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Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

— *of inventorship (Rule 4.17(iv))*

[Continued on next page]

(54) **Title**: CLUTCH MECHANISM COUPLABLE TO DOOR LOCKS WITH LOCKING BOLT OPERATED BY HANDLES OR KNOBS

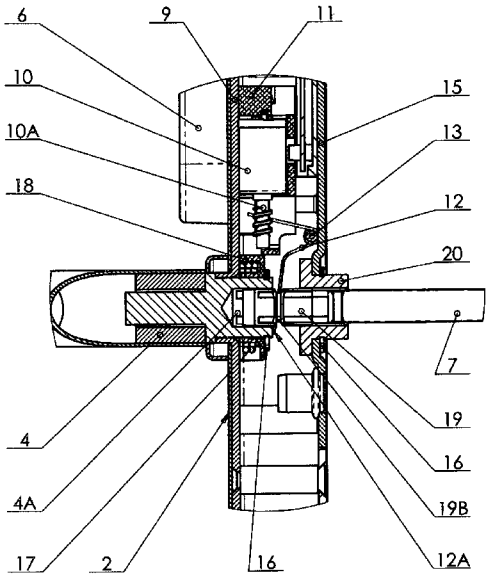

Fig.5

(57) **Abstract**: The clutch mechanism couplable to door locks with locking bolt operated by handles which can be implemented in household, industry, in the hotel doors lock, state institutions, offices, etc. The mechanism manages a pulling movement to be transferred to the bolt (8A) of the lock (8). It includes a square-section shaft (7) passing through the lock (8) which one end is permanently coupled to the internal handle (5) end also an electric motor (10) which axis is coupled with a worm-screw (10A). To the other end of the square-section shaft (7) guide sleeve (20) is fixed, in which profiled bore (20A) it is constantly coupled profile shaped slider (19) coaxially positioned to the external handle (4). When activated, the mechanism by electric motor (10) the slider (19) moves by spring (12) engaged in the worm-screw (10A) axially and directly in the profiled clutch hole (42) of the external handle (4) thus connecting it with the square-section shaft (7), which operates the locking bolt (8A).

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— *with international search report (Art. 21(3))*

— *with amended claims and statement (Art. 19(1))*

CLUTCH MECHANISM COUPLABLE TO DOOR LOCKS WITH LOCKING BOLT OPERATED BY HANDLES OR KNOBS

TECHNICAL FIELD

The invention relates to a clutch mechanism couplable to door locks with locking bolt operated by handles or knobs which can find application in household, industry, in hotel door locks, state institutions, offices, etc.

BACKGROUND ART

A clutch mechanism described in EP 1881135 (A1) is located in a housing mounted under external shield outside the door to a standard mortise lock which a locking bolt activates by turning a handle or a knob. Through this mechanism, from the outside it is, or it is not transmitted a pulling movement to the bolt. The mechanism consists of two coupling elements rotating relative to each other, as the first one is inseparably linked to a square-section shaft which passes through the lock and is connected to the internal handle, and the second coupling element is connected to a second square which in turn is connected to the external handle. The mechanism engagement realizes by activation of an electric motor that causes rotation of a worm-screw which in turn through the swinging pushing arm controls the radial displacement of a pulling pin located in a hole into one element, so as to be introduced into a slot in the other element, whereat both coupling elements become interconnected and rotate together to allow the movement of the locking bolt to its opening position.
The disadvantages of this mechanism are related to the circumstance that the chosen in this decision scheme of radial coupling by means of radial moving pin determines the need for compulsory inclusion of additional parts, like second coupling element, second square, swinging pushing arm and others, mounted between the external

handle and the square-section shaft transmitting the pulling movement to the locking bolt, which complicates the mechanism and increases the cost.

SUMMARY OF THE INVENTION

The present invention seeks to provide a clutch mechanism with simple construction and a minimum number of components, which mechanism shall be a part of shields mounted to the lock with a locking bolt activated by handles or knobs, and capable, when the mechanism is not activated the external handle to rotate freely without turning the square-section shaft which activates the locking bolt, and once the mechanism is activated, it should allow rotation of the square-section shaft and transmission of a pulling movement to the locking bolt, as in both cases from the inside the locking bolt can be retracted by the internal handle.

There is thus provided a clutch mechanism couplable to door locks with locking bolt operated by handles or knobs, which mechanism is implemented as a part of shields, whereto there are fitted respectively external and internal handles by means of spiral springs placed in restrictors. The mechanism is placed into an external box with outer cover built-in into the external shield superimposed on the door, whereat the mechanism includes a square-section shaft passing through the lock, which one-end is permanently coupled to the internal handle and also an electric motor which axis is coupled with a worm-screw.

In accordance with the invention the mechanism includes also a profile shaped slider, which back part is constantly coupled in profiled bore of a guide sleeve fixed to the outer cover by means of a spring ring. The slider is coaxially positioned to the external handle wherein there is formed a profiled clutch hole, and the guide sleeve is stationary fixed to the other end of the square-section shaft, so that its rotation axis coincides with the rotation axes of the square-section shaft and the internal handle. In the worm-screw there is engaged the spring one-end which spring is enabled to

rotate itself around an axis, as the other end of the spring is engaged to the slider, so that by turning of the worm-screw the spring pushes the slider axially and directly in the profiled clutch hole of the external handle until the full engagement of the slider forepart. In accordance with the invention the spring end, that pushes the slider, is shaped as a loop, covering the slider through a channel made therein. By the axial displacement of the slider the said loop contacts with the front surfaces of the guide sleeve and the external handle, and thus being also a limiter of its axial motion.
Furthermore, in accordance with the invention in the slider forepart there is shaped a cylindrical sector, while the rest slider longitudinal part interrupted by the channel is shaped like profile with a squared cross-section which walls are rounded and form a circle with diameter smaller than the square diagonal.The slider cylindrical sector is dimensioned, so that it should rotate freely in the profiled clutch hole of the external handle, while the mechanism is in disengaged position.
Besides, in accordance with this invention, the profiled bore of the guide sleeve and the profiled clutch hole of the external handle correspond to the slider profile and both are dimensioned, so that they should allow free axial displacement of the slider.

The advantages of the proposed mechanism according to the invention are consequence of the chosen rational scheme of its engagement - namely axial and direct engagement with the external handle, moving along its rotation axis, as for this purpose the external handle is shaped itself appropriately for the direct engagement therein.
Thus, not only avoid additional placement of other components transmitting the movement between the external handle and the square which operates the lock bolt, but also facilitates the assembly, resulting in economic advantages.

DESCRIPTION OF THE FIGURES IN THE DRAWINGS

The present invention will be understood and appreciated more fully by the following enclosed drawings:

Fig.1 - represents a partial view of a door profile fitted with a standard lock provided with the clutch mechanism object of the invention located in area (A), an electronic control unit in area (B) and a power supply unit - in area (C).

Fig.2 - represents a partial section of the mechanism around areas (A), (B) and (C).

Fig.3 – represents a part of the external shield around area (A) with the mechanism built-in therein, in exploded view.

Fig.4 – represents a part section of the external shield around area (A) with the mechanism built-in therein with disengaged slider.

Fig.5 – represents a part section of the external shield around area (A) with the mechanism built-in therein with engaged slider.

DETAILED DESCRIPTION OF THE EMBODIMENTS

In accordance with the given examples one preferable embodiment of the mechanism is shown on Figs.1, 2, 3, 4 and 5.

The mechanism is implemented as a part of shields 2 and 3, whereto there are mounted respectively external handle 4 and internal handle 5 through spiral springs 17 placed in restrictors 18. The mechanism is placed into an external box 9 with outer cover 15 built-in into the external shield 2 superimposed on the door 1. The mechanism includes a square-section shaft 7 passing through the lock 8 which one-end is permanently coupled to the internal handle 5 and also an electric motor 10 which axis is coupled with a worm-screw 10A.

The activation of the mechanism in this particular performance realizes from an antenna receiver/keyboard 6, mounted on the external shield 2 and connected by a cable 23 to an electronic control unit 14 and an electric motor 10, powered by batteries placed in a power supply unit 22 mounted under the internal shield 3. The electric motor 10 is placed in a box 11 contained in the external box 9, and the electronic control unit 14 is mounted on the outer cover 15.

In accordance with the invention the mechanism includes also a profile shaped slider 19 which back part 19C is constantly coupled in profiled bore 20A of a guide sleeve 20 fixed to the outer cover 15 by means of a spring ring 16. The slider 19 is coaxially positioned to the external handle 4 wherein there is formed a profiled clutch hole 4A. In this particular performance the guide sleeve 20 is stationary fixed to the other end of the square-section shaft 7 by means of screws 21, whereat its rotation axis coincides with the rotation axes of the square-section shaft 7 and the internal handle 5. In the worm-screw 10A there is engaged the spring 12 one-end, which spring 12 is enabled to rotate itself around an axis 13, as the other end of the spring 12 is engaged to the slider 19, so that by turning of the worm-screw 10A the spring 12 pushes the slider 19 axially and directly in the profiled clutch hole 4A of the external handle 4 until the full engagement of the slider 19 forepart.

In this particular performance, the end of the spring 12 that pushes the slider 19 is shaped as a loop 12A, covering the slider 19 through a channel 19B made therein. Moreover, the said loop 12A serves also as a limiter of the axial motion of the slider 19 by contacting with the front surfaces of the guide sleeve 20 and the external handle 4 during the axial displacement of the slider 19. There is a shaped cylindrical sector 19A in the slider 19 forepart, while the rest slider longitudinal part interrupted by channel 19B is shaped like profile with a squared cross-section, which walls are rounded and form a circle with diameter smaller than the square diagonal. Furthermore, the cylindrical sector 19A of the slider 19 is dimensioned, so that it rotates freely in the profiled clutch hole 4A of the external handle 4, while the mechanism is in disengaged position. The profiled bore 20A of the guide sleeve 20 and the profiled clutch hole 4A of the external handle 4 correspond to the slider 19 profile and both are dimensioned, so that they allow free axial displacement of the slider 19.

IMPLEMENTATION OF THE INVENTION

In accordance with the invention a clutch mechanism couplable to door locks with locking bolt operated by handles or knobs operates as follows:

The activation of the mechanism in this particular performance according to figs. 1, 2, 3, 4 and 5 realizes by submission of an open allowing signal from an electronic control unit 14, based on data received from an antenna receiver / keyboard 6. The said data can be coded on a card, transponder or other carrier and can be received by the antenna-receiver or represents an alpha/ numeric code entered from the keyboard, whereat the electronic control unit 14 submits a signal for turning in opening direction of the electric motor 10, which rotates a worm-screw 10A coupled to its axis. As a result of the rotation the worm-screw 10A moves the spring 12 one-end engaged therein, and the spring 12 rotates around the axis 13. Furthermore the other end of the spring 12 shaped as a loop 12A and covering the slider 19 through a channel 19B pushes axially and directly the slider 19 in the profiled clutch hole 4A of the external handle 4 until the full engagement of its forepart, while the back part 19C of the slider 19 remains constantly coupled in the profiled bore 20A of the guide sleeve 20 which is constantly connected with the square-section shaft 7 and thus the external handle 4 is proved directly connected to the square-section shaft 7 that passes through the lock 8 and is permanently coupled to the internal handle 5. Therefore by pressing the external handle 4 it rotates around its axis together with the slider 19 coupled therein, the guide sleeve 20 and the square-section shaft 7, whereat as a result of its rotation the square-section shaft 7 draws out the locking bolt 8A in the lock 8 and the door 1 can be opened.

When a signal for closing is submitted from the electronic control unit 14 to the electric motor 10, it rotates in closing direction and by the worm-screw 10A coupled to its axis moves the end of the spring 12 engaged therein, whereat its other end shaped like a loop 12A moves axially the slider 19 releasing it from the external handle 4, thus disconnecting the external handle 4 with the square-section shaft 7.

When there isn't an open allowing signal the mechanism is not activated, the slider 19 is not engaged into the profiled clutch hole 4A of the external handle 4 and the external handle 4 rotates freely without turning the square-section shaft 7.

Meanwhile, inside, by pressing the internal handle 5, it rotates around its axis and retracts the locking bolt 8A of the lock 8 by means of the square-section shaft 7 permanently coupled thereto, without requiring an open allowing signal.

Mounted to the handles 4 and 5 spiral springs 17 placed in restrictors 18 serve to return the handles 4 and 5 in the starting position after pressing them, and the restrictors 18 limit the angle of rotation and prevent the handles 4 and 5 from an extraction.

CLAIMS

1. Clutch mechanism couplable to door locks with locking bolt operated by handles or knobs implemented as a part of shields whereto there are fitted respectively external and internal handles by means of spiral springs placed in restrictors, whereat the mechanism is placed into an external box with outer cover built-in into the external shield superimposed on the door, as the mechanism includes a square-section shaft passing through the lock, which one end is permanently coupled to the internal handle, and also an electric motor which axis is coupled with a worm-screw characterized in that it includes also a profile shaped slider (19) which back part (19C) is constantly coupled in profiled bore (20A) of a guide sleeve (20) fixed to the outer cover (15) by means of a spring ring (16), whereat the slider (19) is coaxially positioned to the external handle (4), wherein there is formed a profiled clutch hole (4A) and the guide sleeve (20) is stationary fixed to the other end of the square-section shaft (7), so that its rotation axis coincides with the rotation axes of the square-section shaft (7) and the internal handle (5), whereat in the worm-screw (10A) there is engaged the spring (12) one-end which spring (12) is enabled to rotate itself around an axis (13), as the other end of the spring (12) is engaged to the slider (19), so that by turning of the worm-screw (10A) the spring (12) pushes the slider (19) axially and directly in the profiled clutch hole (4A) of the external handle (4) until the full engagement of the slider (19) forepart.

2. Clutch mechanism, according to claim 1, characterized in that the end of the spring (12), that pushes the slider (19), is shaped as a loop (12A), covering the slider (19) through a channel (19B) made therein.

3. Clutch mechanism, according to claim 2, characterized in that the said loop (12A) serves also as a limiter of the axial motion of the slider (19) by contacting with the front surfaces of the guide sleeve (20) and the external handle (4) upon the axial displacement of the slider (19).

4. Clutch mechanism, according to claim 3, characterized in that there is a cylindrical sector (19A) shaped in the slider (19) forepart, while the rest slider longitudinal part interrupted by the channel (19B) is shaped like profile with a squared cross-section which walls are rounded and form a circle with diameter smaller than the square diagonal.

5. Clutch mechanism, according to claim 4, characterized in that the cylindrical sector (19A) of the slider (19) is dimensioned, so that it should rotate freely in the profiled clutch hole (4A) of the external handle (4) while the mechanism is in disengaged position.

6. Clutch mechanism, according to claim 5, characterized in that the profiled bore (20A) of the guide sleeve (20) and the profiled clutch hole (4A) of the external handle (4) correspond to the slider (19) profile and both are dimensioned, so that they should allow free axial displacement of the slider (19).

AMENDED CLAIMS
received by the International Bureau on 25 June 2012

1. Clutch mechanism couplable to door locks with locking bolt operated by handles or knobs implemented as a part of shields whereto there are fitted respectively external and internal handles by means of spiral springs placed in restrictors, whereat the mechanism is placed into an external box with outer cover built-in into the external shield superimposed on the door, as the mechanism includes a square-section shaft passing through the lock, one end of which is permanently coupled to the internal handle, and also an electric motor the axis of which is coupled with a worm-screw, further it includes also a profile shaped slider the back part of which is constantly coupled in profiled bore of a guide sleeve fixed to the outer cover by means of a spring ring, whereat the slider is coaxially positioned to the external handle, and the guide sleeve is stationary fixed to the other end of the square-section shaft, so that its rotation axis coincides with the rotation axes of the square-section shaft and the internal handle, whereat the one end of the spring is engaged in the worm-screw, the spring is enabled to rotate itself around an axis, and the other end of the spring is engaged to the slider, so that by turning the worm-screw the spring pushes the slider axially to the external handle, characterized in that there is formed a profiled clutch hole (4A) in the external handle (4), while the end of the spring (12) that pushes the slider (19) is shaped as a loop (12A), covering the slider (19) through a channel (19B) made therein, so that to push it directly in the profiled clutch hole (4A) of the external handle (4) until the full engagement of the slider (19) forepart.

2. Clutch mechanism, according to claim 1, characterized in that the said loop (12A) serves also as a limiter of the axial motion of the slider (19) by contacting with the front surfaces of the guide sleeve (20) and the external handle (4) upon the axial displacement of the slider (19).

3. Clutch mechanism, according to claim 2, characterized in that there is a cylindrical sector (19A) shaped in the slider (19) forepart, while the rest slider longitudinal part interrupted by the channel (19B) is shaped like profile with a squared cross-section which walls are rounded and form a circle with diameter smaller than the square diagonal.

4. Clutch mechanism, according to claim 3, characterized in that the cylindrical sector (19A) of the slider (19) is dimensioned, so that it should rotate freely in the profiled clutch hole (4A) of the external handle (4) while the mechanism is in disengaged position.

5. Clutch mechanism, according to claim 4, characterized in that the profiled bore (20A) of the guide sleeve (20) and the profiled clutch hole (4A) of the external handle (4) correspond to the slider (19) profile and both are dimensioned, so that they should allow free axial displacement of the slider (19).

Statement
Under Art. 19 (1) of PCT

Document D1 (WO2005/090720A1), indicated in the written opinion on patentability of PCT/BG2011/000026, can be referred to as the prior art closest to the subject-matter of claim 1.

The following part of item 2.1 of the opinion "*...in the external handle there is formed a profiled clutch protrusion (19)*" is not acceptable. As seen from the claims and drawings of D1, the clutch mechanism includes a profiled, shaped coupling shaft (7) and the said *profiled clutch protrusion (19)* is formed on its inner end (16) which shall engage with the slider (8), whereby the coupling shaft (7) through its external end (17) – via elements (10), (45), (2) and (18) – is engaged with the external handle. Therefore, in document D1, the slider does not engage directly in the external handle, respectively also the spring (29, 30) which pushes it for an axial displacement, does not engage to it directly but through the elements (9) and (21).

In PCT/BG2011/000026 the external handle itself is also a coupling element, since there is *a profiled clutch hole* formed within the external handle in which the slider engages directly. This is a significant difference compared to D1 which excludes the need for additional components and simplifies the mechanism design and assembly. The said slider direct engagement in the external handle, disclosed in claim 1 of PCT/BG2011/000026, is possible in combination with the features disclosed in claim 2.

Therefore the following amendments in claims of PCT/BG2011/000026 are made:

The features known from D1 are included in the restricted part of claim 1: "*a profile shaped slider the back part of which is constantly coupled in profiled bore of a guide sleeve fixed to the outer cover by means of a spring ring, whereat the slider is coaxially positioned to the external handle, and the guide sleeve is stationary fixed to the other end of the square-section shaft, so that its rotation axis coincides with the rotation axes of the square-section shaft and the internal handle, whereat the one end of the spring is engaged in the worm-screw, the spring is enabled to rotate itself around an axis, and the other end of the spring is engaged to the slider, so that by turning the worm-screw the spring pushes the slider axially to the external handle*"
In characterization part of claim 1 are left the features implementing the direct engagement: "*there is formed a profiled clutch hole (4A) in the external handle (4)*",
to which the features from claim 2 are added, namely: "*the end of the spring (12), that pushes the slider (19), is shaped as a loop (12A), covering the slider (19) through a channel (19B) made therein*",
The features: "*so that to push it directly in the profiled clutch hole (4A) of the external handle (4) until the full engagement of the slider (19) forepart*"are left in claim 1.

With these amendments claim 2 is canceled;

The remaining claims are only renumbered to 5 without amendments.

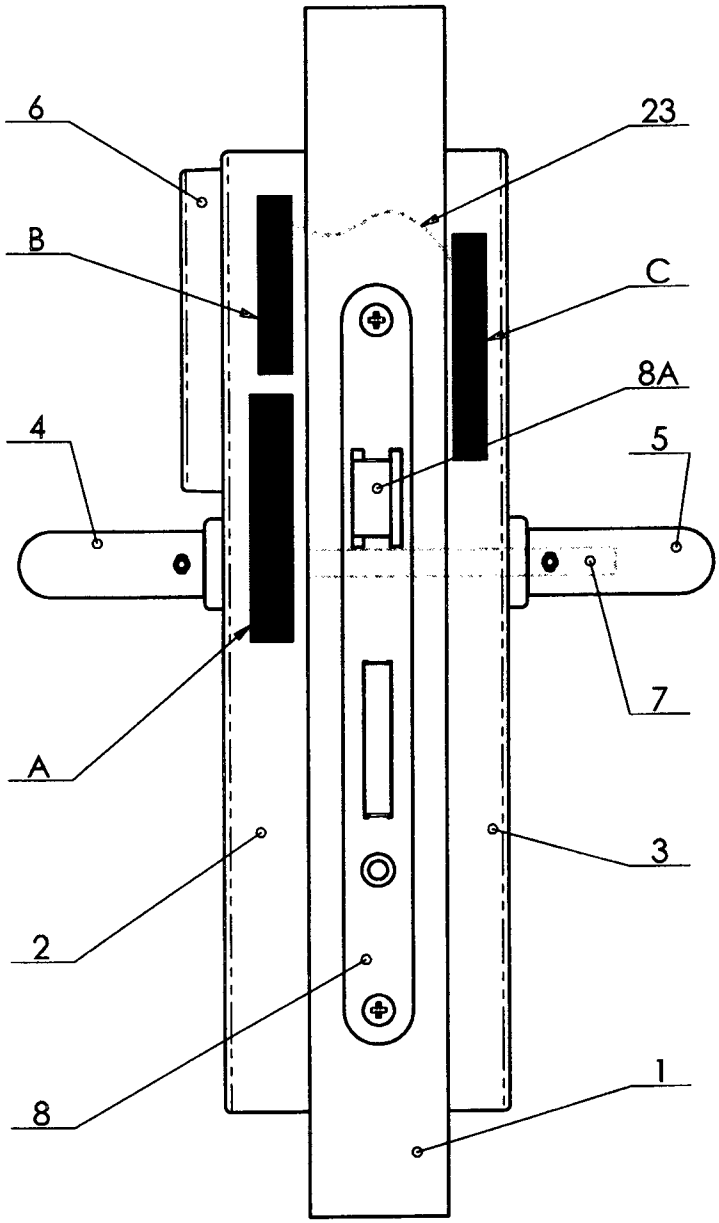


Fig.1

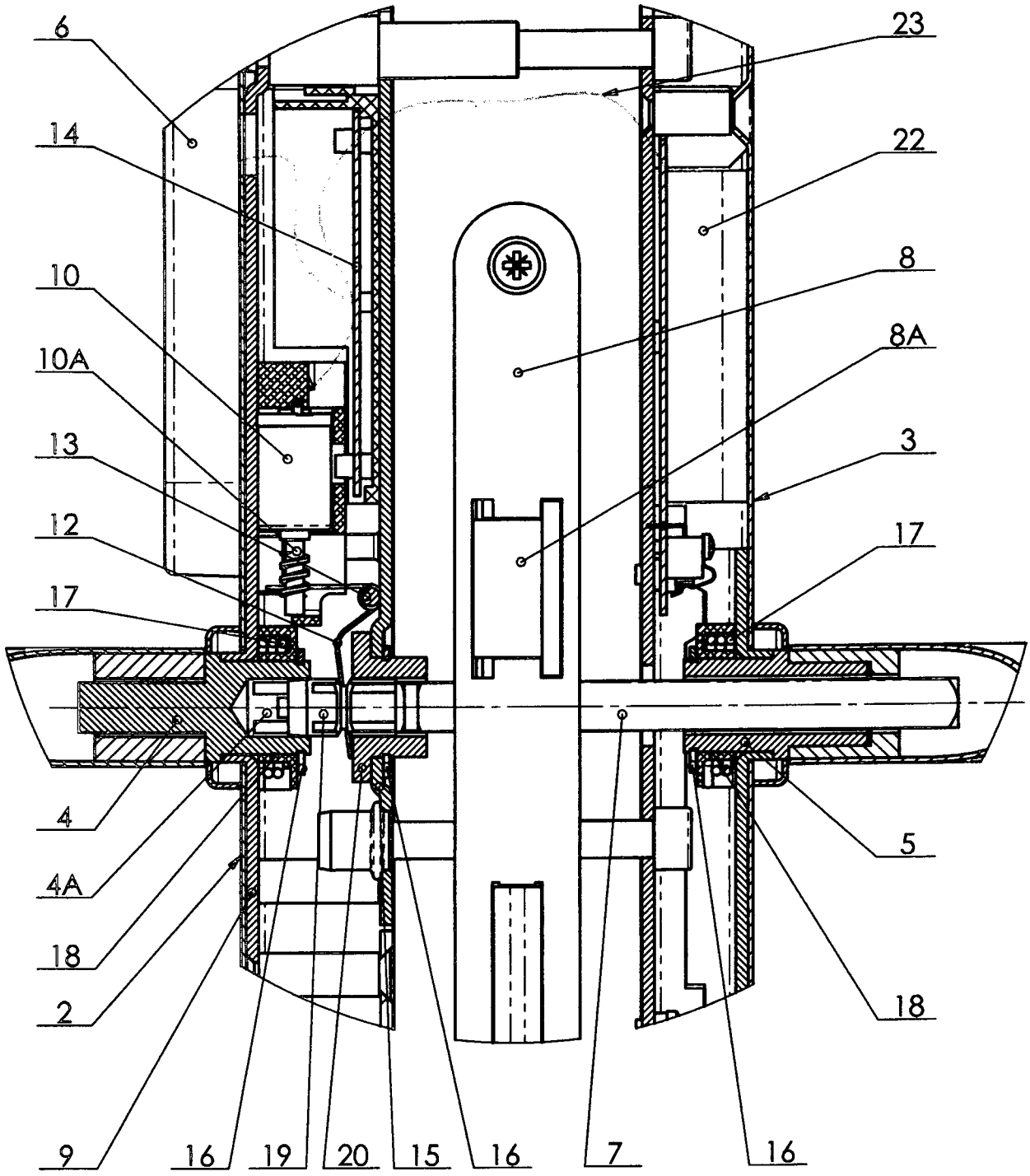
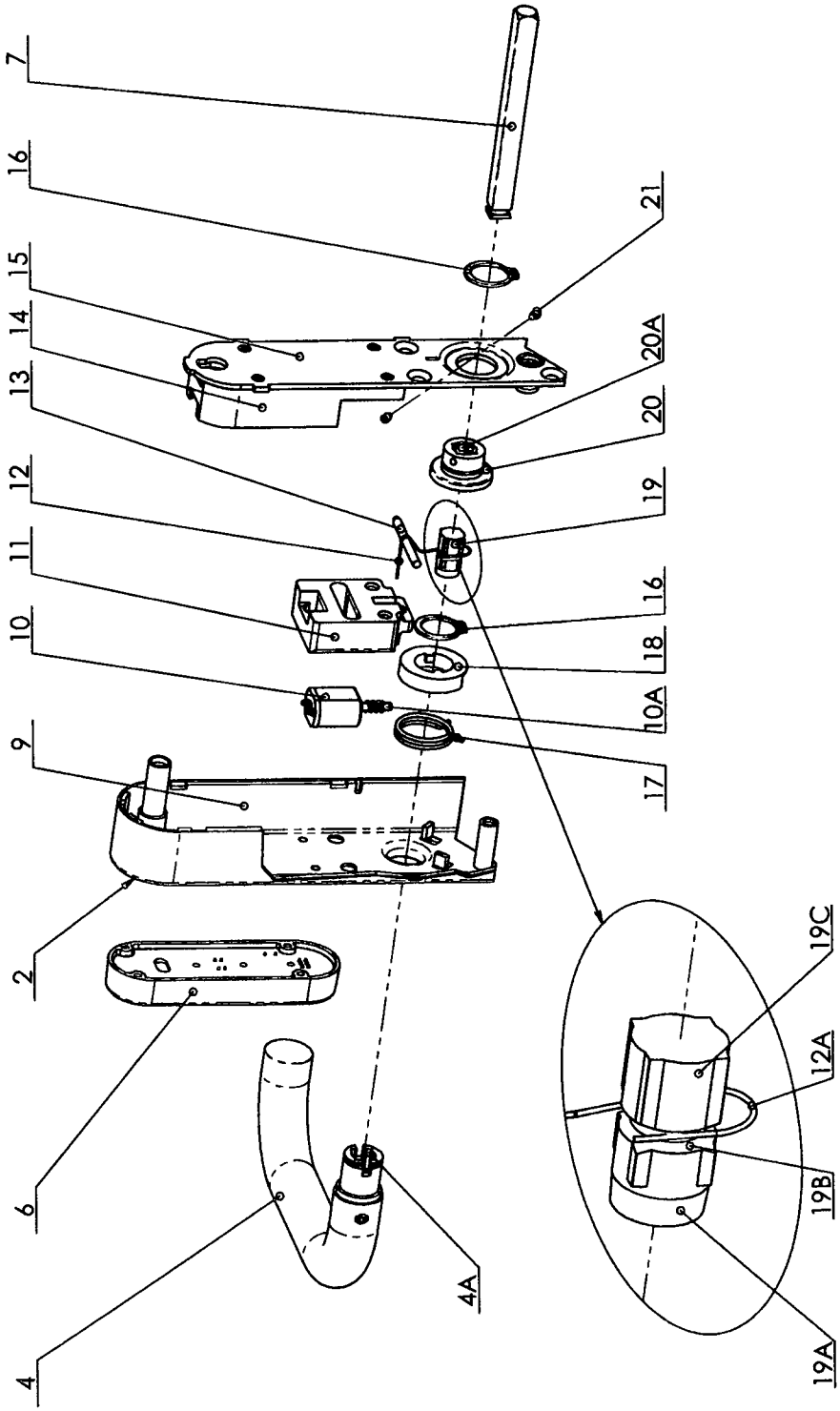


Fig.2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19B
19A

Fig.3

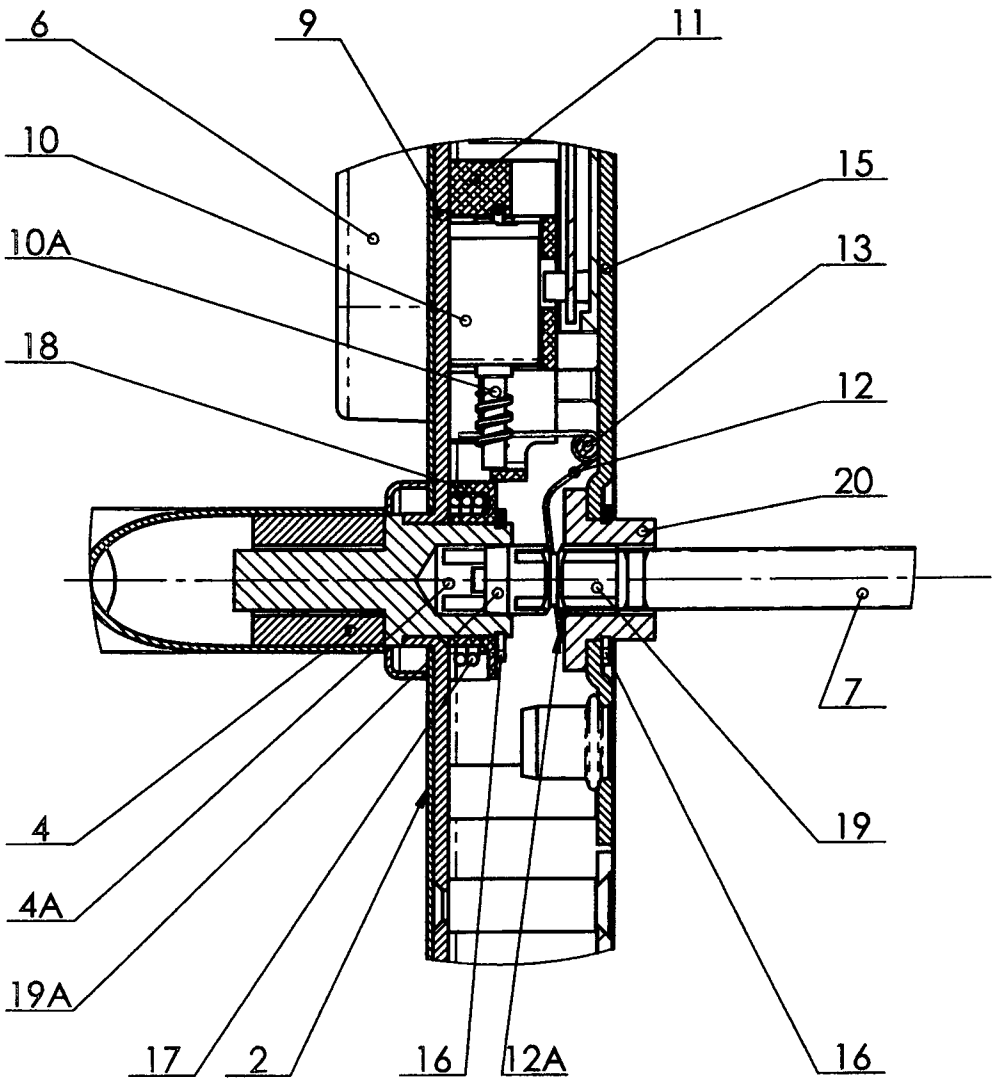

Fig .4

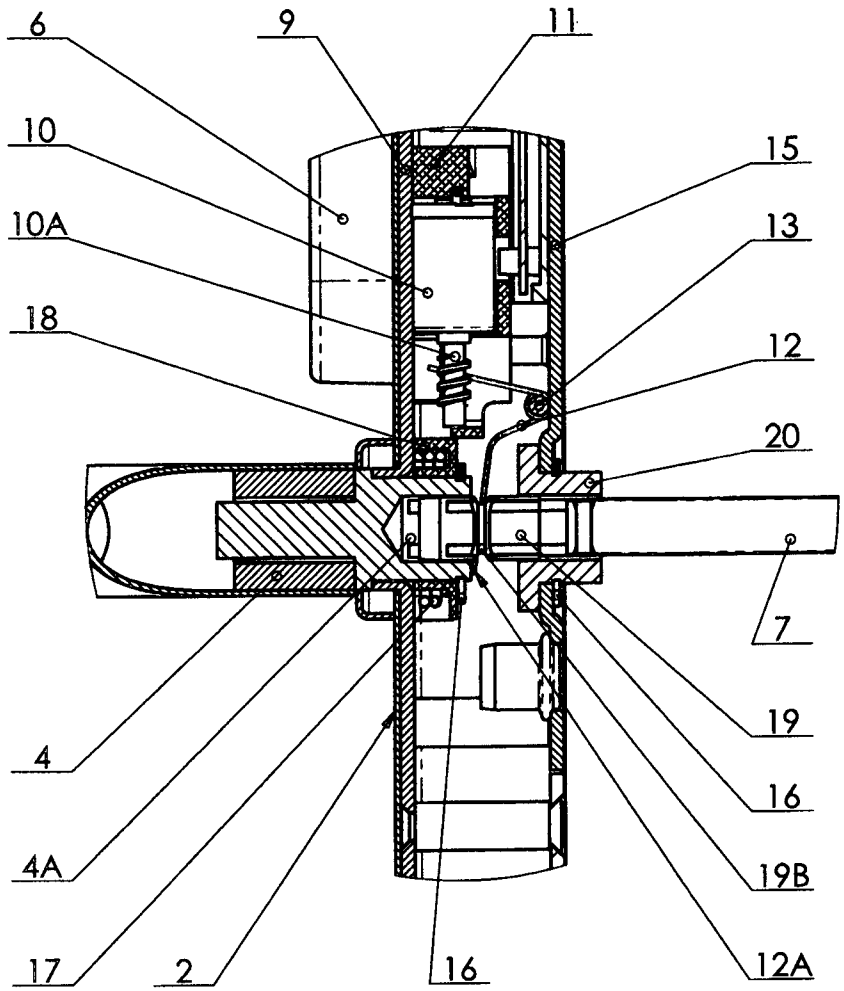

Fig.5

INTERNATIONAL SEARCH REPORT

International application No
PCT/BG2011/000026

A. CLASSIFICATION OF SUBJECT MATTER
INV. E05B47/06
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
E05B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2005/090720 A1 (TALLERES ESCORIAZA SA) 29 September 2005 (2005-09-29)	1,2
A	the whole document	3-6
A	US 2004/040352 A1 (YU ET AL) 4 March 2004 (2004-03-04) paragraph [0027] - paragraph [0029]; figures 4, 5c, 6b	1-6
A	DE 10 2008 020726 A1 (TRAUTMANN, WURZER & WURZER) 29 October 2009 (2009-10-29) the whole document	1-6
A	EP 2 136 019 A2 (ASSA ABLOY SICHERHEITSTECHNIK GMBH) 23 December 2009 (2009-12-23) figures	1-6

-/--

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
24 April 2012	03/05/2012

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Van Beurden, Jason

INTERNATIONAL SEARCH REPORT

International application No
PCT/BG2011/000026

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2002/144526 A1 (MING-CHIH) 10 October 2002 (2002-10-10) figures -----	1-6

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/BG2011/000026

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2005090720 A1	29-09-2005	AT 11207 U1	15-06-2010
		CZ 18014 U1	21-11-2007
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