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(54) LOCK UNIT FOR DOORS AND WINDOWS

(57) Lock unit (1) suitable for doors or windows (6) drivable by an electric motor (M), wherein said lock system unit (1) comprises:
- a control member (2), able to couple with a lock cylinder (C) drivable by a key (K),
- a first drive unit (3) and a second drive unit (4) which engage with the control member (2) to be rotated around corresponding rotation axes (R_I, R_{II}),
- at least one of the first drive unit (3) and the second drive unit (4) being connected to a corresponding motion transmission element (TI, T2) movable along a projection/ retraction direction (D_I, D_{II}) with respect to a box-shaped body (5) of the lock unit (1), which is suitable for moving a corresponding bolt (7a, 7b) so as to engage the latter with, and disengage it from, a corresponding blocking seat provided on a wall or fixed subframe,
- wherein the first (3) and the second drive unit (4) are rotatable between a first angular position (AI), to which a retracted position of the corresponding motion transmission element/elements (T1, T2) corresponds, and a second angular position (A2), to which corresponds a projected position outside the corresponding motion transmission element/elements (TI, T2),
position indicating controlling means (W), configured to provide information on the position of the first (3) and/or second (4) drive unit 4 to prevent/enable the driving of the electric motor (M) thus preserving the drive unit 4 from a risk of damage resulting from operation under stress.

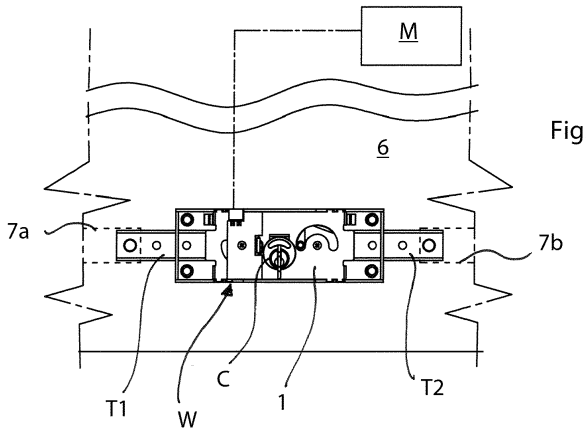

Fig. 1

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Description

BACKGROUND OF THE INVENTION

[0001] The present invention relates to a lock system unit for motor-driven closing elements in general, such as roller shutters, tilting doors and the like.

PRIOR ART

[0002] Current automatically driven roller shutters or tilting doors comprise an electric motor the function of which is to move the door or window from the lowered closed position to the raised opened position. Such motor-driven systems are necessary where the dimensions and the weight of the doors and windows are such as to make it impossible for the user to move the doors and window manually or they are also used only for the purpose of convenience and to avoid a manual effort for the user.

[0003] A lock of manual type is coupled with the shutter to lock the door or window with a key. This lock is connected to bolts that engage in corresponding seats obtained on the fixed subframe or on a wall zone, to prevent forced opening of the shutter.

[0004] The lock is provided with a cylinder rotatable by a suitable key, to move the bolts from the engaged position to the disengaged position and viceversa.

[0005] When locking of shutter is required, the user first acts on an opening selector unit, or on a remote control, to drive the electric motor that in this manner moves the shutter (or the tilting door, etc) to the lowered closed position. At this point, the user can use the key to rotate the cylinder of the lock to arrange the bolts in an extracted position so as to engage the bolts with the respective blocking seats.

[0006] When it is required again for the shutter to be opened again, the user has to, before starting the electric motor by the selector unit or the remote control, remember to act on the lock to retract the bolts. Otherwise, the user would subject the electric motor to a dangerous operating condition under stress with the risk of damaging the electric motor irreparably.

[0007] Unfortunately, it is not always easy to remember, in particular in animated or rushed situations, to check that the bolts have been first disengaged before driving the motor, especially whether the door or window is used by several users.

[0008] Numerous practical situations can thus exist in which the motor driven door or window, and in particular the lock disclosed above has drawbacks and limits to use.

[0009] Locks for doors or roller shutters are known from WO2006/122755, EP1249565, CN107503589 and EP1676968.

[0010] In the light of what has been disclosed above, there is ample room for improvement of current motor driven locks for doors and windows.

OBJECTS OF THE INVENTION

[0011] The object of the present invention is to improve the locks currently used for motor-driven doors and windows.

[0012] Another object of the present invention is to provide a new and different solution for a lock that is able to overcome the limits and drawbacks set out above.

[0013] In particular, one object is to provide a lock configured to eliminate the drawbacks inherent in currently known motor-driven systems; in particular, one object is to provide a solution that is able to avoid, in the step of opening of the door or window, the electric motor being subjected to stress because the bolts are forgotten in the engaged position.

[0014] In other words, one object is to provide a solution that, in addition to being constructionally and functionally simplified, frees the user from the annoying and not always easy task of having to ascertain the correct operational status of the lock before any driving of the electric motor.

SHORT DESCRIPTION OF THE OF THE INVENTION

[0015] The present invention thus aims to achieve the aforesaid objects and overcome the drawbacks of the conventional locks for doors and windows by a solution according to claim 1.

[0016] Owing to the invention, all the limits of prior art locks are overcome and the objects set out above are reached.

SHORT DESCRIPTION OF THE DRAWINGS

[0017] The invention, and some possible embodiments thereof, will be disclosed here below with reference to the attached drawings, in which:

Figure 1 is a schematic view of the lock unit system according to the invention fitted to a door, in particular on an electrically driven door or window, in which the lock unit is operationally connected to an electric motor for driving the door or window;

Figure Ibis is an exploded view of the lock unit according to the invention;

Figure 2 is a frontal view of the lock unit in an opening operating position;

Figure 3 is a side view of the lock unit;

Figure 4 is an enlargement of some inner drive components of the lock unit; Figures 5 and 6 are two other frontal views of the lock unit respectively in an open and in a closed position;

Figure 7 is an enlarged view that shows position indicating controlling means included in the lock unit;

Figures 8 to 11 are other perspective views of the lock unit of the invention according to different possible fitting configurations of the position indicating controlling means.

DETAILED DESCRIPTION OF THE INVENTION

[0018] With reference to the attached Figures, a lock unit 1 according to the invention is disclosed below that is suitable for being fitted to a door or window in general, such as an electric shutter, an electric tilting door etc, and other possible closing elements the opening/closing movement of which is performed automatically by an electric motor M.

[0019] The lock unit 1 is of the type comprising a cylinder C drivable by a corresponding key K.

[0020] In particular, the lock unit 1 comprises a control member 2 that is suitable for coupling with the cylinder C drivable by the key K so as to move one or two corresponding bolts 7a, 7b or latches, to be engaged with or disengaged from, a corresponding blocking seat provided on a wall or on a zone of the fixed subframe.

[0021] The cylinder C can be a European profile lock cylinder or a round lock cylinder or other desired key locking element. It is possible to size the control member 2 and/or other parts of the lock unit 1 according to the type of lock cylinder C or closing element that it is desired to adopt.

[0022] The lock unit 1 comprises a box-shaped body 5 that encloses the operating components.

[0023] The lock unit 1 comprises a first drive unit 3 and a second drive unit 4 configured to engage with the control member 2.

[0024] The first drive unit 3 and the second drive unit 4 are shaped like a cogwheel and comprise a corresponding toothing 30; the control member 2 is of the rotary type and comprises a further toothing 31 shaped to mesh with the aforesaid toothing 30, so as to be able to rotate the first 3 and second 4 drive unit around corresponding rotation axes R_I, R_{II}.

[0025] Both the first drive unit 3 and the second drive unit 4 (or just one thereof in the case of a configuration with just one bolt) is connected to a corresponding motion transmission element T1, T2 that is movable along a projection / retraction direction D_I, D_{II} with respect to the box-shaped body 5.

[0026] The rotation axes R_I, R_{II} are arranged orthogonally with respect to the projection/retraction direction D_I, D_{II}.

[0027] In the case of a shutter, or also of a tilting door, etc, the projection/retraction directions D_I, D_{II} are horizontal directions.

[0028] Fitting the present lock unit 1 for example to a gate, grille or the like of motor-driven type is not ruled out: in this case, the projection/retraction directions D_I, D_{II} are vertical directions.

[0029] Each motion transmission element T1, T2 is suitable for being connected to, and moving, a corresponding bolt 7a, 7b so as to engage the corresponding bolt 7a, 7b with, and disengage it from the corresponding blocking seat of the wall or fixed subframe.

[0030] In the attached figures an embodiment is shown of a lock unit 1 of central type, provided with both the T1, T2 motion transmission elements that are in turn each connectable to a corresponding bolt. The lock unit 1 of central type is then configured to establish, on opposite sides, two blocking points opposite the wall or fixed subframe.

[0031] According to another possible embodiment, it is possible to have the lock unit 1 of lateral type, i.e. with only one (right or left) motion transmission element T1, T2, to which a corresponding bolt, 7a or 7b is connectable according to need. In this case, the lock unit 1 of lateral type is configured to establish the position of locking to the wall or fixed subframe on only one right, or left side.

[0032] The first drive unit 3 and the second drive unit 4 are rotatable between a first angular position A1, to which a retracted position of the T1, T2 motion transmission elements corresponds, and a second angular position A2), to which a position corresponds that projects outside the T1, T2 motion transmission elements.

[0033] On an inner end of each motion transmission element T1, T2 a slot 32 is obtained, extending orthogonally to the aforesaid projection/retraction direction D_I, D_{II}. In the slots 32 corresponding driving protrusions 14 are engaged that are provided on the first drive unit 3 and on the second drive unit 4 respectively.

[0034] The protrusions 14 extend along directions parallel to the rotation axes R_I, R_{II} or, in an equivalent manner, along directions orthogonal to the aforesaid projection/retraction direction D_I, D_{II}.

[0035] The coupling between slots 32 and protrusions 14 enables a rotation of the drive units 3, 4 to be transformed into a linear movement of the T1, T2 motion transmission elements.

[0036] The reciprocal arrangement between the control member 2, drive units 3, 4 and the specific position of the protrusions 14 engaging in the slots 32, are such as to achieve, at a rotation of the cylinder C, then of the control member 2, a movement in opposite directions of the T1, T2 motion transmission elements and thus of the corresponding bolts 7a, 7b connected thereto.

[0037] The lock unit 1 is provided with position indicating controlling means W, configured to provide information on the position of the first drive unit 3 and/or of the second drive unit 4 to prevent/enable the driving of the electric motor M, thus preserving the latter from a risk of damage resulting from operation under stress.

[0038] The position indicating controlling means W, in general, comprises an "activatable" part 9 in a stationary position, and a movable "activator" element 8, fixed to a movable part of the lock unit 1 and configured to interact with the aforesaid "activatable" part 9. When the movable "activator" element 8 is positioned at the "activatable" part 9 a signal indicating the position or operating status of the lock unit 1 is generated. Precisely, the activatable part 9 and the "activator" element 8 are configured to interact without physical contact.

[0039] In the embodiment disclosed below with reference to the attached drawings, the position indicating controlling means comprises a magnetic switch unit W,

configured to enable/disable the operation of the electric motor M according to the position of the first drive unit 3 and/or of the second drive unit 4.

[0040] In particular, the magnetic switch unit W is configured to enable the operation of the electric motor M when the aforesaid first drive unit 3 and/or the aforesaid second drive unit 4 is in the first angular position A1.

[0041] More precisely, the magnetic switch unit W comprises a "reed" phial sensor 9 in a stationary position, operationally coupled with, and activatable by, a magnetic element 8, in particular a neodymium, provided on the first drive unit 3 and/or on the second drive unit 4.

[0042] The neodymium 8, for example, can have the shape of a pad measuring ø 2x2 mm.

[0043] In particular, the magnetic element 8 is glued or embedded by interference on, or in, a support 12 that is in turn fixed to the -suitably adapted- driving protrusion 14 of the first drive unit 3 or, alternatively and similarly, to the driving protrusion 14 of the second drive unit 4.

[0044] The support 12 is fixed to the driving protrusion by embedding or screwing or gluing.

[0045] Preferably, the support 12 is made of a non-magnetically conductive material. In other words, the support 12 must not be affected by or affect the magnetic field of the magnetic element 8.

[0046] In this manner, the magnetic field generated by the neodymium 8, or in general magnetic element 8, is contained in a much localized zone and this enables to obtain a greater reading precision of the position of the driving protrusion 14.

[0047] The support 12 can be a brass element shaped by turning or aluminium element, or nonferrous metal alloy element, or can be made of moulded plastic material or another suitable material.

[0048] According to another possible embodiment, the magnetic element 8 is fixed to a motion transmission element (T1 or T2) connected to the respective drive unit (3 or 4) and intended for being connected to a corresponding bolt (7a or 7b).

[0049] The magnetic switch unit W comprises a support 10 defined by a printed circuit board 10 (*PCB*) configured to be coupled by fixing means 11 with a cover 13 of the box-shaped body 5.

[0050] On the printed circuit board 10 the aforesaid stationary reed phial sensor 9 is fitted that is configured to interact with the movable magnetic element 8.

[0051] The printed circuit board 10 and the cover 13 are shaped for fitting the magnetic switch unit W in a desired zone, in particular near the first 3 or the second drive unit 4, as shown in the various embodiments of figures 8 to 11.

[0052] This reversible fitting feature confers great versatility on the lock unit 1 that thus adapts easily to specific assembly and use needs.

[0053] The magnetic switch unit W is connectable to the electric motor M by an extendible spiralled connection/supply cable. Owing to this connection/supply cable, the control signal generated by the magnetic switch unit W reaches the electronic control unit of the electric motor M and enables the operation thereof; the operation of the electric motor M is enabled only when the magnetic element 8 and at the reed phial sensor 9, i.e. when the motion transmission elements T1, T2 are in the most retracted position.

[0054] In other words, the electric motor M is activated when the aforesaid first drive unit 3 and/or the aforesaid second drive unit 4 are in the first angular position A1.

[0055] The aforesaid connection/supply cable is also used for the electric supply of the magnetic switch unit W.

[0056] The magnetic switch unit W is provided with a connector 20 for rapid connection to the aforesaid connection/supply cable.

[0057] As shown in the various figures, the printed circuit board 10 can be fitted to the right and to the left (for example for the side locks that have only one bolt).

[0058] Further, the printed circuit board 10 can be fitted with the connector 20 facing upwards or downwards, allowing the installers to choose the most appropriate fitting configuration.

[0059] In a possible alternative embodiment, the position indicating controlling means W comprises a transceiver device by means of which communication without wires (i.e. wireless) with the electric motor M is possible. The transmission of the signal can be obtained by Bluetooth technology, another radio wave technology or equivalent.

[0060] In this possible embodiment, the position indicating controlling means W is provided with an electric supply battery.

[0061] During operation, when the bolts 7a 7b are engaged in the corresponding seats of the subframe or of the wall, the electric motor M is not activatable. It is further pointed out that it is impossible to drive the electric motor M even when the bolts are partially extracted. In fact, even with the bolts in a partially extracted position, damage could occur if the electric motor M were driven.

[0062] Owing to the position indicating controlling means W, this risk is eliminated: in fact, the electric motor M can be driven only when the magnetic element 8 has reached completely the most internal position thereof (angular position A1). More precisely, in the angular position A1, the neodymium 8 interacts with the reed phial sensor 9; only in this condition, the magnetic switch unit W enables, or "switches on" the electric motor M.

[0063] Thus the user can serenely act on the remote control or on the selector unit without having to worry about the position of the bolts.

[0064] If the bolts are still engaged in the corresponding seats, the switch unit W simply does not supply the consent signal to the control unit of the electric motor M.

[0065] In a further simplified possible embodiment, the position indicating controlling means W comprises a magnetic proximity sensor to detect the position of the first drive unit 3 and/or of the second drive unit 4, and a LED (*light emitting diode*) unit that lights up to signal a given position of the first unit 3 and/or of the second drive

unit 4.

[0066] In this manner, a visual light signal is sent that alerts the user about a closed condition of the lock: the thus alerted user, before activating the electric motor, can disengage the bolts from the respective blocking seats by rotating the cylinder C by the key K.

[0067] According to another possible embodiment, the position indicating controlling means W comprises a proximity sensor ("activatable" part 9), that can be of inductive, capacitive, ultrasonic or optical (or photoelectric) type. In this case, instead of the phial reed indicated by "9", there can be the aforesaid inductive, capacitive, ultrasonic or optical proximity sensor and instead of the magnetic element 8, there will be an "activator" element, interacting with the aforesaid sensor fitted to the printed circuit board 10.

[0068] Similarly to what has been said for the embodiment with the magnetic element 8, the "activator" element can be provided on a movable part that can be a drive unit 3 or 4 (cogwheel 3 or 4) or alternatively can be a motion transmission element T1 or T2, that is connectable to a corresponding bolt.

[0069] Also in these versions, the proximity sensor included in the position indicating controlling means W, is configured to enable the operation of the electric motor M when the first drive unit 3 and/or the second drive unit 4 is in the first angular position A1.

[0070] For example, in the case of the inductive proximity sensor, the operation is based on the principle of the reluctance variation that has an electromagnet (to be positioned on the printed circuit board 10 instead of the reed phial 9), when an element (fixed to the protrusion 14) made of ferromagnetic material is positioned in the vicinity. The presence of ferromagnetic material inside the magnetic field facilitates the closure of the field with a resulting reduction of the reluctance. The inner circuits of the sensor detect the reluctance variation, and, after a certain threshold has been exceeded, switch the output signal.

[0071] In the case of a capacitive sensor, the principle of detecting the electric capacity of a capacitor is exploited: an armature is positioned on the printed circuit board 10 in a fixed position (instead of the reed phial 9), and the other armature, that is movable and is made of electric conductive material, is coupled with the protrusion 14. The presence of the movable armature in a position near the fixed armature generates an electric capacity that the inner circuits detect, signalling in this manner the position of total opening of the bolts.

[0072] With regard to the ultrasonic, or optical (or photoelectric) proximity sensors, there will be similarly an "activatable" stationary part (instead of the reed phial 9) and a suitable "activator" element (instead of the magnetic element 8) fitted to the protrusion 14, or another suitable movable zone.

[0073] Interaction without physical contact between the "activator" element and the proximity sensor solves any problem of wear or risk of damage of the sensor, with silent and reliable operation.

[0074] According to a further possible embodiment, the position indicating controlling means W can comprise a microswitch, for example a lever or a button or something else suitable. In this case, the microswitch will be positioned instead of the reed phial 9, and the lever thereof, or button or equivalent part, will be configured to be moved mechanically by a movable part like the protrusion 14 or element fitted on the latter, instead of the magnetic element 8.

[0075] In this embodiment of the position-indicator controller means W, the activatable part 9, placed in a stationary position, is defined by the microswitch, whilst the movable "activator" element 8 is represented by the protrusion 14, or a suitable element fixed to the latter.

[0076] From what has been disclosed and shown in the drawings, it is clear that the lock unit 1 according to the invention enables the declared objects to be obtained.

[0077] The lock unit 1 successfully performs the task of overcoming the previously mentioned drawbacks relating to a possible risk of damage to the electric motor due to the lock being forgotten in the locked position.

[0078] Owing to the lock unit 1 according to the invention, the user no longer has the task of checking the position of the lock unit; enabling the electric motor is automatic and is caused by the switch unit W on the basis of the position signal associated with the drive unit 3 or 4.

[0079] The object is achieved of providing a solution that, in addition to being constructionally and functionally simplified, frees the user from the annoying and not always easy task of having to ascertain the correct operating status of the lock before each activation of the electric motor.

[0080] The lock unit 1 according to the invention, being structurally and functionally simplified, is also an advantageous solution from the financial point of view.

[0081] What has been said and shown in the attached drawings, has been provided by way of illustration of the innovative features of the lock unit for doors and windows according to several possible embodiments.

[0082] Modifications can be made to the lock unit 1, or to parts thereof without thereby falling outside the scope of the claims.

[0083] In practice, the materials, insofar as they are compatible with the specific use and the respective individual components for which they are intended, can be chosen appropriately according to the requirements and the available prior art.

[0084] It is further possible to configure and size the lock unit and adopt materials according to need and variations on and/or additions to what has been disclosed and illustrated in the attached drawings are possible.

Claims

1. Lock unit (1) suitable for doors or windows (6) driv-

able by an electric motor (M), in which said lock unit (1) comprises:

- a control member (2) that is suitable for coupling with a lock cylinder (C) drivable by a key (K),
- a first drive unit (3) and a second drive unit (4) engaging with said control member (2) to be rotated around corresponding rotation axes (R_I, R_{II}), wherein said first drive unit (3) and said second drive unit (4) are shaped like a toothed wheel and comprise corresponding toothing (30), and said control member (2) is of the rotary type and comprises further toothing (31) shaped to mesh with said toothing (31),
- at least one of said first drive unit (3) and second drive unit (4) being connected to a corresponding motion transmission element (T1, T2) movable along a projection / retraction direction (D_I, D_{II}) with respect to a box-shaped body (5) of said lock unit (1), said motion transmission element (T1, T2) being suitable for being connected to, and moving, a corresponding bolt (7a, 7b) so as to engage the latter with, and disengage it from, a corresponding blocking seat provided on a wall or fixed subframe, wherein
- said first drive unit (3) and said second drive unit (4) are rotatable between a first angular position (A1), to which a retracted position of the corresponding motion transmission element/elements (T1, T2) corresponds, and a second angular position (A2), to which a projected position corresponds outside the corresponding motion transmission element/elements (T1, T2),
- position indicating controlling means (W), configured to provide information on the position of said first drive unit (3) and/or of said second drive unit (4) to prevent/enable the driving of said electric motor (M), preserving it from a risk of damage resulting from operation under stress, wherein
- said position indicating controlling means (W) comprises an activatable part (9) in a stationary position, and a movable "activator" element (8) fixed on a movable part of said lock unit (1) and configured to interact without physical contact with said activatable part (9), the positioning of said "activator" element (8) that is movable at said "activatable" part (9) being such as to generate a signal indicative of the position, or operating state of said lock unit (1),
- said position indicating controlling means (W) being configured to enable the operation of said electric motor (M) when said first drive unit (3) and/or said second drive unit (4) is in said first angular position (A1).

2. Lock unit (1) according to claim 1, wherein said position indicating controlling means comprises a magnetic switch unit (W), configured to enable/disable the operation of said electric motor (M) according to the position of said first drive unit (3) and/or of said second drive unit (4).

3. Lock unit (1) according to claim 2, wherein said magnetic switch unit (W) is configured to enable the operation of said electric motor (M) when said first drive unit (3) and/or said second drive unit (4) is in said first angular position (A1).

4. Lock unit (1) according to claim 2 or 3, wherein said magnetic switch unit (W) comprises a reed sensor in a stationary position, operationally coupled with, and activatable by, a magnetic element (8) fixed to said first drive unit (3) and/or said second drive unit (4).

5. Lock unit (1) according to claim 2 or 3, wherein said magnetic switch unit (W) comprises a reed sensor in a stationary position, operationally coupled with, and activatable by, a magnetic element (8) that is fixable to a motion transmission element (T1; T2) connected to a drive unit 4 (3;4) and intended to be connected to a bolt.

6. Lock unit (1) according to any one of claims 2 to 5, wherein said magnetic switch unit (W) comprises a printed circuit board (10) (*"PCB"*) configured to be coupled by fixing means (11) with a cover (13) of said box-shaped body (5), said printed circuit board (10) and said cover (13) being configured to enable, optionally, an installation of said printed circuit board (10) at said first drive unit (3) or at said second drive unit (4), according to the specific assembly and use requirements of the lock unit (1).

7. Lock unit (1) according to claim 6, as appended to claim 4, wherein said reed sensor is supported by said printed circuit board (10), and said magnetic element (8) is mounted on a support (12) in turn fixed on, or in, a driving protrusion (14) obtained on said first drive unit (3) and/or on said second drive unit (4).

8. Lock unit system (1) according to any one of the preceding claims, wherein each motion transmission element (T1, T2) is provided with a slot (32), extending orthogonally to said projection / retraction direction (D_I, D_{II}), in which it engages a corresponding driving protrusion (14), so as to transform rotation of the corresponding drive unit (3, 4) into a linear movement of the motion transmission element (T1, T2).

9. Lock unit system (1) according to any one of the preceding claims, wherein said position indicating controlling means (W) is connectable to said electric motor (M) by a spiral connection/supply cable by which the control signals are transferred from said position

indicating controlling means (W) to said electric motor (M), said connection/supply cable being further suitable for the electric supply of said position indicating controlling means (W).

10. Lock unit (1) according to claim 9, wherein said position indicating controlling means (W) is provided with a connector (20) for rapid connection to said connection/supply cable.

11. Lock unit system (1) according to any one of claims 1 to 8, wherein said position indicating controlling means (W) comprises a transceiver device by which with said electric motor (M), a wireless communication of the *Bluetooth* type or other radio wave transmission or equivalent means is possible, said position indicating controlling means (W) being further provided with an electric power supply battery.

12. Lock unit system (1) according to any one of the preceding claims, wherein said position indicating controlling means (W) comprises a magnetic proximity sensor for detecting the position of said first drive unit (3) and/or of said second drive unit (4), a LED (*light emitting diode*) unit that lights up to indicate a certain position of said first drive unit (3) and/or of said second drive unit (4).

13. Lock unit system (1) according to any one of claims 1 to 11, wherein said position indicating controlling means (W) comprises a proximity sensor (9) selected from a group comprising: an inductive sensor, a capacitive sensor, an ultrasonic sensor, an optical (or photoelectric) sensor, said proximity sensor being configured to enable/disable the operation of said electric motor (M) depending on the position of said first drive unit (3) and/or of said second drive unit (4).

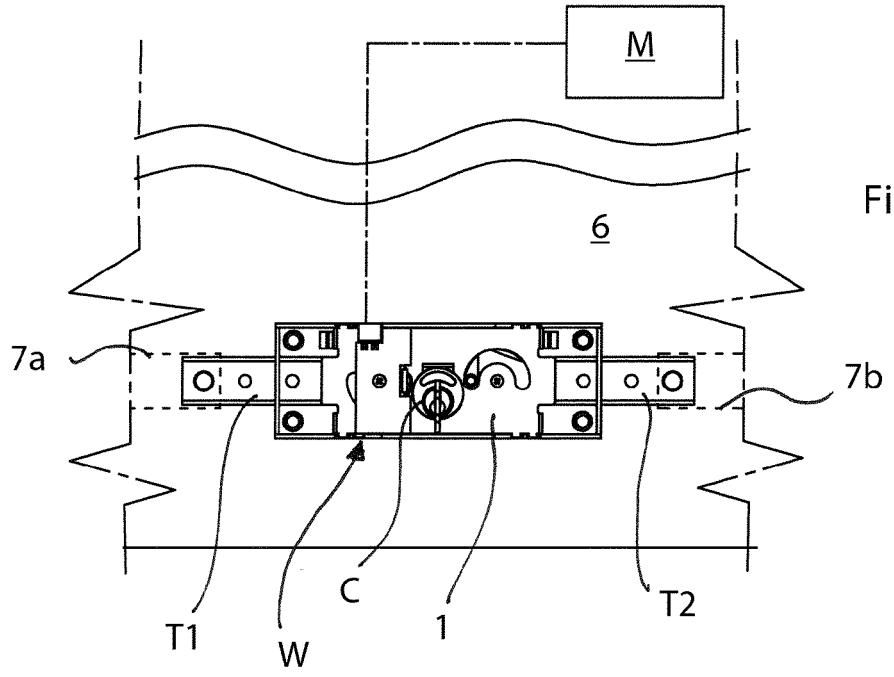

Fig. 1

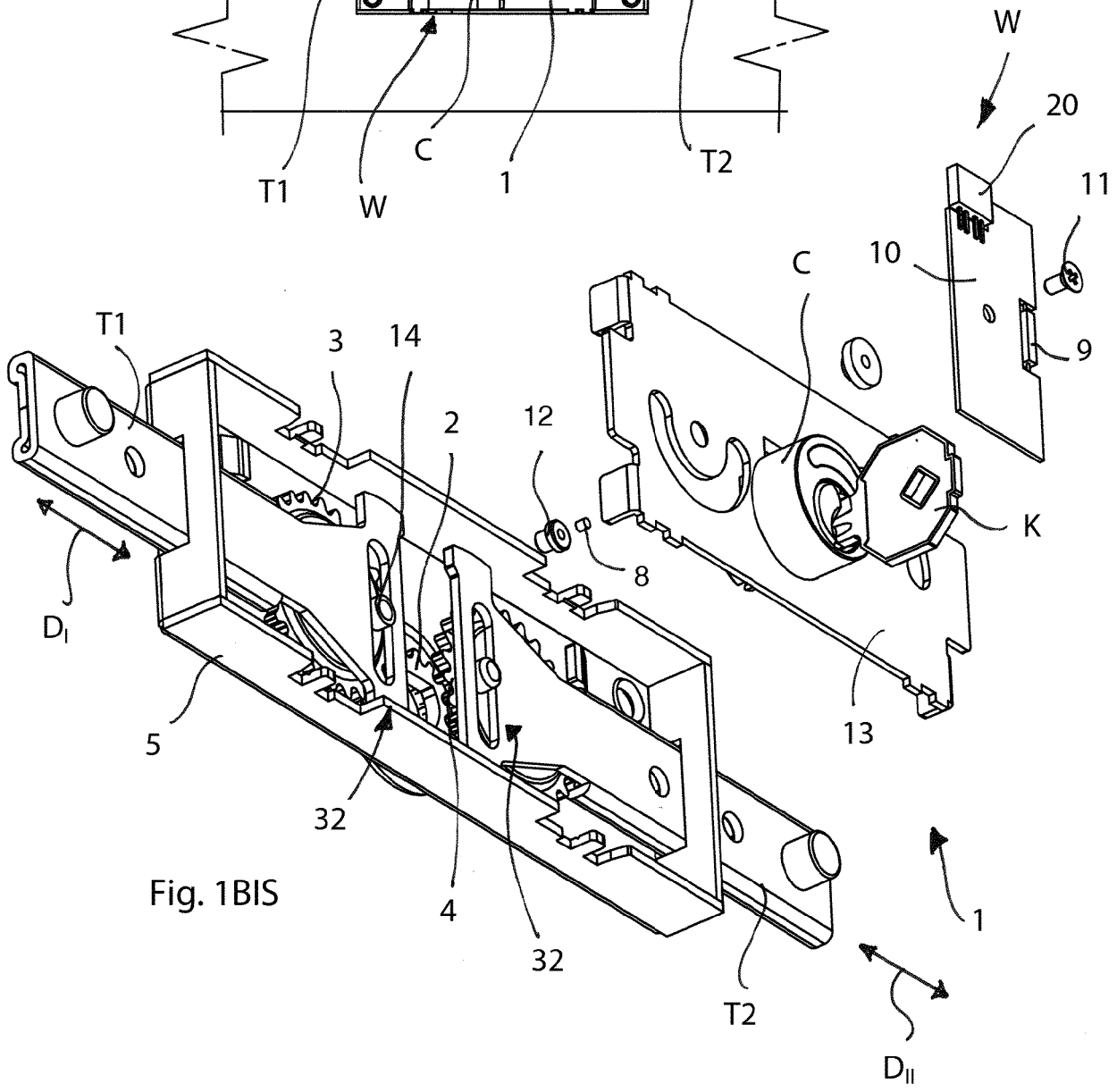

Fig. 1BIS

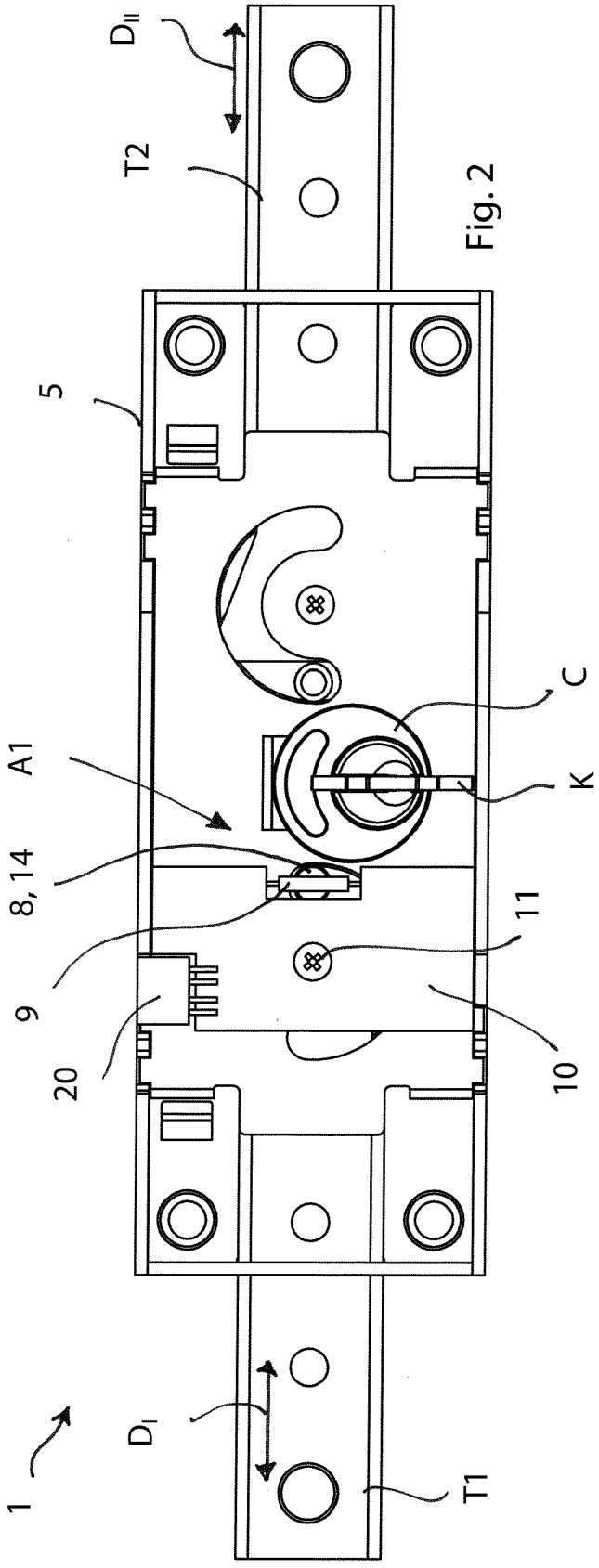

Fig. 2

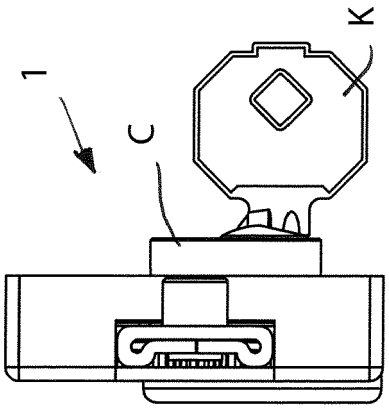

Fig. 3

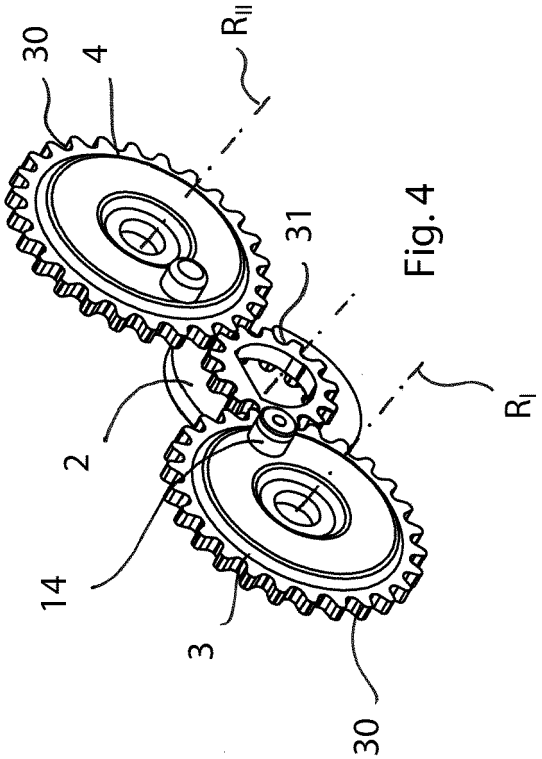

Fig. 4

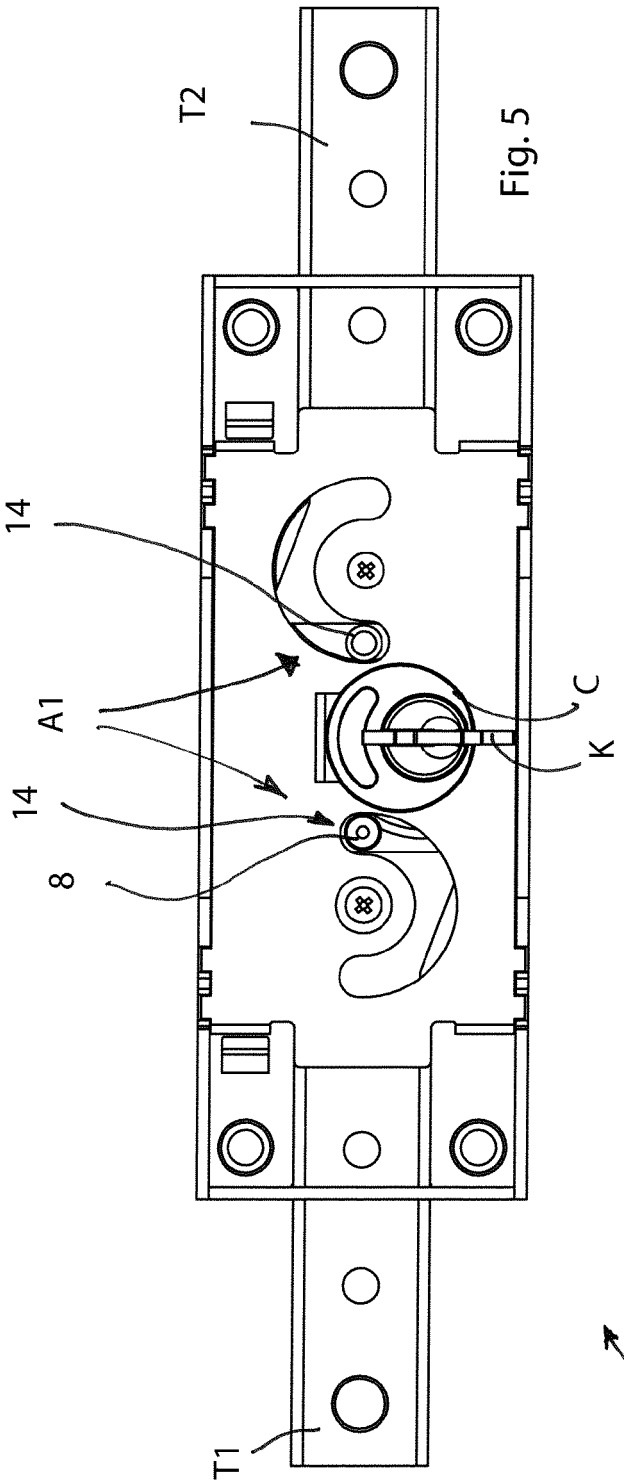

Fig. 5

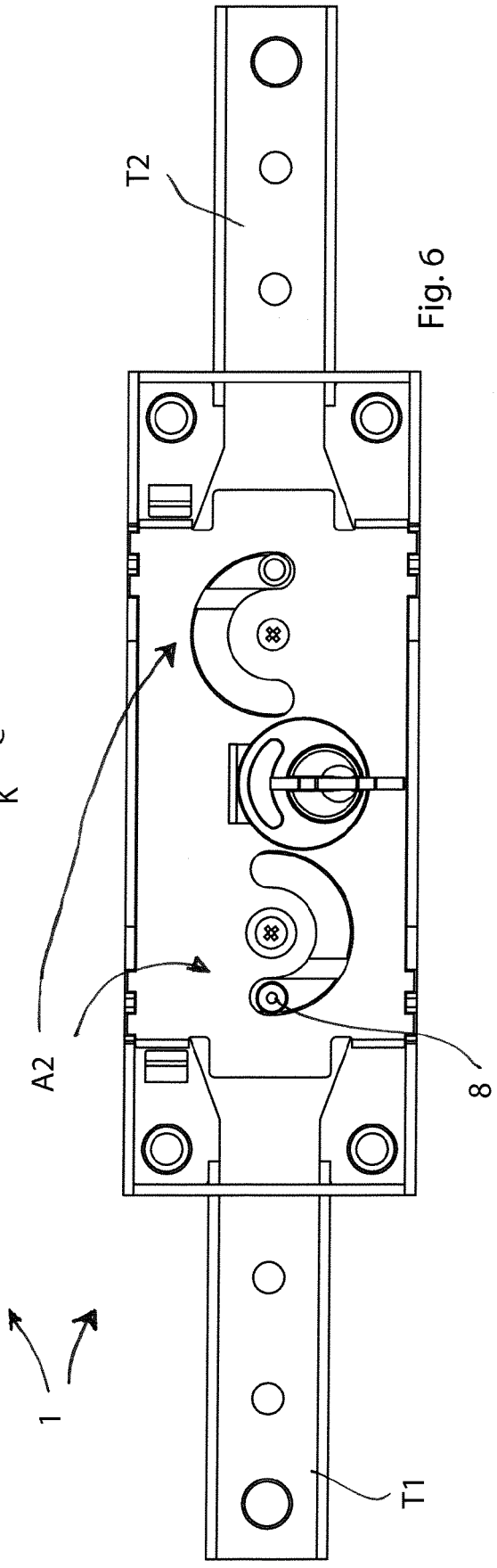

Fig. 6

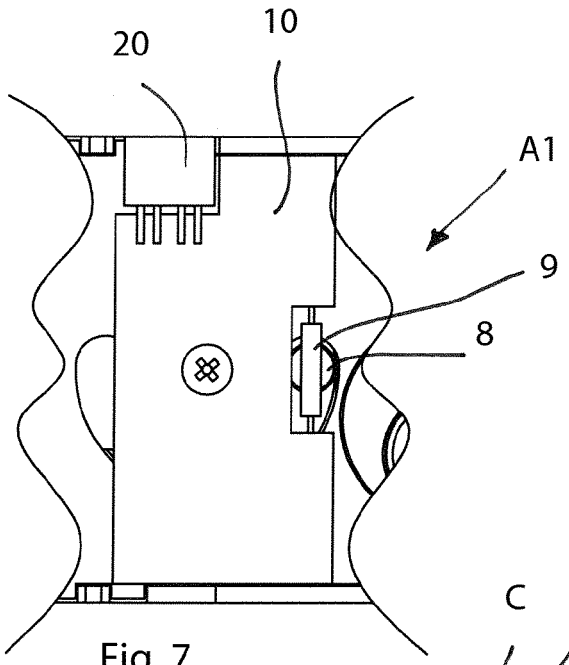

Fig. 7

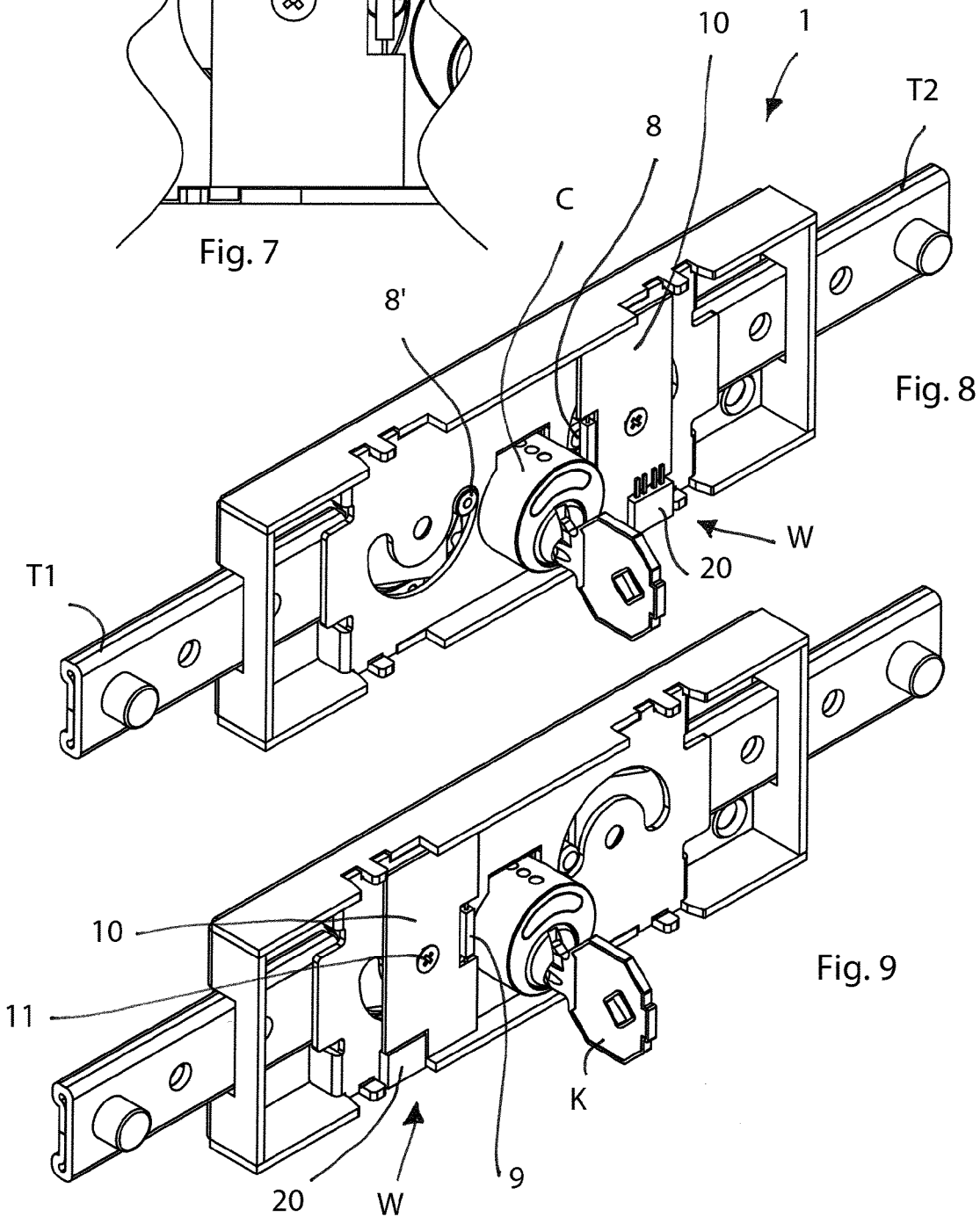

Fig. 8

Fig. 9

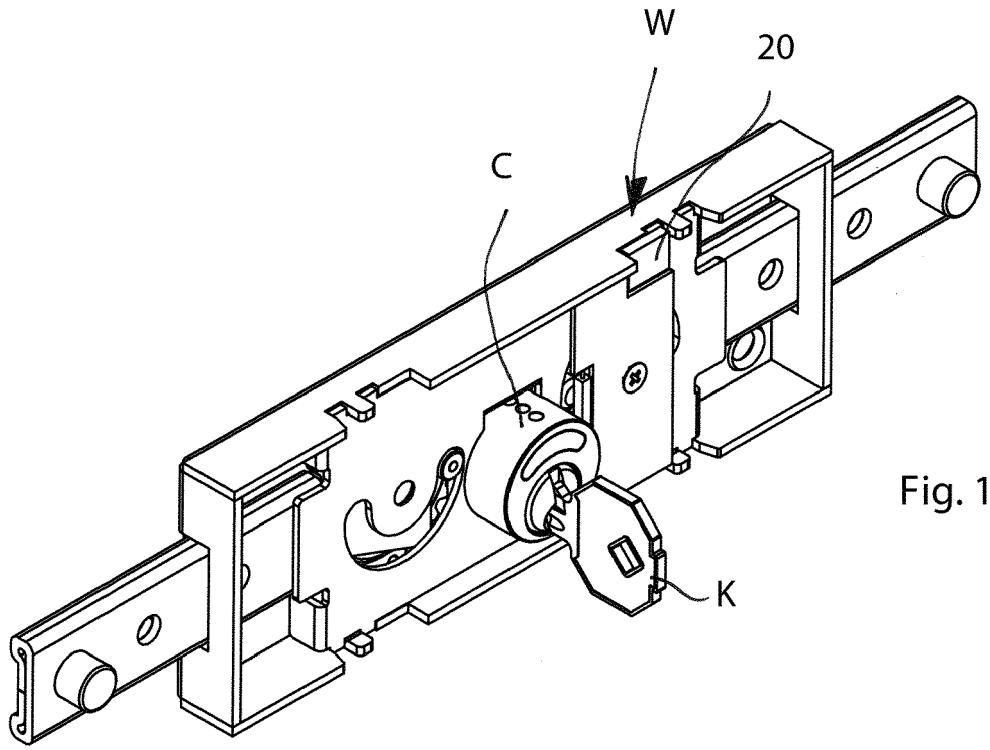

Fig. 10

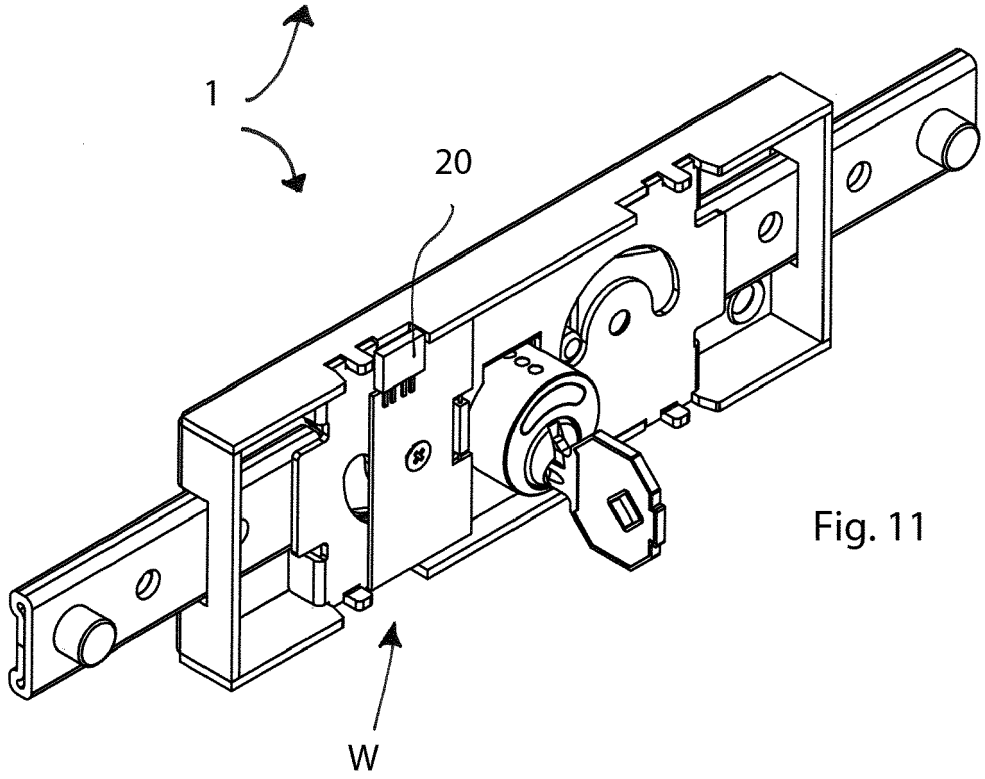

Fig. 11

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EUROPEAN SEARCH REPORT

Application Number
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The Hague	16 November 2020	Koster, Michael

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