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(54) COMPRESSION LOCK WITH TWO CLOSING POINTS

(57) A lock adapted to close, by compression, a door, tailgate, hatch, on two or more mutually distant closing points, by actuating a single handle.

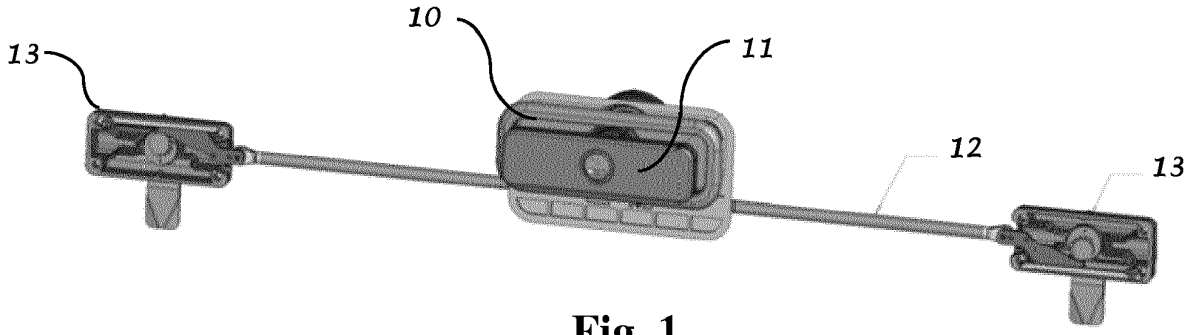

Fig. 1

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to the field of closures and safety locks for doors and hatches; in greater detail, the present invention relates to the technical field of compression locks for doors, tailgates and hatches - in particular for motor vehicles, such as vans, caravans, camper vans and the like - provided with two or more distanced closing points.

BACKGROUND ART

[0002] Locks of the compression type are particularly used in the fields of doors, tailgates and hatches installed on motor vehicles, such as vans, caravan, camper vans etc. Compression locks offer quick and secure closing where a certain resistance to vibrations is required and where seals are present.

[0003] However, in the case of doors with multiple closing points, the use of compression locks requires positioning a handle block at each closing point, to the detriment of simplicity and cost-effectiveness of the construction and of practicality of use.

[0004] The present invention thus describes a lock which is adapted to close, by compressing it, a door, a tailgate, a hatch, on two or more mutually distant closing points, by actuating only one handle.

[0005] Therefore, by using the present invention it is not necessary to arrange an external handle at each closing point of the door.

[0006] Further objects, features and advantages of the present invention will become more apparent from the following detailed description provided by way of non-imitative example and shown in the accompanying drawings, in which:

Fig. 1 shows a perspective view of a preferred embodiment of the present invention comprising two rods and two closing blocks;
Fig. 2 shows a preferred embodiment of the present invention in a first operating position;
Fig. 3 shows a preferred embodiment of the present invention in a second operating position;
Fig. 4 shows a preferred embodiment of the present invention in a third operating position;
Fig. 5 shows a section view of the closing block of a preferred embodiment of the present invention in a first operating position;
Fig. 6 shows a section view of the closing block of a preferred embodiment of the present invention in a second operating position;
Fig. 7 shows a section view of the closing block of a preferred embodiment of the present invention in a third operating position;
Fig. 8 shows an exploded view of the closing block of a preferred embodiment of the present invention;
Fig. 9 shows an exploded view of the handle block of a preferred embodiment of the present invention;
Fig. 10 shows a section view of the handle block of a preferred embodiment of the present invention;
Fig. 11 shows an exploded view of the handle block of a preferred embodiment of the present invention;
Fig. 12 shows a top view of the handle block of a preferred embodiment of the present invention; and
Fig. 13 shows a section view of the handle block of a preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0007] With reference to the accompanying drawings, a preferred embodiment of the present invention comprises:

- a single handle block 10 adapted to be fixed to a door 15, said handle block 10 comprising
- a handle 11 associated with a mechanism adapted to transform the rotational motion of said handle 11 into a plurality of translational or linear motions according to methods widely known in the prior art;
- a plurality of rods 12 adapted to transmit said translational motions at a distance, each of said rods 12 being associated, at a first end, with said mechanism;
- a plurality of closing blocks 13 adapted to be fixed to said door 15 and each associated with a second end of a rod 12 of said plurality of rods 12, said closing blocks 13 comprising reversible engagement means with the frame 14 of said door 15 which can be actuated by means of said rods 12.

[0008] The preferably "T"-shaped handle 11 of the device according to the present invention may be provided with a travel stop device and may comprise a cylinder lock adapted to control a stop sliding door bolt adapted to engage a specific housing on said handle block 10 in closing position.

[0009] In a preferred embodiment of the present invention, said closing blocks 13 are of the compression type and said reversible engagement means comprise a door bolt 16 adapted to rotate, so as to promote the engagement with the frame 14 of said door 15, and to translate in axial direction, orthogonal to the plane of the door 15, to achieve the successive fastening of the door 15.

[0010] In another preferred embodiment of the present invention, shown in the accompanying figures 1 - 4, there are two of said rods 12 and said closing blocks 13. The mechanism of the handle block 10 is thus adapted to transform the rotational motion of said handle 11 into two translational motions having opposite directions, transmitted by said rods 12. The handle block 10 is centrally arranged with respect to the height of the door 15, near the long side of the door 15 itself. The two closing blocks 13 are placed on opposite sides with respect to the handle block 10. The rods 12 are arranged parallel to the long

side of the door 15.

[0011] In lieu of said rods 12, belts or pulling cables can be advantageously employed to perform the same action of the rods 12 described herein: transforming the rotating movement of said handle 11 to a plurality of translational or linear movements, still according to methods widely known in the prior art.

[0012] In another preferred embodiment of the present invention, the handle block 10 comprises reversible engagement means with the frame 14 of said door 15. Said reversible engagement means preferably comprise a door bolt 26 adapted to rotate to engage the frame 14 of said door 15 and adapted to shift in axial direction, perpendicular to the surface of the door 15, to complete the closing of the door 15.

[0013] More in detail and with reference to accompanying figures 2, 3 and 4, the rotation of the handle 11 actuates the mechanism inside the handle block 10, fixed to a first end of the two rods 12, which pushes the two rods 12 to translate in opposite directions so as to act, by means of their second end, on the sliding door bolt of the two closing blocks 13. The action of the second end of the rods 12 rotates the sliding door bolt of the two closing blocks 13 firstly to promote the engagement with the frame 14 of said door 15 and then translate axially to press the door 15 onto its frame 14 and fasten the door 15 itself.

[0014] In greater detail and with reference to accompanying figure 2, when the door 15 is open, the handle 11 is in resting position and, correspondingly, no action is applied onto the rods 12 and onto the door bolts 16 of the two closing blocks 13, door bolts 16 which are in position substantially parallel to said rods 12 and to the long edge of the door 15, and such to not interfere with the frame 14 of the door 15. In this position, the door bolt 16 has a distance A from the plane of the door 15 on which the two closing blocks 13 are fixed.

[0015] With reference to accompanying figure 3, the handle 11 rotates the door bolt 16 when it is actuated and its rotation starts. When the handle has performed approximately half of the available rotation, the door bolt 16 is in position substantially orthogonal to said rods 12 and to the long edge of the door 15, and thus such to interfere with the frame 14 of the door 15. In this position, the door bolt 16 still has a distance A from the plane of the door 15 onto which the two closing blocks 13 are fixed.

[0016] At this point, with reference to accompanying figure 4, a further rotation of the handle 11 to the end of travel does not apply further rotations to the door bolt 16, instead it applies an axial translation, orthogonal with respect to the plane of the door 15, such to reduce the distance between the door bolt 16 itself and the plane of the door 15 on which the two closing blocks 13 are fixed. This axial translation is adapted to progressively compress the door 15 onto its frame 14, guaranteeing the right squeezing of any seals placed on the edge of the door 15 or of the frame 14 and achieving the fastening of the door.

[0017] The mechanism inside the closing block 13 may be provided according to the following preferred embodiment, shown in accompanying figures 5, 6 and 7.

[0018] Said mechanism comprises a shaft 19 having the rotation axis 20 substantially orthogonal to the plane of the door 15, and connected to said door bolt 16 by one end and to a toothed wheel 17, eccentric with respect to the axis of said shaft 19 and adapted to engage a rack 18 connected, in turn, to said second end of the rod 12, by the other end.

[0019] Therefore, the rotation of the handle 11 acts on the rod 12, which, in turn, actuates the rack 18, which, rotates the shaft 19 and thus the door bolt 16 by engaging the toothed wheel 17.

[0020] The mechanism comprising the toothed wheel 17 and the rack 18 is such as to allow to minimize dimensions and to modulate the torque and rotation speed of the guiding shaft 19 of the door bolt 16.

[0021] In a preferred embodiment of the present invention, said toothed wheel is eccentric with respect to the axis 20 of said shaft 19 and, correspondingly, the rack 18 is oblique with respect to its direction of displacement, which is parallel to the rod 12, to the second end of which said rack 18 is integrally connected.

[0022] With reference to accompanying figures 2 and 5, when the door 15 is open, the handle 11 is in resting position and, correspondingly, no action is performed on the rods 12 or on the door bolts 16 of the closing blocks 13. The door bolts 16 are in position substantially parallel to said rods 12 and the long edge of the door 15, and thus such to interfere with the frame 14 of the door 15. In this position, the door bolt 16 has a distance A from the plane of the door 15 on which the two closing blocks 13 are fixed. Correspondingly, the gear inside the closing blocks 13 is such that the toothed wheel 17 meshes at the tooth having the minimum distance from the axis of the shaft 19 with the initial part of the rack 18, closest to said second end of the rod 12 and closest to the axis 20 of the shaft 19. During this first rotation step, the rack 18 works near the axis of the shaft producing high speed and low torque.

[0023] Continuing the rotation of the handle 11, as shown in accompanying figure 6, the distance between the action point of the rack 18 on the profile of the toothed wheel 17 and the rotation axis 20 of the shaft 19 progressively increases, producing a reduction of the speed and a corresponding increase of the torque.

[0024] Finally, when the handle approaches its end of travel, the action point of the rack 18 on the profile of the toothed wheel 17 occurs at the points which are the most distant from the axis 20, the speed transmitted to the shaft 19 is the lowest and the torque is the highest.

[0025] As a result, as the handle 11 approaches it end of travel, the door bolt 16 reaches its fastening position, substantially perpendicular to the long side of the door 15 and, then, the shaft 19 starts moving, dragging the door bolt 16, which may thus complete the fastening of the door 15 by compressing the seal placed on the edge

of the door 15 or of the frame 14.

[0026] With reference to accompanying Fig. 8, a preferred embodiment of the closing block 13 according to the present invention comprises a so-called screwlock 21. Said screwlock 21 is associated with said shaft 19 - connected, in turn, to said door bolt 16 by a first end - and with said toothed wheel 17, eccentric with respect to the axis of said shaft 19, by a second end.

[0027] The screwlock 21 is adapted to guide the shaft 19 therein, in a rotational and axially translatable manner, by means of a pin 22 adapted to engage both said shaft 19 and a guide 23 present on said screwlock 21. The screwlock 21 further comprises, in turn, an adjustment bushing 24 adapted to cooperate with said pin 22 and with said guide 23 so as to allow said screwlock 21 to rotate relatively to said shaft 19, while said shaft 19 translates axially.

[0028] In a further preferred embodiment of the present invention and with reference to enclosed Figures 9 - 13, the handle block 10 comprises a mechanism similar to the one employed in the closing blocks 13 described above. Said mechanism comprises a screwlock 27 associated by a first end to the shaft 28 - connected, in turn, to a door bolt 26 - and by a second end to a first toothed wheel 29 and to a second toothed wheel 30.

[0029] The screwlock 27 is adapted to guide the shaft 28 therein, in a rotational and axially translatable manner, by means of a pin 33 adapted to engage both said shaft 28 and a guide 34 present on said screwlock 27. The screwlock 27 further comprises, in turn, an adjustment bushing 35 adapted to cooperate with said pin 33 and with said guide 34 so as to allow said screwlock 27 to rotate relatively to said shaft 28, while said shaft 28 translates axially.

[0030] The first toothed wheel 29 is adapted to engage with a pair of racks 31, 32, each connected to one end of said rods 12. The second toothed wheel 30 is adapted to engage with a further toothed wheel 25 associated with the handle 11 of said handle block 10 in a way to allow the transmission of rotation from the handle 11 to the shaft 28.

[0031] Therefore, through the cooperation between the toothed wheels 25 and 30, the handle 11 transmits a rotational movement to the shaft 28 adapted to move the rods 12 and the door bolt 26 according to the operation described above with regards to the closing block 13 wherein the door bolt 26 rotates and then translates axially in a way to complete the fastening of the door 15 by compressing the seal placed on the edge of the door 15 or of the frame 14.

[0032] The handle 11 being connected to the shaft 28 through a pair of toothed wheels 25, 30, allows designing the gear ratio of said pair of toothed wheels 25, 30 in order to suitably choose the force required to a user to operate the handle and fasten the door.

[0033] Furthermore, the pair of toothed wheels 25, 30 can be chosen with a toothed profile adapted to engage correctly within a certain range of distances between the handle 11 and said handle block 10, thus allowing adapting the lock according to the present invention to doors of various thickness.

[0034] The description of the preferred embodiments of the invention above makes reference to the accompanying drawings. The same reference numbers in the various figures identify the same or similar elements. The detailed description given above does not limit the scope of the disclosed invention because the scope of protection of the present invention is defined by the accompanying claims.

Claims

1. A lock comprising:

. a handle block (10) adapted to be integrally fixed to a door (15), said handle block (10) comprising
. a handle (11) associated with
. a mechanism adapted to transform the rotational motion of said handle (11) into a plurality of translational motions;
. a plurality of rods (12) adapted to transmit said translational motions at a distance, each of said rods (12) being associated, at a first end, with said mechanism;
. a plurality of closing blocks (13) adapted to be fixed to said door (15) and each associated with a second end of a rod (12) of said plurality of rods (12), said closing blocks (13) comprising reversible engagement means with the frame (14) of said door (15) which can be actuated by means of said rods (12).

2. A lock according to claim 1, **characterized in that** said closing blocks (13) are of the compression type.

3. A lock according to one or more of the preceding claims from 1 to 2, **characterized in that** said reversible engagement means comprise a door bolt (16) adapted to rotate, so as to promote the engagement of said door (15) with the frame (14) and to translate in axial direction to then fasten of the door (15).

4. A lock according to one or more of the preceding claims from 1 to 3, **characterized in that** said closing blocks (13) each comprise a shaft (19) having the rotation axis (20) substantially orthogonal to the plane of the door (15), and connected by an end to said door bolt (16) and by the other end to a toothed wheel (17), eccentric with respect to the axis of said shaft (19) and adapted to engage a rack (18) connected, in turn, to said second end of the rod (12).

5. A lock according to claim 4, **characterized in that**

said toothed wheel (17) is eccentric with respect to the axis (20) of said shaft (19) and, correspondingly, the toothed profile of said rack (18) is oblique with respect to the direction of displacement of said rack (18) which is parallel to the rod (12), to the second end of which said rack (18) is integrally connected.

6. A lock according to one or more of the claims from 4 to 5, **characterized in that** said toothed wheel (17) is adapted to engage said rack (18) between a first limit position and a second limit position: said first limit position, in which said toothed wheel (17) meshes, at its tooth having the minimum distance from the axis of the shaft (19), with the initial part of said rack (18) having the minimum distance from the axis (20) of the shaft (19); said second limit position, in which said toothed wheel (17) meshes, at its tooth having the maximum distance from the axis of the shaft (19), with the final part of said rack (18) having the maximum distance from the axis (20) of the shaft (19).

7. A lock according to one or more of the claims from 1 to 6, **characterized in that** said closing blocks (13) each comprise a screwlock (21) associated with said shaft (19) - connected in turn to said door bolt (16) - by a first end and with said toothed wheel (17), eccentric with respect to the axis of said shaft (19), by a second end.

8. A lock according to claim 7, **characterized in that** said screwlock (21) is adapted to guide the shaft (19) therein, in a rotational and axially translatable manner, by means of a pin (22) adapted to engage both said shaft (19) and said guide (23) present on said screwlock (21), said screwlock (21) further comprising an adjustment bushing (24) adapted to cooperate with said pin (22) and with said guide (23) so as to allow said screwlock (21) to rotate relatively to said shaft (19), while said shaft (19) translates axially.

9. A lock according to one or more of the claims from 1 to 8, **characterized in that** said handle block (10) comprises a door bolt (26) adapted to rotate, so as to promote the engagement of said door (15) with the frame (14) and to translate in axial direction to then fasten of the door (15).

10. A lock according to one or more of the claims from 1 to 9, **characterized in that** said handle block (10) comprises a shaft (28) having the rotation axis substantially orthogonal to the plane of the door (15), and connected by a first end to said door bolt (26) and by a second end to a first toothed wheel (29), adapted to engage a rack (31, 32) connected, in turn, to said second end of the rod (12).

11. A lock according to claim 10, **characterized in that** said shaft (28) is connected by said second end to a second toothed wheel (30), coaxial to said first toothed wheel (29), and said handle block (10) comprises a further toothed wheel (25) associated to said handle (11) and adapted to engage with said second toothed wheel (30) to transmit rotating motion from the handle (11) to the shaft (28).

12. A lock according to one or more of the claims from 10 to 11, **characterized in that** said handle block (10) comprises a screwlock (27) associated by a first end to said shaft (28), connected, in turn, to said door bolt (26), and by a second end to said first toothed wheel (29) and second toothed wheel (30), said screwlock (27) being adapted to guide the shaft (28) therein, in a rotational and axially translatable manner, by means of a pin (33) adapted to engage both said shaft (28) and a guide (34) present on said screwlock (27), said screwlock (27) further comprising an adjustment bushing (35) adapted to cooperate with said pin (33) and with said guide (34) so as to allow said screwlock (27) to rotate relatively to said shaft (28), while said shaft (28) translates axially.

13. A lock according to one or more of the claims from 11 to 12, **characterized in that** said second toothed wheel (30) and said further toothed wheel (25) comprise a toothed profile adapted to engage correctly within a certain range of distances between the handle (11) and the handle block (10), thus allowing adapting the lock to doors of various thickness.

14. A lock according to one or more of the claims from 1 to 13, **characterized in that** said handle (11) comprises a cylinder adapted to control a stop sliding door bolt adapted to engage, in closing position, a specific housing present on said handle block (10).

15. A door (15) **characterized in that** it comprises a lock according to one or more of the claims from 1 to 14.

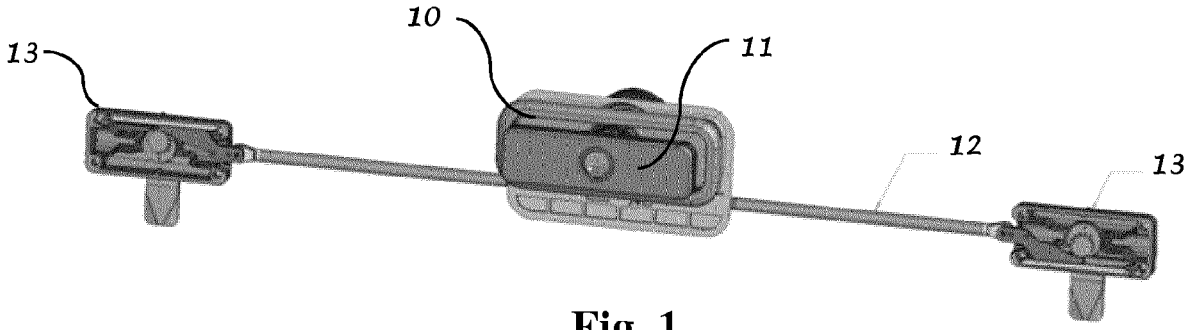
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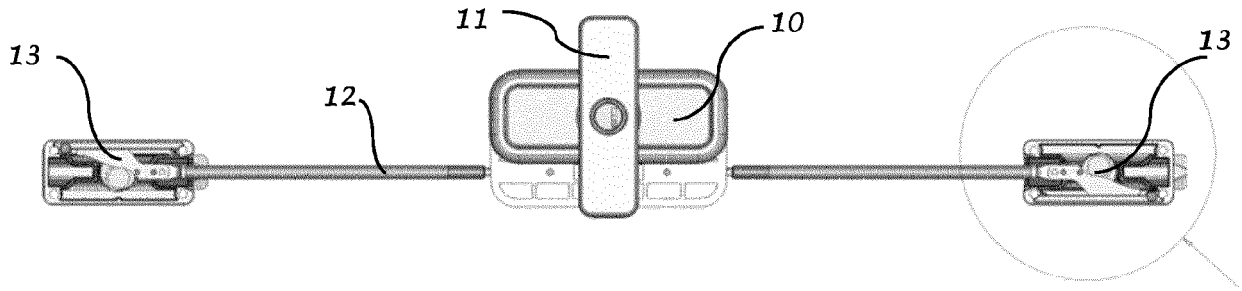
Fig. 1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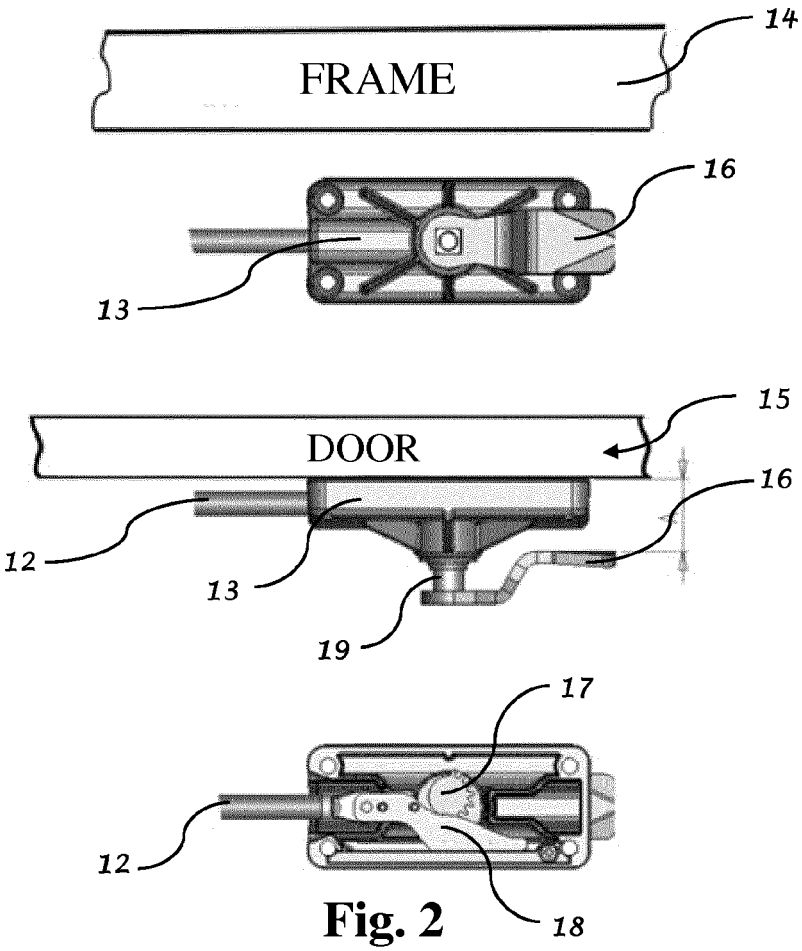
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Fig. 2

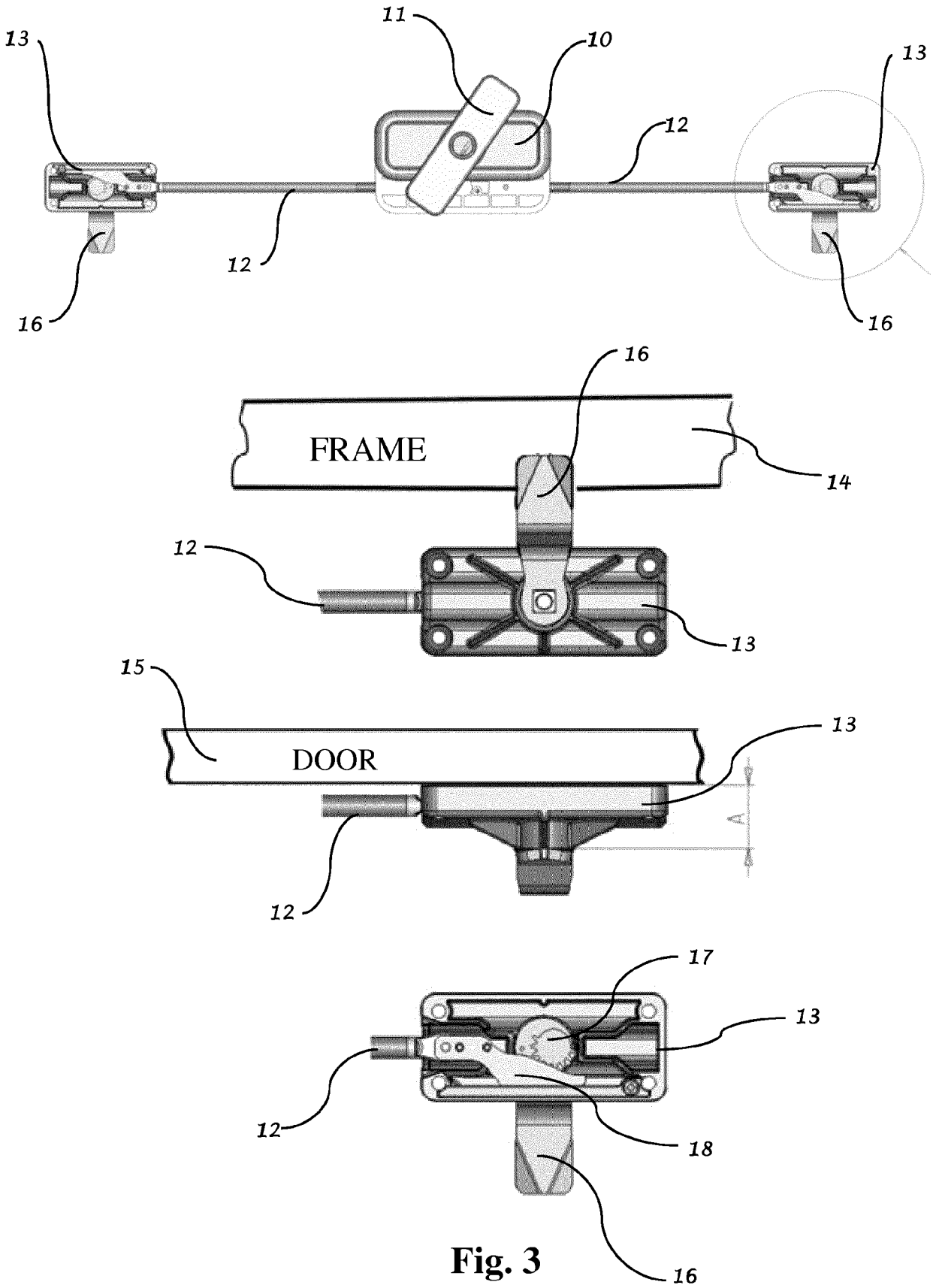

Fig. 3

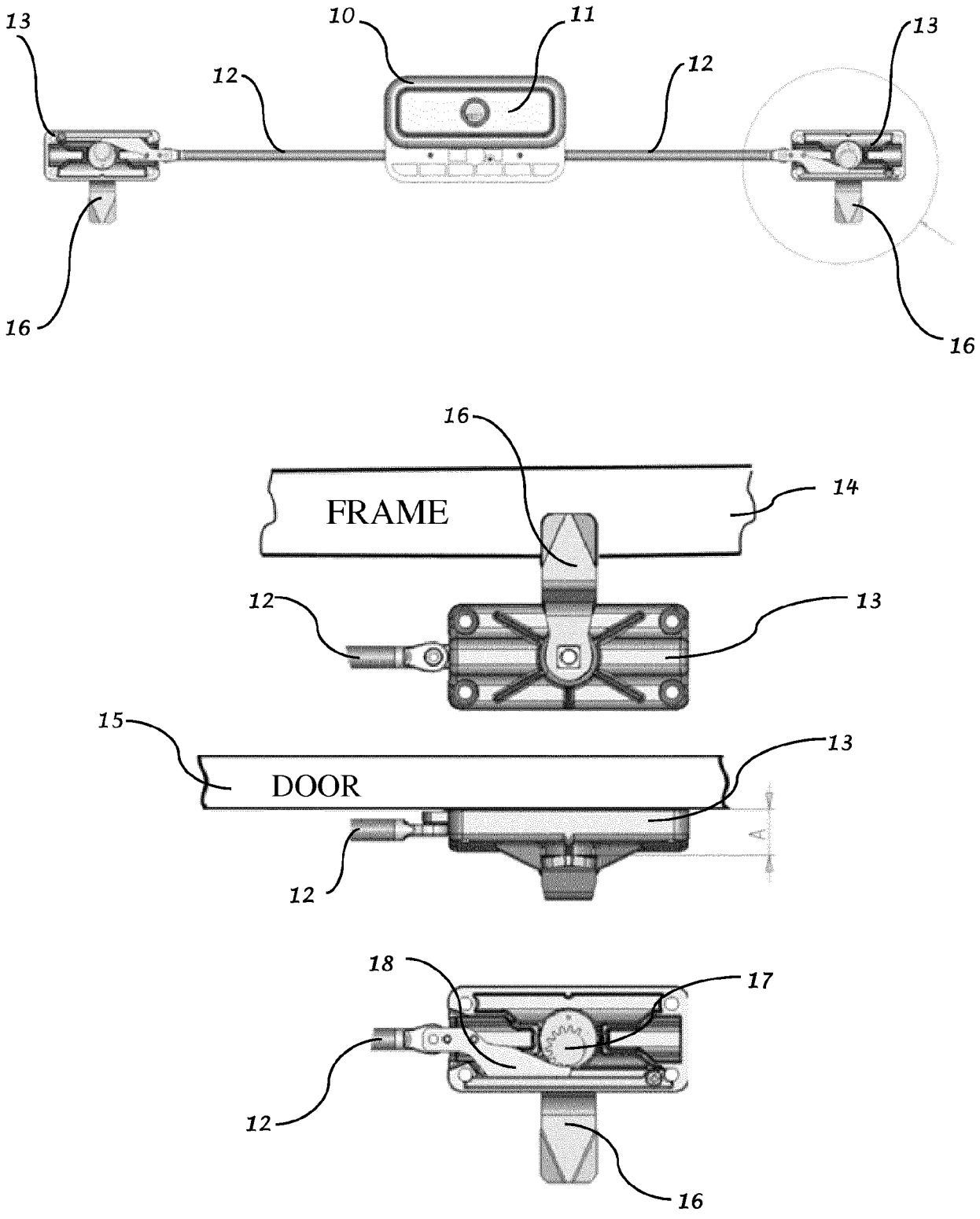

Fig. 4

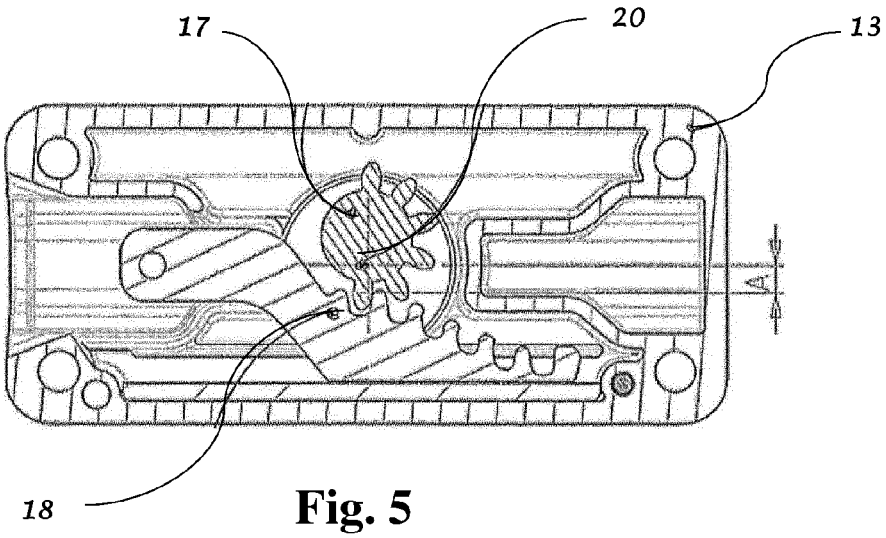

Fig. 5

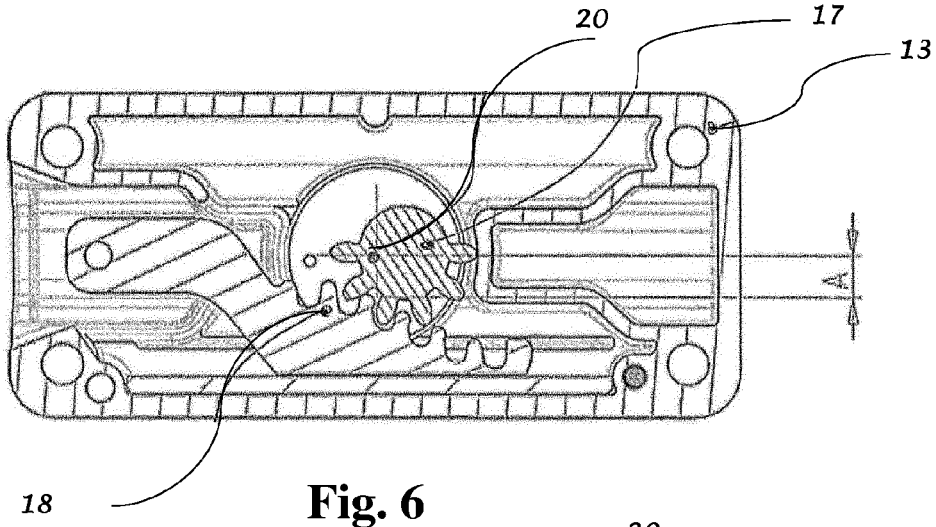

Fig. 6

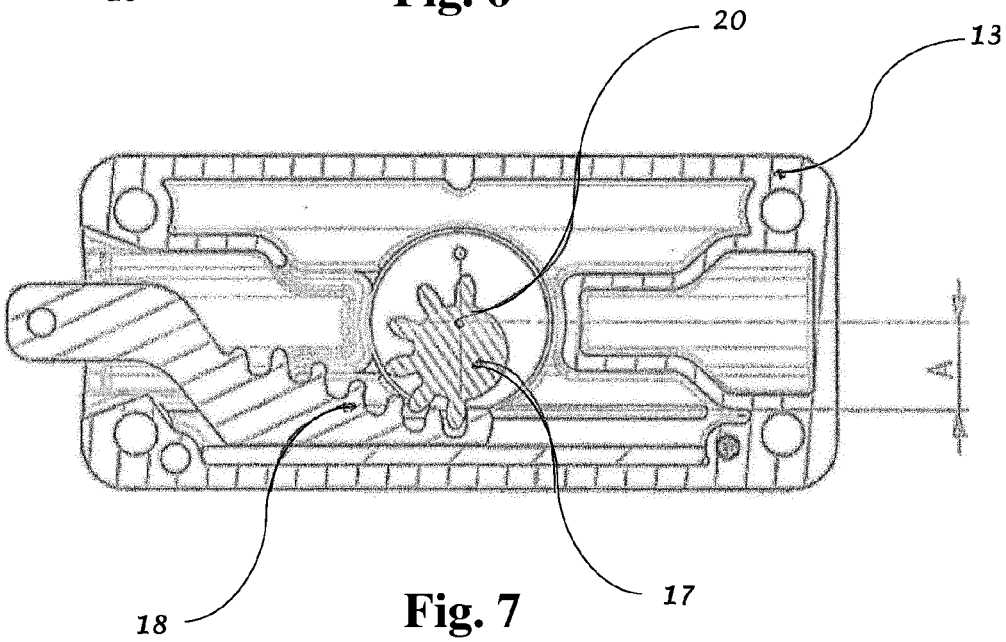

Fig. 7

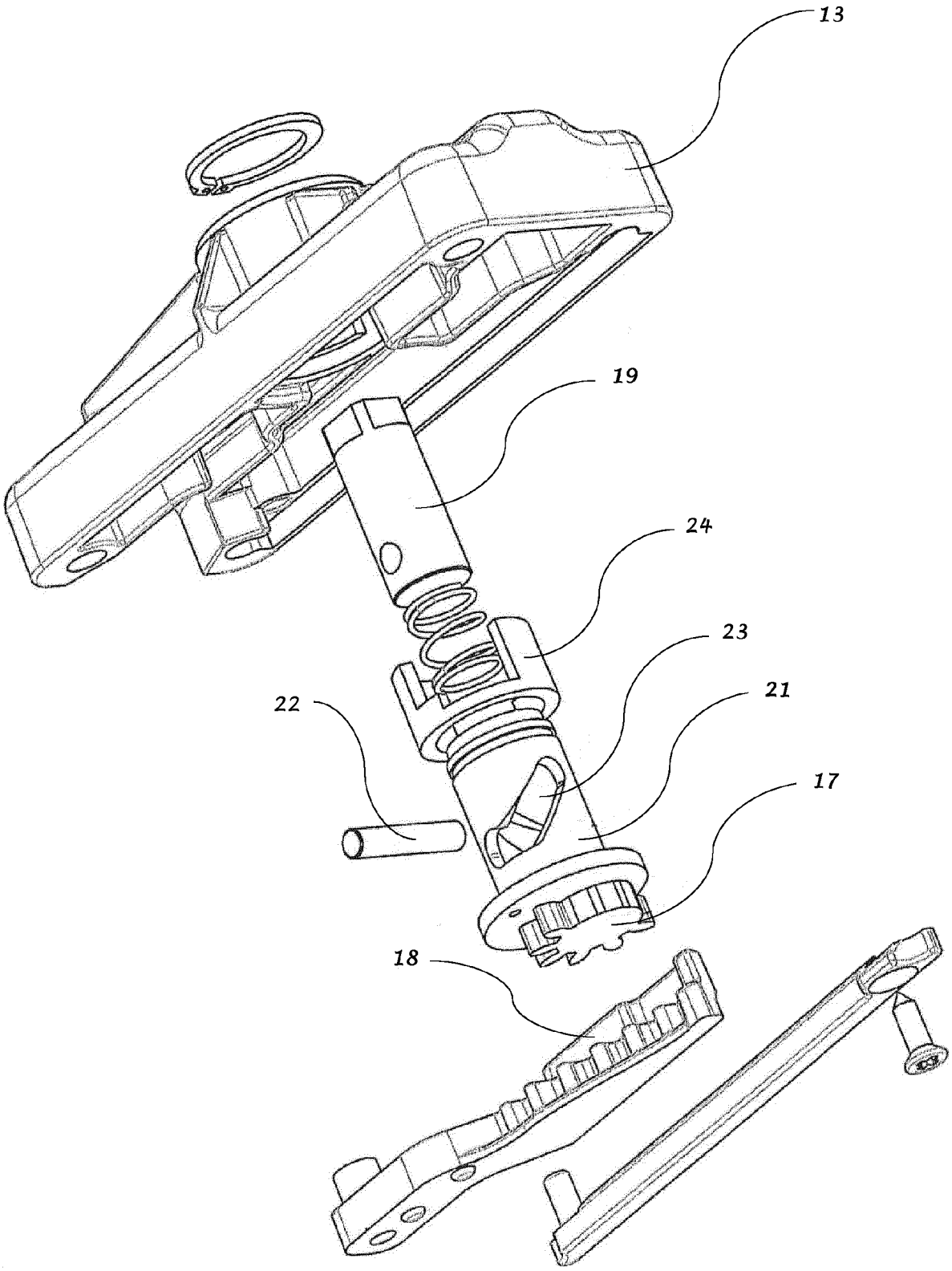

Fig. 8

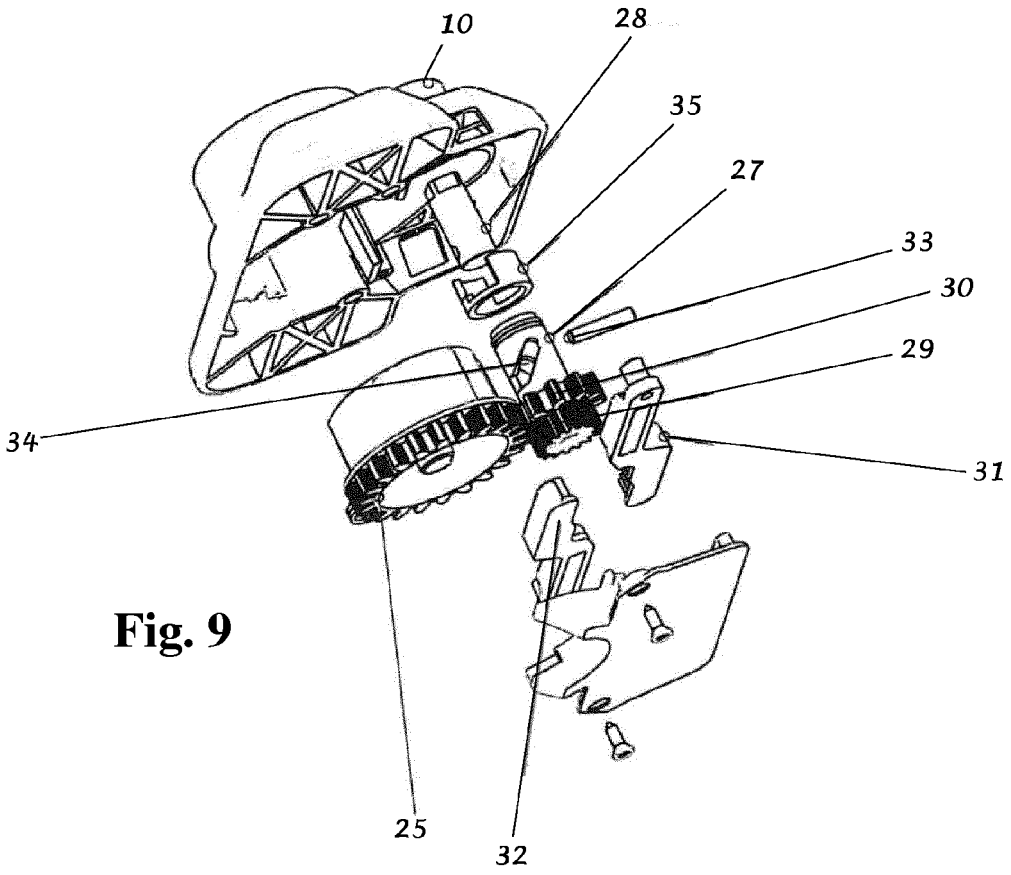

Fig. 9

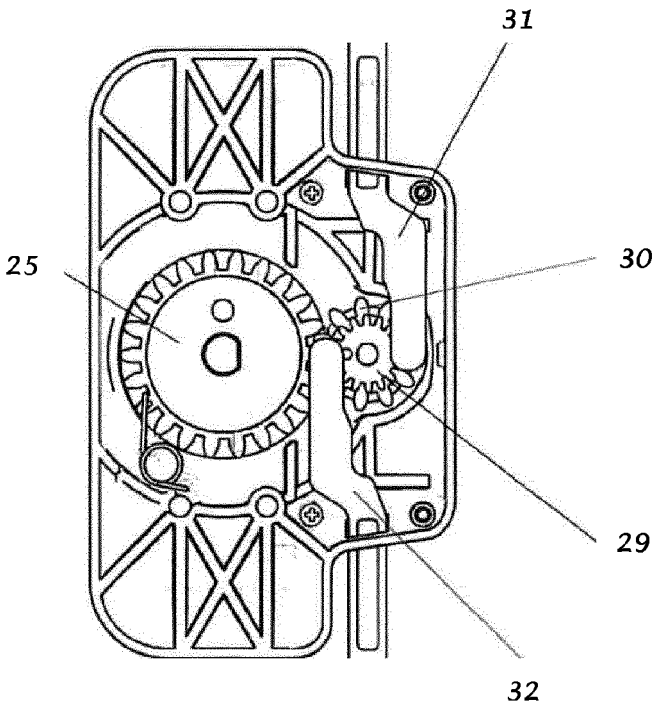

Fig. 10

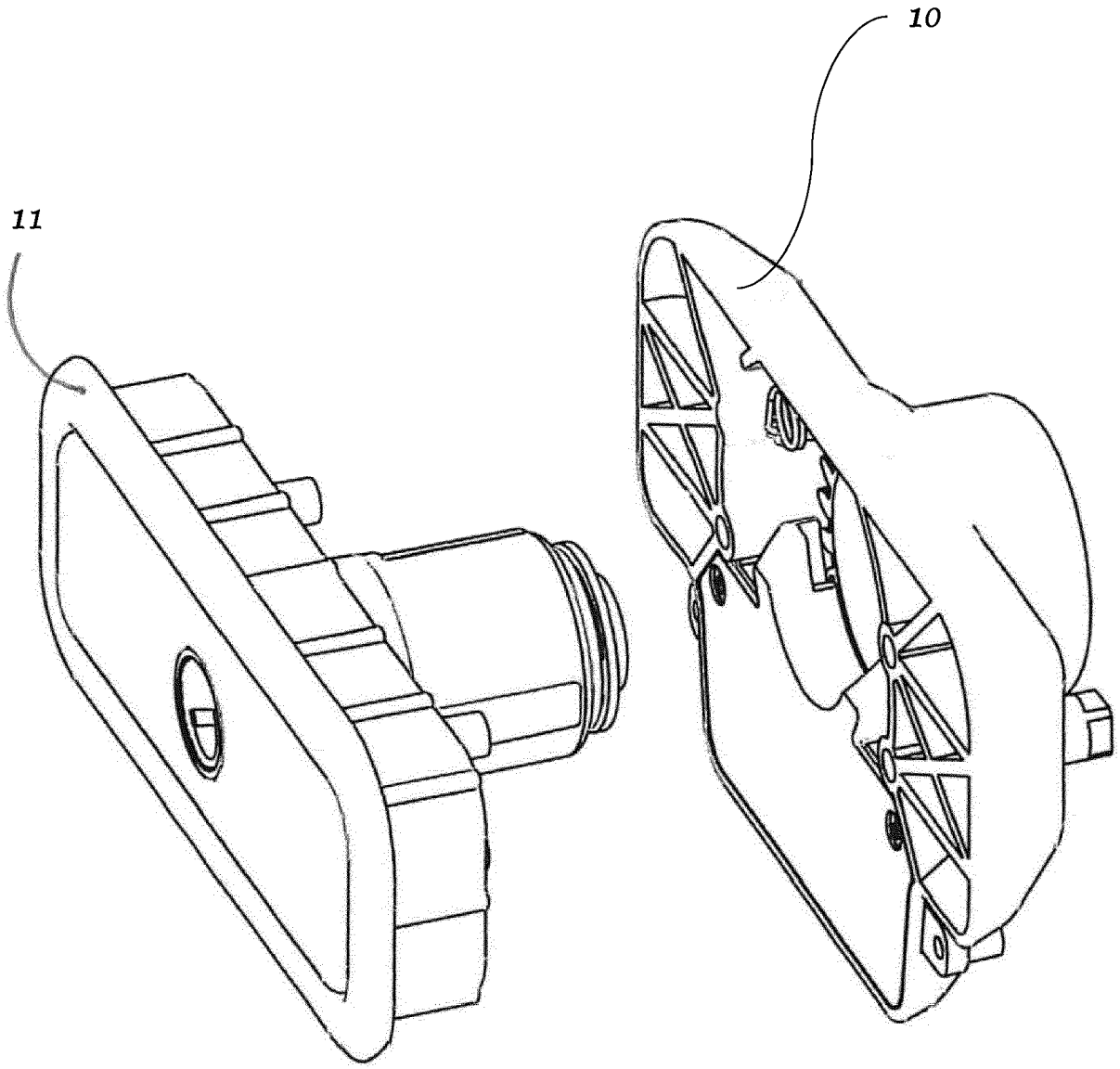

Fig. 11

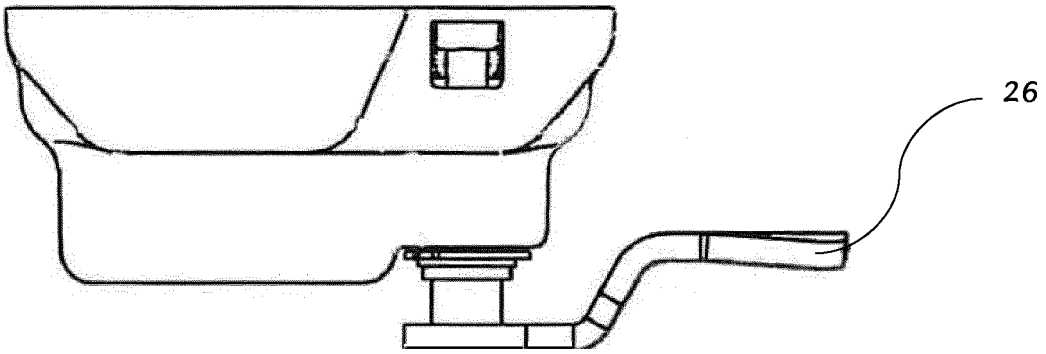

Fig. 12

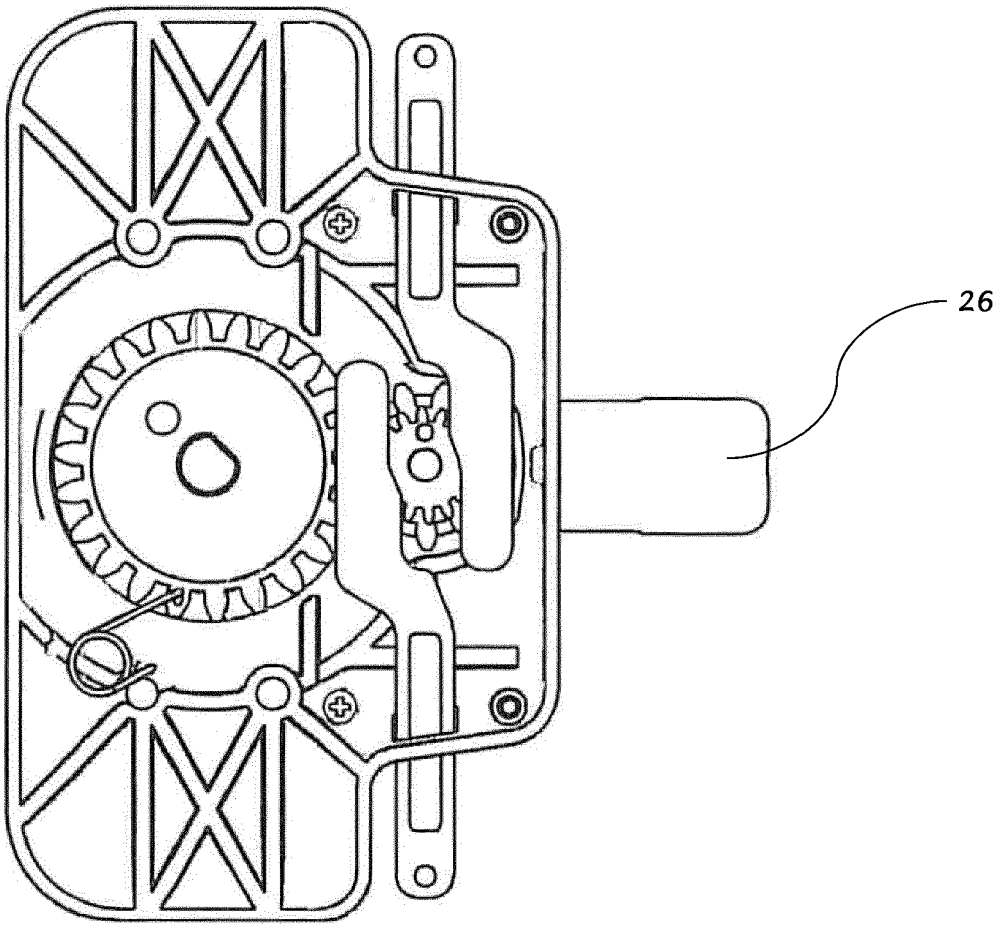

Fig. 13

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EUROPEAN SEARCH REPORT

Application Number
EP 17 18 7722

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	FR 2 937 363 A1 (RONIS [FR]) 23 April 2010 (2010-04-23)	1-3,7-15	INV. E05C5/02
A	* the whole document *	4-6	E05C9/04 E05C9/18
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A	* the whole document *	5,6	ADD. E05C9/12
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X	DE 20 2007 007076 U1 (DIRAK DIETER RAMSAUER GMBH & C [DE]) 18 September 2008 (2008-09-18) * paragraph [0056] - paragraph [0065]; figures 4-5 *	1-3,7-15	
X	WO 2004/101364 A2 (ROAHAN RAMESH [IN]) 25 November 2004 (2004-11-25) * the whole document *	1-3,7-15	
A	DE 198 14 297 A1 (ROBERT WAGNER GMBH & CO KG [DE]) 7 October 1999 (1999-10-07) * the whole document *	1-3, 7-10,12	TECHNICAL FIELDS SEARCHED (IPC) E05B E05C
A	DE 20 2010 012699 U1 (EMKA BESCHLAGTEILE [DE]) 9 December 2010 (2010-12-09) * the whole document *	1,9,12	
A	EP 2 374 972 A2 (MACO TECHNOLOGIE GMBH [AT]) 12 October 2011 (2011-10-12) * figure 1 *	1,11	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	20 December 2017	Robelin, Fabrice

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
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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 17 18 7722

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
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20-12-2017

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