coupled to the rotary pawl (140) and configured to be operatively coupled to at least one handle (700) or knob.

5. Magnetic latch operation mechanism (100) according to any one of claims 3 and 4, wherein the slider (120) has at least two actuation surfaces (122,122'), offset from each other in the second direction (Z), and each configured to be selectively engaged by the rotary pawl (140) to push the slider (120) in the second direction (Z) to move the latch body (110) towards the retracted position.

6. Magnetic latch operation mechanism (100) according to any one of claims 1 to 5, wherein the slider (120) has a holding surface (123), configured to be

engaged by a lock cam (321) to lock the slider (120) in a locking position in which the first pin (124) is held in a pocket (114) extending from an end (116) of the inclined actuation surface (112) of the latch body (110) to retain the latch body (110) in the extended position.

7. Magnetic latch operation mechanism (100) according to claim 6, wherein a perimeter of said opening (111) in the latch body (110) includes an inwardly protruding detent portion (115) between the inclined actuation surface (112) and a bottom of the pocket (114).

8. Lockset (10) comprising the magnetic latch operation mechanism (100) according to any one of claims 1 to 7 and a housing (200) receiving the latch operation mechanism (100).

9. Lockset (10) according to claim 8, wherein the housing (200) comprises a front plate (220) and a front plate cover (230) magnetically attached to the front plate (220).

10. Lockset (10) according to claim 9, wherein the front plate (220) is ferromagnetic and the front plate cover (230) comprises one or more permanent magnets.

11. Lockset (10) according to any one of claims 8 to 10, further comprising a lock adaptor (310) received into the housing and configured to receive a lock (320).

12. Lockset (10) according to claim 11, wherein the lock adaptor (310) is configured to receive a key lock, a cylinder lock, or a thumb turn lock.

13. Lockset (10) according to any one of claims 8 to 12, further comprising the magnetic striker (410).

14. Door assembly comprising a frame (600) and a leaf (500) connected by one or more hinges (700), and the lockset (10) according to any one of claims 9 to 13._

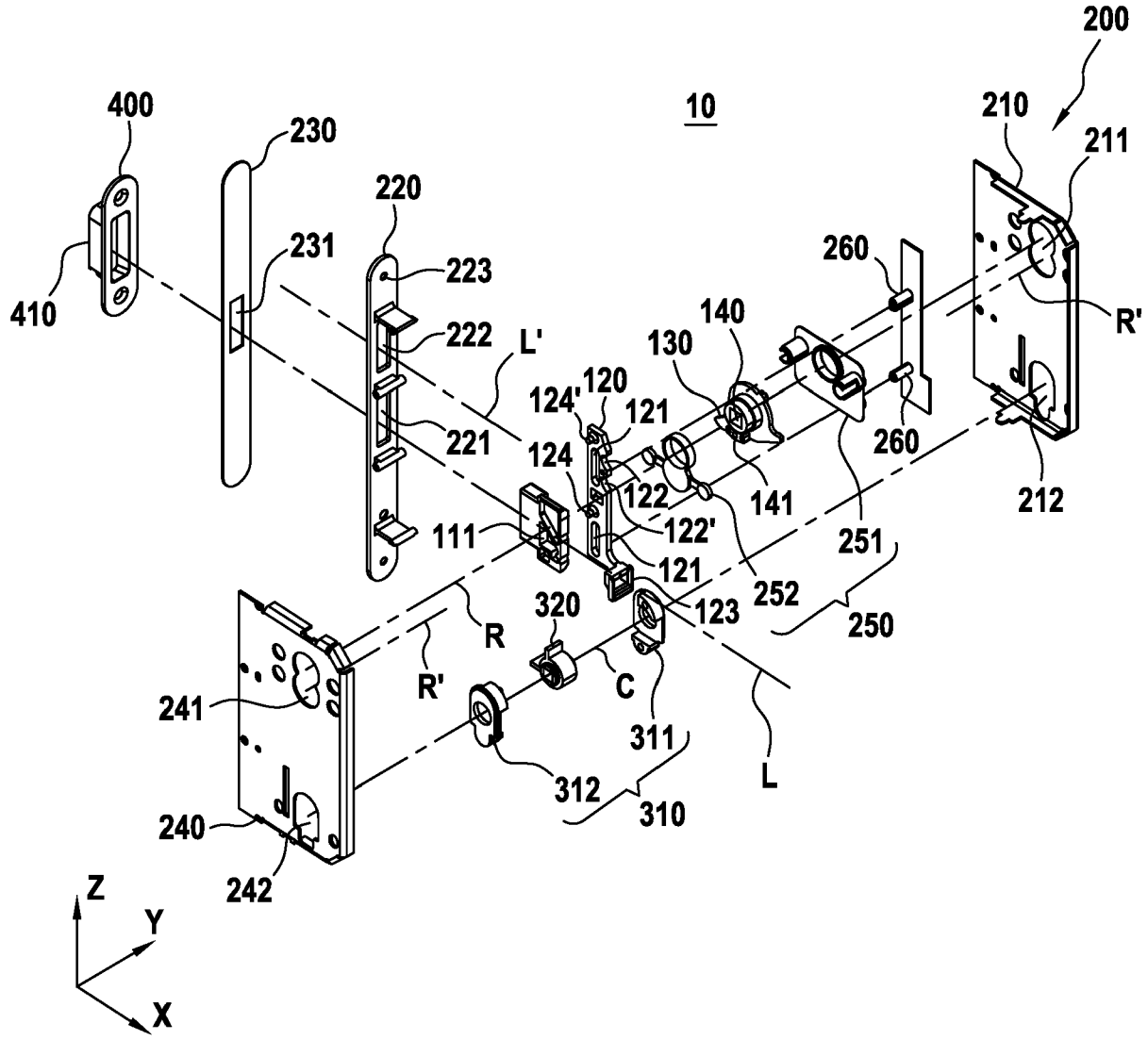
200
400
230
10
210
211
220
231
223
260
410
222
L'
140
130
R'
120
124'
121
221
124
260
122
141
212
111
122'
251
121
252
123
250
320
R
R'
C
241
311
L
312
310
240
242
Z
Y
X

FiG.1

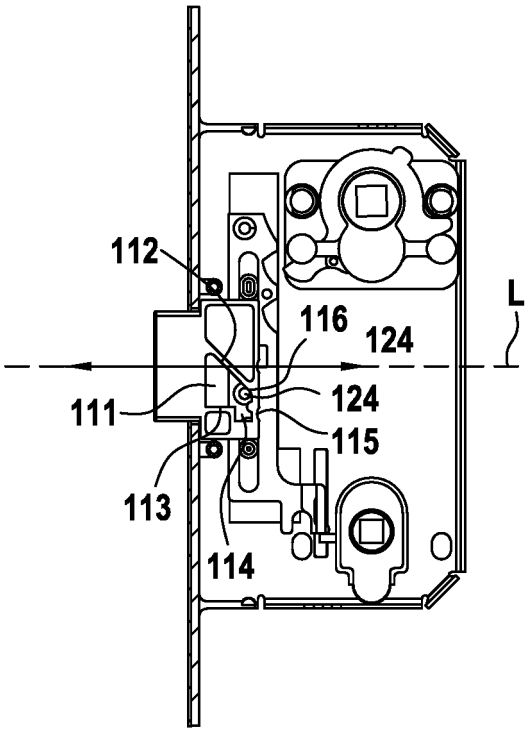

FiG.2A

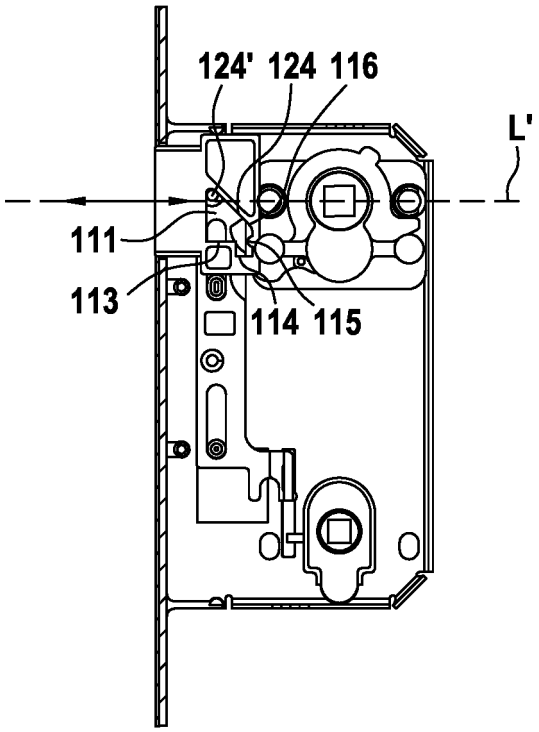

FiG.2B

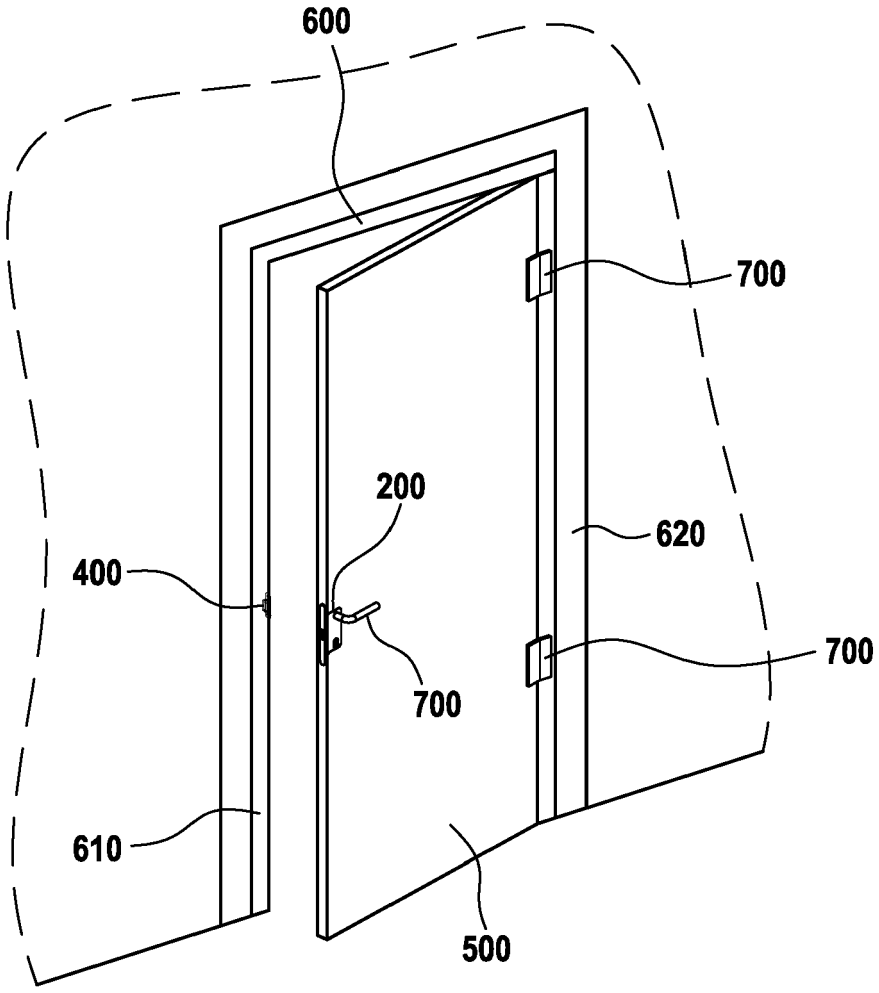

FiG.3

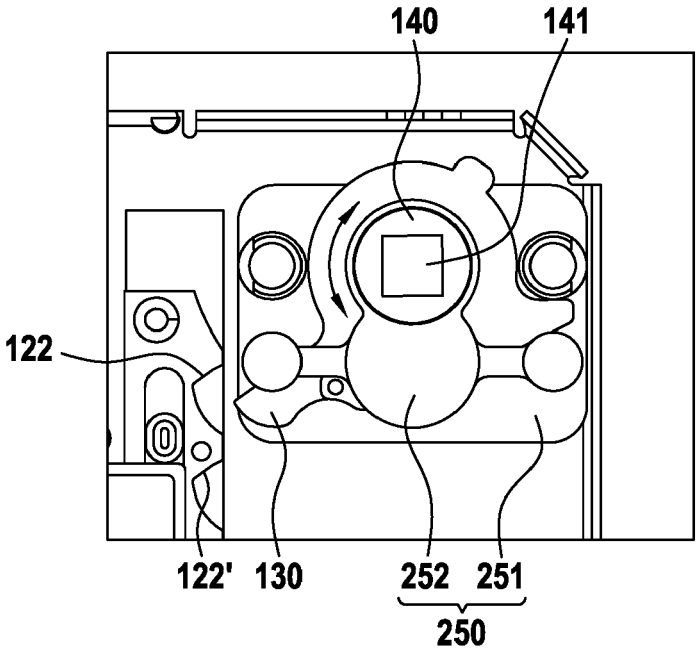

FiG.4A

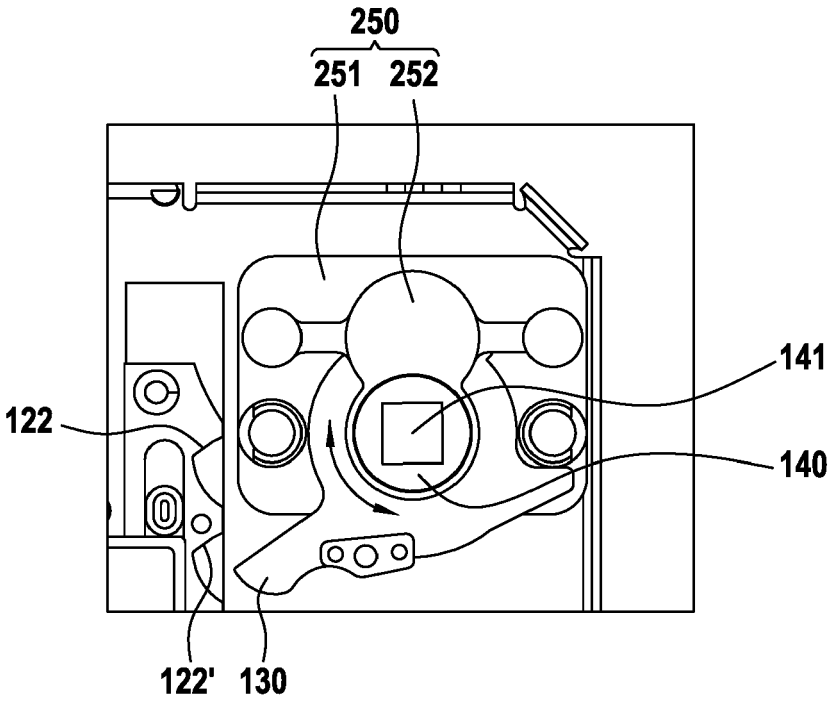

FiG.4B

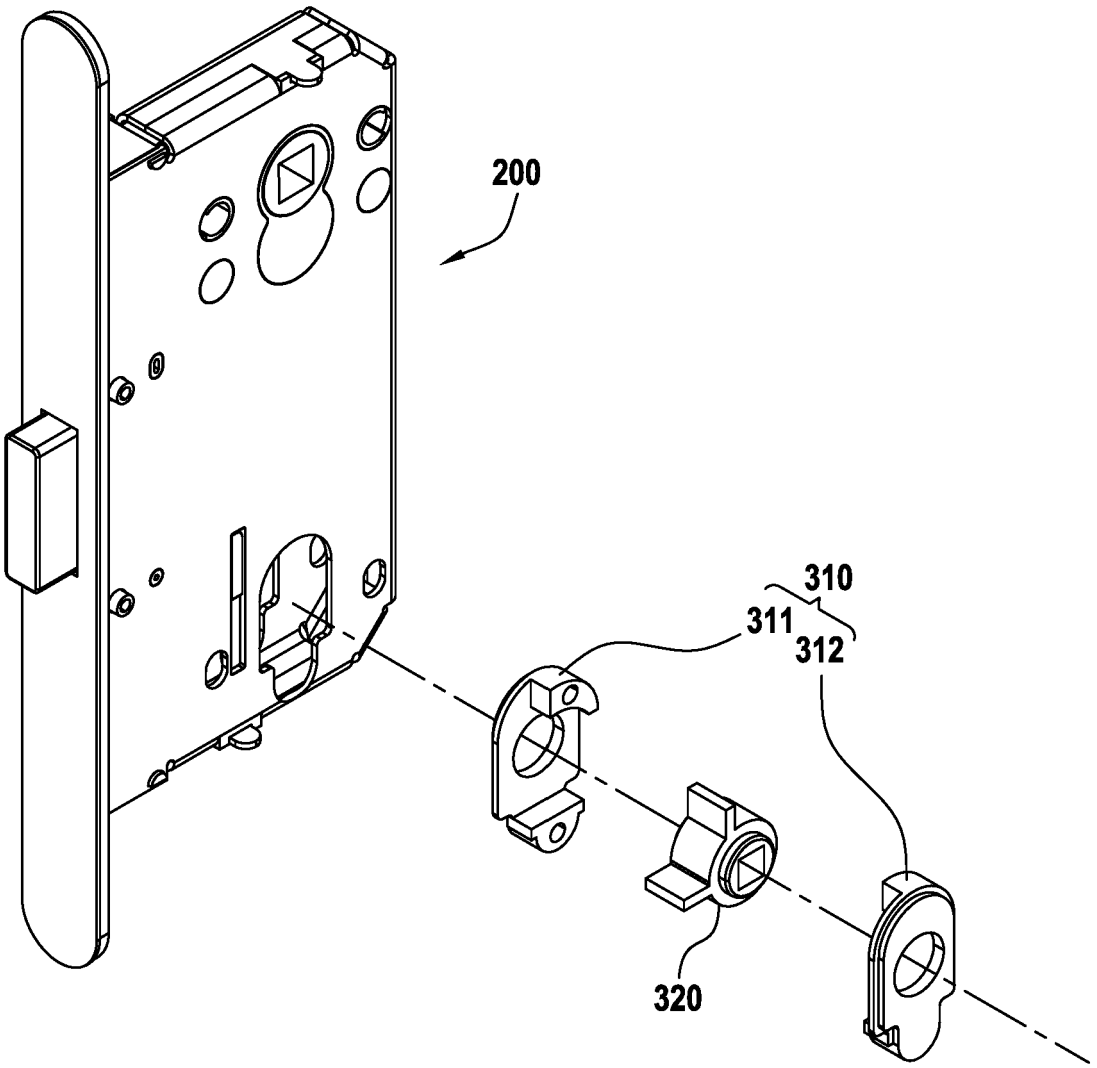

FiG.5

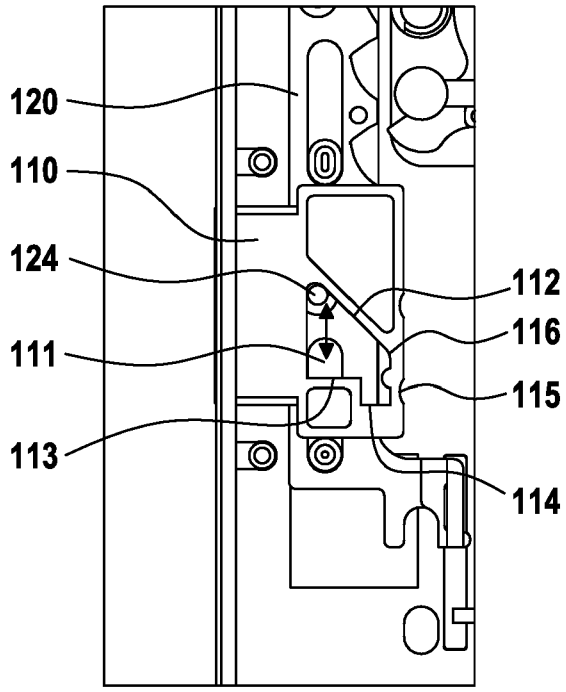

FiG.6A

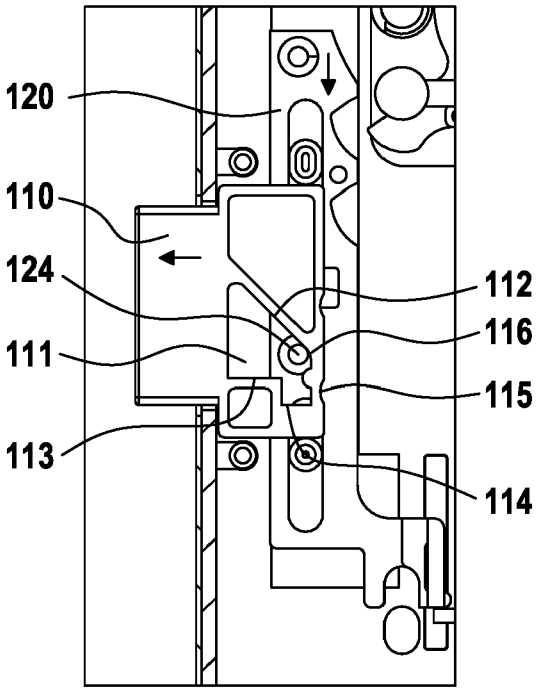

FiG.6B

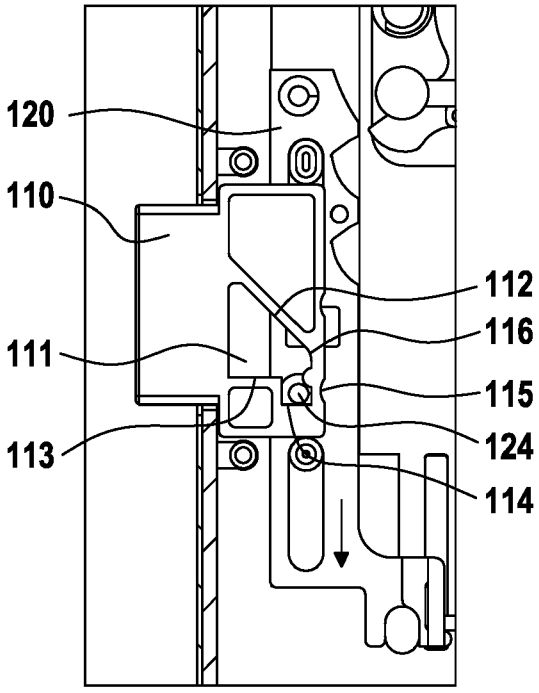

FiG.6C

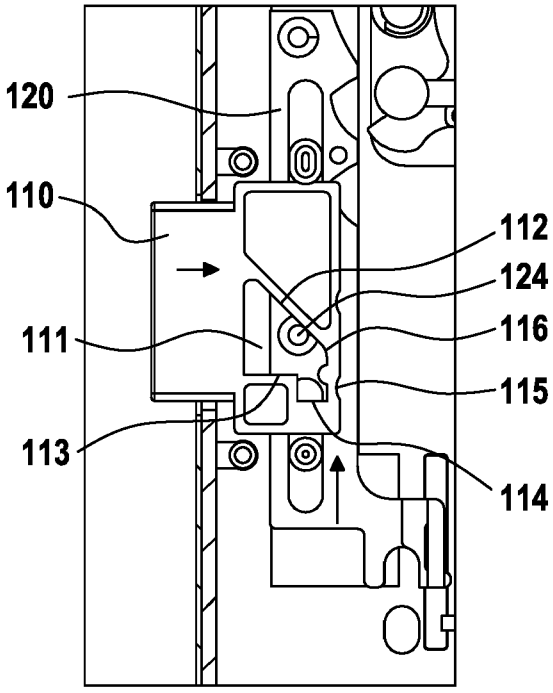

FiG.6D

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 23 30 6488

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	WO 2020/157624 A1 (ALBAN GIACOMO SPA [IT]) 6 August 2020 (2020-08-06)	1	INV. E05C19/16 E05B47/00
A	* the whole document *	2-14	
Y	DE 20 2006 011379 U1 (WINKHAUS FA AUGUST [DE]) 26 October 2006 (2006-10-26)	1	
A	* the whole document *	2-14	
A	WO 2019/171290 A1 (BONAITI SERRATURE SPA [IT]) 12 September 2019 (2019-09-12) * the whole document *	1-14	
A	WO 2017/149023 A1 (BONAITI SERRATURE SPA [IT]) 8 September 2017 (2017-09-08) * the whole document *	1-14	
A	EP 1 288 404 B1 (ROTO FRANK EISENWAREN [AT]) 28 February 2007 (2007-02-28) * the whole document *	1-14	
			TECHNICAL FIELDS SEARCHED (IPC) E05C E05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	27 February 2024	Westin, Kenneth

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 23 30 6488

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

27-02-2024

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2020157624 A1	06-08-2020	EP 3918162 A1	08-12-2021
		WO 2020157624 A1	06-08-2020
DE 202006011379 U1	26-10-2006	NONE	
WO 2019171290 A1	12-09-2019	EP 3762568 A1	13-01-2021
		WO 2019171290 A1	12-09-2019
WO 2017149023 A1	08-09-2017	CA 3015710 A1	08-09-2017
		CN 108699862 A	23-10-2018
		EP 3423651 A1	09-01-2019
		ES 2783827 T3	18-09-2020
		HR P20200620 T1	10-07-2020
		PL 3423651 T3	21-09-2020
		PT 3423651 T	21-04-2020
		RU 2018133182 A	02-04-2020
		SI 3423651 T1	31-07-2020
		US 2019063124 A1	28-02-2019
		WO 2017149023 A1	08-09-2017
EP 1288404 B1	28-02-2007	AT 410961 B	25-09-2003
		AT E355434 T1	15-03-2006
		EP 1288404 A2	05-03-2003

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- IT MI20011504 A1 **[0002]**