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

(11) **EP 2 829 673 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
28.01.2015 Bulletin 2015/05

(51) Int Cl.:
E05B 65/10 *(2006.01)* ***E05B 59/00*** *(2006.01)*
E05B 41/00 *(2006.01)* *E05B 17/22* *(2006.01)*

(21) Application number: **13177440.8**

(22) Date of filing: **22.07.2013**

(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 MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

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(54) **An adapter for a lock case**

(57) An adapter for a lock case, comprising a handle bushing (42) to be connected to a handle (80) and arranged to be rotated about a first axis (A) when the handle (80) is pushed down or pulled up for moving a latch bolt in and out from said lock case. The adapter further comprises a lock bushing (45) to be connected to a lock follower extending through said lock case and arranged to rotate about a second axis (B) for moving a lock bolt (81) in and out from said lock case, and a transmission (50) connecting said handle bushing (42) with said lock bushing (45) such that the lock bushing (45) is arranged to rotate in a first direction when the handle bushing (42) is rotated in a second direction being opposite said first direction.

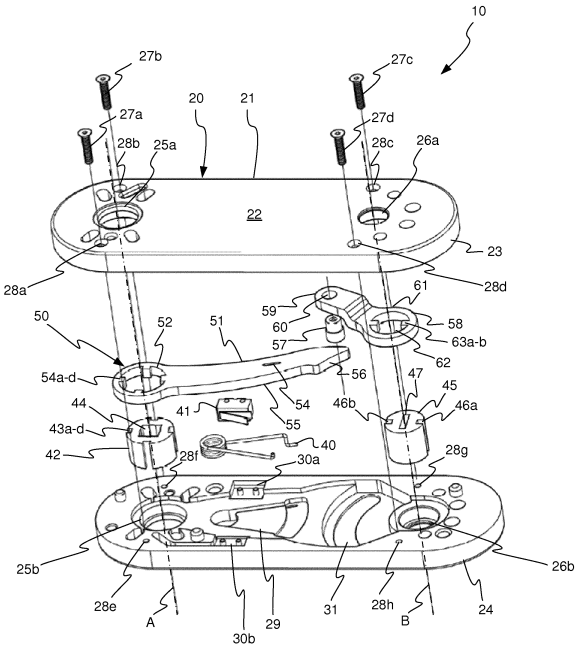

Fig. 1

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Description

TECHNICAL FIELD

[0001] The present invention relates to an adapter for a lock case for opening a locked door without a key or a locking knob. In particular, the present invention relates to an adapter to be connected to a lock case for always allowing a person to open a door from the inside without a key, a knob or a handle, even if said door is locked.

BACKGROUND

[0002] There are many situations where it is of importance to be able to open a door without needing a key or a locking knob. Today there are systems used for this purpose in e.g. escape routes, in hotel doors and in schools so that people e.g. can escape a potential danger. A common system used today is called a split spindle system which is arranged to disengage the inner handle from the outer handle in such way the door may be opened from the inside even though it is locked from the outside. Hence, such split spindle solution may be utilized such that the inner door handle always is connected to the lock bolt, whereby the outer door handle is disconnected from the lock bolt.

[0003] One disadvantage is that the installation of the split spindle system usually is made in extremely small or narrow areas or surfaces inside the lock case, which areas and/or surfaces may get worn out if the door is constantly used; doors in schools are one example. When the split spindle gets worn out the entire system may stop working and the door may not be opened. Such damage will result in the inner door handle to always be disengaged from the lock bolt which means that if the door is locked, a person entrapped inside the door will have no possibility to exit.

[0004] Further, since the split-spindle system operates on small and narrow surfaces it may be complicated to install the system, for new installations as well as when it needs to be replaced or maintained.

SUMMARY

[0005] An object of the present invention is to provide a new adapter for a lock case, which is improved over prior art. This object is achieved be a technique defined in the appended independent claims; certain embodiment being set forth in the related dependent claims.

[0006] In one aspect of the invention there is provided an adapter for a lock case, comprising a handle bushing to be connected to a handle and arranged to be rotated about a first axis when the handle is pushed down or pulled up for moving a latch bolt in and out from said lock case. Further the adapter comprises a lock bushing to be connected to a lock follower extending through said lock case and arranged to rotate about a second axis for moving a lock bolt in and out from said lock case, and a transmission connecting said handle bushing with said lock bushing such that the lock bushing is arranged to rotate in a first direction when the handle bushing is rotated in a second direction being opposite said first direction. The advantage with this adapter is that it provides a secure transmission of the movement between the handle and latch bolt/lock bolt.

[0007] In one embodiment of the invention the adapter is adapted to be arranged on one side of a door, between a door leaf and the door handle. This is advantageous when the adapter is used on a door which is used as e. g. an emergency door or a hotel door where it is necessary and desired to be able to open the locked door and get out.

[0008] In another embodiment the adapter is adapted to be detachable from said door which is advantageous since it is possible to then post-install the adapter to a door which is already installed.

[0009] In an alternative embodiment the transmission comprises a handle lever connected to the handle bushing, and a lock lever which is connected to the lock bushing and which is in constant contact with the handle lever such that the lock lever always rotates with the handle lever. Since the lock bushing always is in contact with the handle lever the adapter never has to be switch on which to function.

[0010] In an embodiment the handle lever is biased such that it automatically returns to an idle state, corresponding to a horizontally aligned position of the door handle, when a force for pushing down the door handle has been released. This is as above also an assurance that the door is always locked except for when the handle is pushed down, which is advantageous for e.g. emergency doors.

[0011] In another embodiment the adapter further comprises a casing including a cover portion and a support portion which are connected by fastening means, wherein the cover portion protects the other components of the adapter from externals.

[0012] I an alternative embodiment the support portion comprises a track in which the lock lever is guided when it rotates about the second axis. The guidance of the track is advantageous since it provides a safe and predetermined transmission of the lock lever.

[0013] In yet another alternative embodiment the adapter further comprises an indicator configured to indicate an active and/or inactive state of said adapter, which is advantageous since it provides a clear indication whether the adapter is able to accomplish its function.

[0014] In another aspect of the invention there is provided a door lock assembly for mounting to a door leaf, comprising a lock case including a latch bolt to be operated by at least one door handle connected to a door handle follower of said lock case, a lock bolt in connection with a lock follower of said lock case, and an adapter as described above, connected to said lock case.

[0015] In yet another aspect of the invention there is provided a door comprising a door lock assembly men-

tioned above.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] Embodiment of the invention will be described in the following; reference being made to the appended drawings which illustrate non-limiting examples of how the inventive concept can be reduced into practice.

Fig. 1 is an exploded view of an adapter according to an embodiment,

Fig. 2 shows the adapter in Fig. 1 in a locked state, and

Fig. 3 shows the adapter in Fig. 1 in an unlocked state.

DETAILED DESCRIPTION OF EMBODIMENTS

[0017] With reference to Fig. 1 an adapter 10 is shown, including a casing 20 and a transmission 50 which is suitable to use together with a lock case of a door. The casing 20 comprises a cover portion 21 which comprises a base member 22 and a side member 23 surrounding the base member 22 along its periphery and extending perpendicularly from said base member 22. The base member 22 and the side member 23 are in this case integrally formed and made in one piece, casted in preferably zinc. In an alternative embodiment the base member 22 may be mounted, e.g. by welding, to one edge of the side member 23 such that they together may accommodate a support portion 24. In another embodiment the base member 22 and the side member 23 may made in one piece. The cover portion 21 further includes a first circular opening 25a which is centered arranged about a fist axis A, and a second circular opening 26a which is centered arranged about a second axis B. The first opening 25a of the cover portion 21 corresponds to a first opening 25b of the support portion 24 which is also centered arranged about the first axis A. In the same way the second opening 26a of the cover portion 21 corresponds to a second opening 26b of the support portion 24 and centered arranged about the second axis B.

[0018] The support portion 24 is preferably made in a solid piece which has the same outer shape and size as the base member 22 of the cover portion 21. In an assembled state the base member 22 and the side member 23 of the cover portion 21 enclose the support portion 24 with the exception of the rear outer surface of the support portion 24, adapted to be in close contact with the door. The cover portion 21 and the support portion 24 are assembled by means of fastening means, in this case screws 27a-d which are inserted into threaded holes 28a-h in the cover portion 21 and the support portion 24. The two portions 21, 24 are preferably made of a castable material such as metal or plastic.

[0019] The support portion 24 further comprises a spring recess 29 for receiving a spring 40 and at least one sensor recess 30a, 30b for receiving an electronic sensor 41. Close to the second opening 26b of the support portion 24 a curved track 31 is arranged for receiving a guide member 57 which will be described further below. The recesses 29, 30a, 30b and the track 31 may preferably be shaped by moulding or milling.

[0020] Accommodated within the casing 20 is the spring 40, the optional electronic sensor 41, a door handle bushing 42 arranged with four outer grooves 43 a-d and a square centered opening 44 and a lock bushing 45 with two outer grooves 46a-b and a rectangular centered opening 47. In another embodiment the axles 42, 45 may of course have another suitable appearance for providing a suitable fitting with regards to the lock case. The handle bushing 42 is arranged in the first openings 25a, 25b of the cover portion 21 and the support portion 24 and its square opening 44 is arranged to receive a handle follower which is connected to a handle on one side, in this case on the inside, of a door. The lock bushing 45 is arranged in the second openings 26a, 26b of the cover portion 21 and the support portion 24 and its rectangular opening 47 is arranged to receive a lock follower which is in operation with a lock bolt within the lock case. To be able to support the handle bushing 42 and the lock bushing 45 in their right places the first and second openings 25a, 25b, 26a, 26b are provided with an edge or a stop close to the outer surface of the cover portion 21 and support portion 24, so that the bushing 42, 45 do not fall out of the casing 20. The handle bushing 42 and the lock bushing 45 are however always free to rotate about the first and second axis A, B.

[0021] The casing 20 further accommodates a transmission 50 including a handle lever 51 which is provided with an opening 52 at its first end 53. The shape of the opening 52 corresponds to the outer shape of the handle bushing 42, where the opening 52 has four protrusion 54a-d which are configured to slide into the outer grooves 43a-d of the handle bushing 42 when assembling the two parts 42, 51 together. The handle lever 51 is connected to the handle bushing 42 in such a way that it is required to rotate with the handle bushing 42. Further, the handle lever 51 has an elongated hole 54 on its intermediate part 55 for receiving the spring 40 arranged in the spring recess 29. The handle lever 51 is, in an assembled state, located in an recess of the support portion 24 which allows the handle lever 51 to rotate a certain number of degrees, preferably between 10° and 30° which corresponds to a normal movement a handle being pushed down, about the first axis A. In alternative embodiments the preferred degrees of rotation may be different depending on the features of the handle and door, e.g. in some embodiments the handle has to be rotated up to 360° which may lead to the adapter further including gear means (not shown). The second end 55 of the handle lever 51 has a side surface 56 which is allowed to engage with a guiding member 57 and during rotation may push on the guiding member 57 which is arranged to be guided in the curved track 31.

[0022] Besides from the guiding member 57 the trans-

mission 50 further includes a lock lever 58 to which the guiding member 57 is fixedly connected. In an alternative embodiment the guiding member 57 and the lock lever 58 may be formed integrally and made in one piece and yet in another embodiment the guiding member 57, the lock lever 58 and the lock bushing 45 may be made in one piece. The lock lever 58 is at its first end 59 provided with an opening 60 for receiving the guiding member 57, the shape of the guiding member 57 then should preferably correspond to the shape of the opening 60. The first end 59 is slightly elevated relative to the second end 61 of the lock lever 58 so that e.g. the lock lever 58 does not risk to affect the side surface 56 of the handle lever 51 as it rotates. In an alternative embodiment there is no elevation between the first end and the second end.

[0023] The second end 61 of the lock lever 58 is provided with an opening 62 configured to receive the lock bushing 45. The opening 62 has two protrusions 63a-b which corresponds to the two outer grooves 46a-b of the lock bushing which together in an assembled state provides a strong connection for securing rotational fixation between the lock lever 58 and the lock axle 45. The appearances of the handle bushing 42, the handle lever 51, the guiding member 57, the lock lever 58 and the lock bushing 45 may of course in other embodiments have another shape suitable for its purpose. These parts may preferably be made of plastic or metal.

[0024] In an alternative embodiment, e.g. where the adapter is arranged to a lock case in which the handle follower and the lock follower has the same rotational direction there may be a direct connection between the handle lever and the second end of the lock lever or the lock follower.

[0025] Fig. 2 shows the adapter 10 mounted to a door leaf 70 and an inner handle 80, in a first idle state when the handle 80 is in a resting position. This handle 80 is configured to be left hand rotated, if the handle is right hand rotated the appearance of the adapter 10 is inverted in relation to what is shown in Fig. 2. The handle 80 is connected to the handle bushing 42 through an optional handle follower (not shown). The handle lever 51 is in an idle state resting against one side of the recess, in this case to the right. The lock lever 61 and its guiding member 57 are also located to the right in the idle state and in contact with the side surface 56 of the handle lever 51. The lock bushing 45 is connected to a biased lock follower (not shown) leading to a lock bolt 81.

[0026] Fig. 3 then shows the adapter 10 in a second state where the inside door handle 70 has been pushed down. As soon as the handle 70 is pushed down the handle bushing 42 with the handle lever 51 starts to rotate about the first axis A. The second end 55 of the handle lever 51 then starts to move towards the left side of the recess, pushing the first end 59 of the lock lever 58 and the guiding member in the same direction. As the handle lever 51 rotates the spring 40 is strained. As the first end 59 of the lock lever 58 is pushed to one side the second end 61 and the lock bushing 45 starts to rotate about the second axis B, leading to rotation of the biased lock follower. The lock bolt 81 is before rotation of the lock follower in an idle state protruding from the door leaf 70 leaving the door locked. When the lock follower rotates the lock bolt 81 is pulled into the door leaf 70 unlocking the door.

[0027] As soon as the person pushing the handle 80 down lets go of it, it returns to its resting position, shown in Fig. 2, by means of the strained spring 40 acting on the handle lever 51. The spring 40 pulls back the handle lever 51 leading to the handle bushing 42 rotating the handle follower and the handle 80 back to its resting position. At the same time the biased lock follower rotates back to its idle state resulting in that the lock bolt 81 is pushed out of the door leaf 70 locking the door and that the lock bushing 45 and lock lever 58 returns the position shown in Fig. 2.

[0028] The rotation of the handle lever 51 also affects the optional electronic sensor 41 which may be located in one of the two sensor recesses 30a, 30b in such a way that either when the contact between the sensor 41 and the handle lever 51 is broken or generated the sensor can send a signal to the, in this embodiment, an electronic locker which from the outside preferably is opened by means of a card or a code. The sensor 41 may be used to by-pass a possible alarm or pass system when a person opens the door from the inside.

[0029] The adapter 10 is detachable and preferably mounted in close contact with a door leaf on the inside, facing the room. Since it is detachable it is possible to mount the adapter 10 to an already existing lock case and also remove it if necessary which makes the installation easier for a mechanic. A door lock assembly including the lock case and the adapter is less sensitive to hard wear since the assembly is not dependent on small and narrow margins during operation, which leads to less breakage and maintenance than prior systems. If the assembly however needs maintenance work it is just to disassemble the adapter and perform necessary work on site.

[0030] An advantage with the present adapter is that it may be used on existing lock cases with no split spindle functionality. Hence, the present adapter may, together with such lock case without split spindle, replace spilt spindle lock cases for improving the reliability of the door lock thus always allowing persons on the inside of the locked door to exit the door.

[0031] In an alternative embodiment the adapter may include an indicator (not shown) which is configured to indicate an active and/or inactive state of the adapter. The active state is when the components of the adapter are able to interact with each other so that locked door opens if the handle on one side is pressed down. The indicator is preferably an electrical indicator which indicates the active and/or inactive state with light, sound or movement. In an alternative embodiment it could be a mechanical indicator.

[0032] It should be appreciated that even though nu-

merous characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and function of the invention, the description is only illustrative and changes may be made in detail, especially in matters of shape, size and arrangement of parts within the scope of the invention to the full extent indicated by the appended claims.

Claims

1. An adapter for a lock case, comprising
a handle bushing (42) to be connected to a handle (80) and arranged to be rotated about a first axis (A) when the handle (80) is pushed down or pulled up for moving a latch bolt in and out from said lock case,
a lock bushing (45) to be connected to a lock follower extending through said lock case and arranged to rotate about a second axis (B) for moving a lock bolt (81) in and out from said lock case, and
a transmission (50) connecting said handle bushing (42) with said lock bushing (45) such that the lock bushing (45) is arranged to rotate in a first direction when the handle bushing (42) is rotated in a second direction being opposite said first direction.

2. The adapter according to claim 1, wherein the adapter (10) is adapted to be arranged on one side of a door, between a door leaf (70) and the door handle (80), wherein said lock case is inserted into a recess of said door.

3. The adapter according to claim 2, wherein the adapter (10) is adapted to be detachable from said door.

4. The adapter according to any one of the claims 1-3, wherein the transmission (50) comprises a handle lever (51) connected to the handle bushing (42), and a lock lever (58) which is connected to the lock bushing (45) and which is in constant contact with the handle lever (51) such that the lock lever (58) always rotates with the handle lever (51).

5. The adapter according to claim 4, wherein the handle lever (51) is biased such that it automatically returns to an idle state, corresponding to a horizontally aligned position of the door handle (80), when a force for pushing down the door handle (80) has been released.

5. The adapter according to claim 4 or 5, wherein the handle lever (51) is arranged to push on the lock lever (58) as it rotates with the handle bushing (42) about the first axis (A), affecting the lock lever (58) and the lock follower to rotate about the second axis (B).

6. The adapter according to any one of the claims 1-6, further comprising a casing (20) including a cover portion (21) and a support portion (24) which are connected by fastening means (27a-d).

7. The adapter according to claim 7, wherein the support portion (24) comprises a track (31) in which the lock lever (58) is guided when it rotates about the second axis (B).

8. The adapter according to any one of the preceding claims, further comprising an indicator configured to indicate an active and/or inactive state of said adapter.

9. The adapter according to claim 8, wherein the indicator is an electrical indicator.

10. A door lock assembly for mounting to a door leaf, comprising
a lock case including a latch bolt to be operated by at least one door handle (80) connected to a door handle follower of said lock case,
a lock bolt (81) in connection with a lock follower (not shown) of said lock case, and
an adapter according to any of the preceding claims connected to said lock case.

11. A door comprising a door lock assembly according to claim 10.

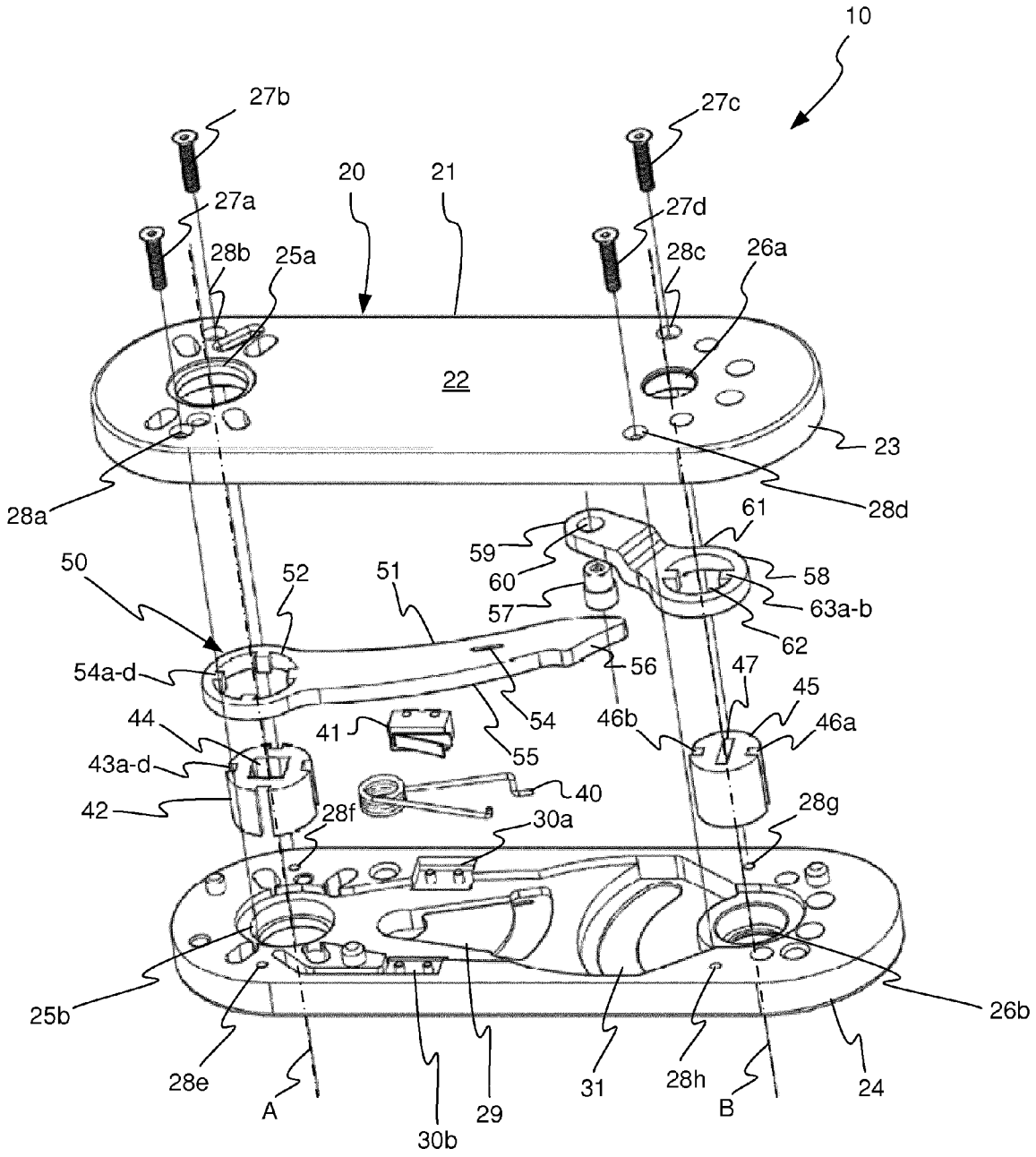
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Fig. 1

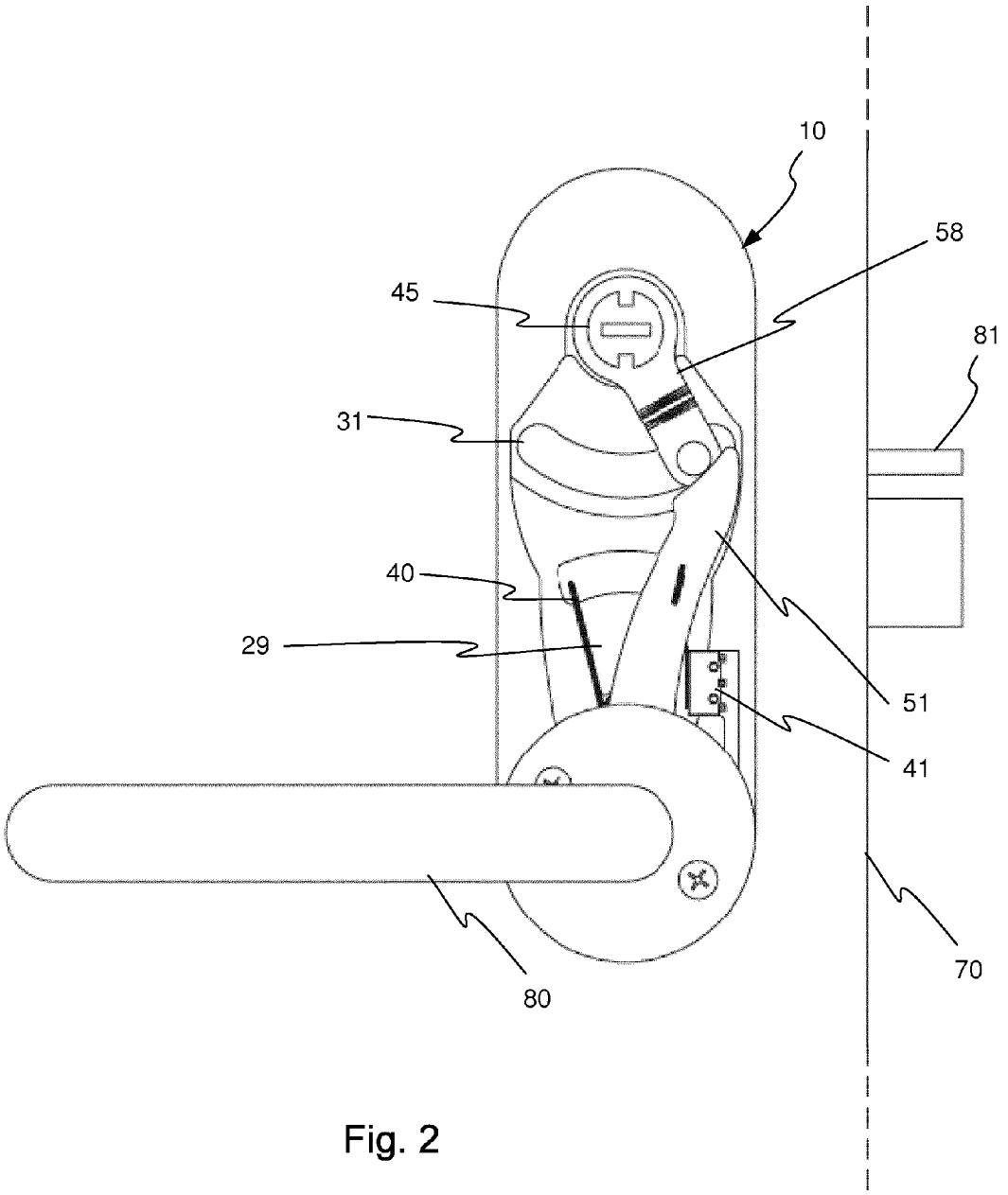

Fig. 2

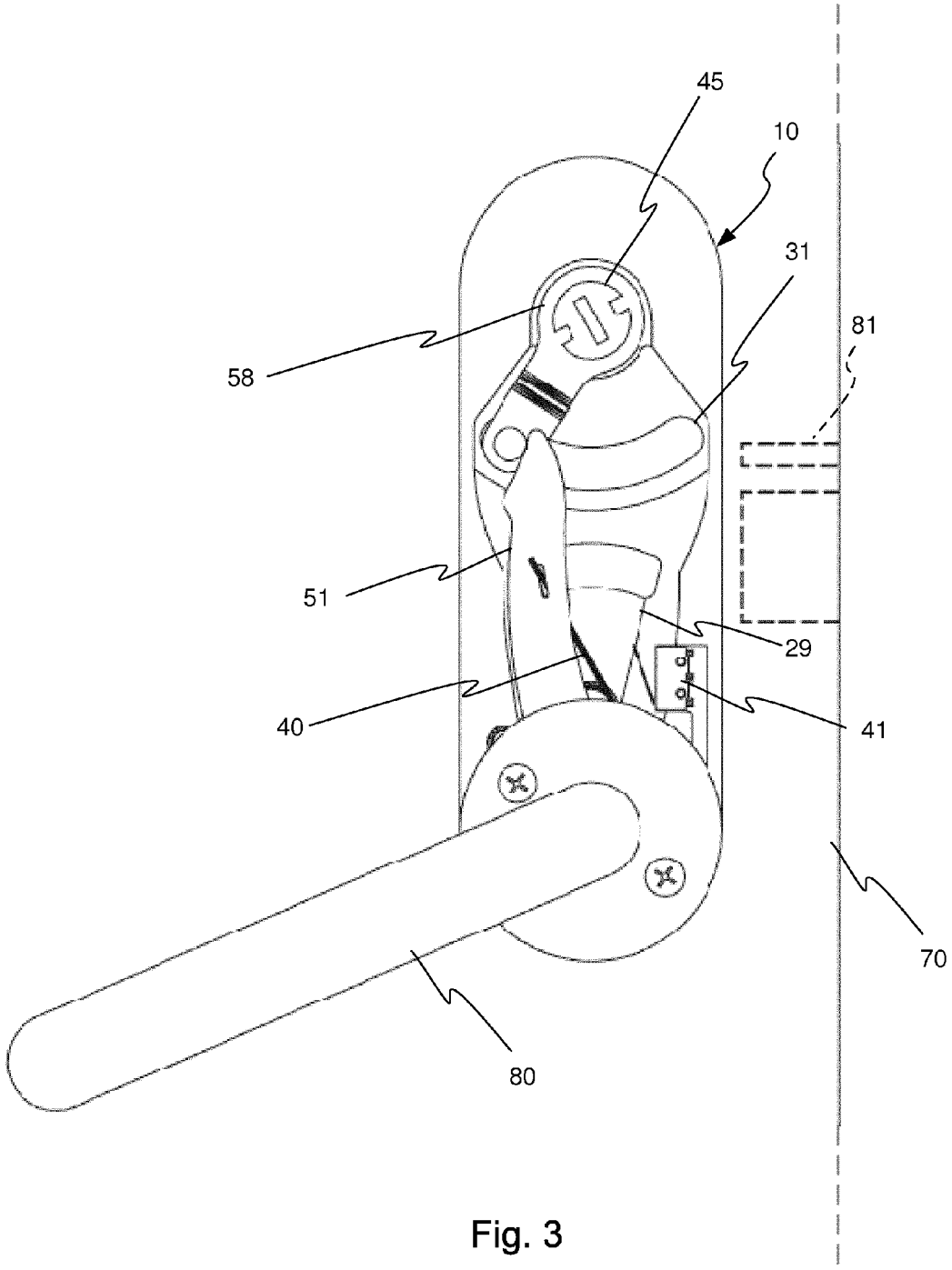

Fig. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 13 17 7440

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	US 2004/107747 A1 (CHANG SHIH-CHUNG [TW]) 10 June 2004 (2004-06-10) * paragraph [0015] - paragraph [0023]; figures 1-4 *	1-3,11, 12	TECHNICAL FIELDS SEARCHED (IPC) E05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	10 February 2014	Pérez Méndez, José F

CATEGORY OF CITED DOCUMENTS

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