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(54) **Highly safe automatic lock for overhead doors, gates or the like**

(57) An automatically closed lock (1) for overhead or swinging doors, gates or the like, comprises a box-like construction (2), supporting a rotatable handle (3) and at least a slidable bolt (4), projecting from the box-like construction (2).

The lock (1) comprises coupling means (8) for coupling the handle (3) to the bolt (4), for causing the bolt (4) to be slidably displaced in order to open the lock (1), as the handle (3) is turned, and means for automatically operating the bolt, in order to cause it to further slide for the closing operation. The lock (1) comprises, moreover, deactuating means (13, 14) for deactuating the coupling means (8), which can be controllably driven in order to cause the handle (3) to idly turn.

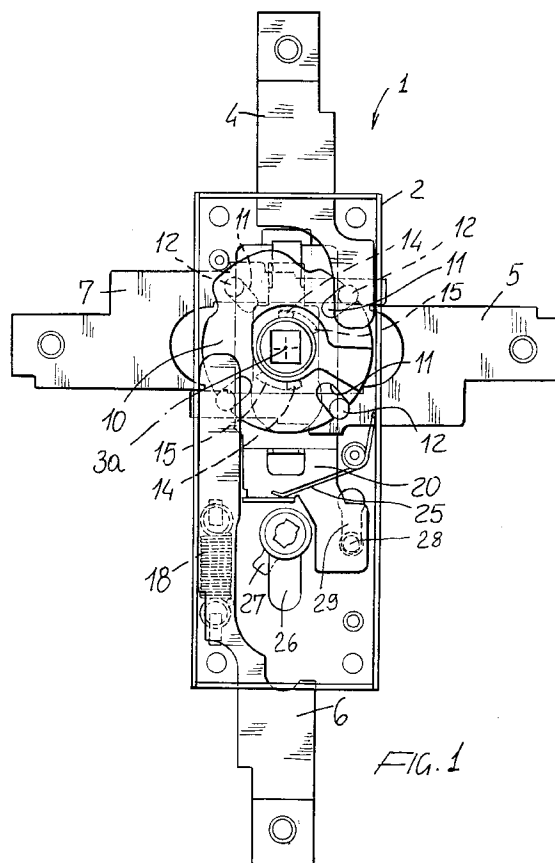


FIG. 1

EP 0 723 057 A1

Description

BACKGROUND OF THE INVENTION

The present invention relates to a highly safe automatically closed lock for overhead or swinging doors, gates or the like.

Several types of different locks are already known, which differ from one another depending on the type of application and/or type of gate or swinging door to which they must be applied.

The at present commercially available locks can be substantially classified into two different classes: the locks provided with means for automatically causing the lock bolts to return to their closure position, and the locks in which the two opening and closing operations are performed manually.

In both the above mentioned types of locks, the latter are provided with a key control unit, in order to allow the door to be opened from outside, and with a manually operated pin in order to allow the lock to be opened from the inside of the door.

The driving of the key or pin will either enable or lock the operation of a rotatable handle, by means of which the lock is either opened or closed, i.e. the lock bolts are so driven as to cause said bolts to slide in order to provide the closing or opening operations of the lock.

As a prior lock is in its closing condition, the handle is held in a latched condition, since it is engaged by a tooth element or a mechanical gear assembly, which, on the other hand, is affected by the handle as the rotary movement of the latter is enabled.

Prior locks of the above mentioned types do not provide satisfactory anti-tampering characteristics, since, by operating on the lock handle, locked or latched in a closure position, by a comparatively high force, it is possible to damage, in a comparatively quick manner, the lock itself, so as to easily unlatching the door.

SUMMARY OF THE INVENTION

Accordingly, the aim of the present invention is to solve the above mentioned problem, by providing an automatically closed lock, which is specifically designed to efficiently discourage any tampering attempts, tending to unlatch or open the lock by a forced rotary displacement of the handle.

Within the scope of the above mentioned aim, a main object of the present invention is to provide such an automatic lock which is very safe and reliable in operation, is very simple construction-wise and can be made at a very reduced cost.

According to one aspect of the present invention, the above mentioned aim and object, as well as yet other objects, which will become more apparent hereinafter, are achieved by a highly safe automatically closed lock for overhead doors, gates or the like, comprising a box-like construction, supporting a rotatable handle and at

least a slidable bolt, projecting from said box-like construction, coupling means being provided for coupling the handle to the bolt, to allow said bolt to slide for opening the lock, as the handle is turned, characterized in that said lock comprises moreover driving means for automatically driving said bolt in its closing sliding movement, and deactuating means for deactuating said coupling means, said deactuating means being controllably driven in order to idly turn the handle.

BRIEF DESCRIPTION OF THE DRAWINGS

Further characteristics and advantages of the automatically closed lock according to the present invention, will become more apparent hereinafter from the following detailed disclosure of a preferred, though not exclusive, embodiment of the lock, which is illustrated, by way of a merely indicative, but not limitative, example, in the figures of the accompanying drawings, where:

Figure 1 is a front elevation view illustrating the lock in its closure position;

Figure 2 is a further front elevation view illustrating the subject lock in its closure position, some components thereof being omitted, for a better clearness;

Figure 3 is a further front elevational view illustrating the subject lock in its opening position; and

Figure 4 is a cross-sectional view, substantially taken along the section line IV-IV of Figure 2.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

With reference to the number references of the above mentioned figures, the lock according to the present invention, which has been generally indicated by the reference number 1, comprises a box-like body 2 rotatably supporting, about an axis 3a, a handle 3 and at least a bolt 4 which can be slidably driven and projects from the box-like construction or body 2.

In the illustrated embodiment, are provided four bolts, indicated by the reference numbers 4, 5, 6, 7 which are coupled to the handle 3, so that a turning or rotary movement of the handle about its axis 3a will cause the bolts to slide in order to either open or close the lock.

The coupling means for coupling the handle 3 to the bolts comprise a nose element or nox 8 which is rotatably supported about its rotary axis, coinciding with the axis 3a, by the box-like body or construction 2 and is axially traversed by a throughgoing hole 9 provided for housing the shaft of the handle.

About the nose element 8 is arranged a cam disc 10, which can turn about the axis 3a of the handle and is peripherally provided with a plurality of hollows 11 in which are engaged pins 12 rigid with the bolts, so that a rotary movement of the cam disc 10, about the rotary

axis 3a, will cause the bolts to be translated either in a direction or in an opposite direction.

Between the nose element 8 and the cam disc 10 is arranged a clutch-in device, substantially comprising a sleeve 13, which is keyed about the nose element 8 and can axially slide along said nose element 8.

More specifically, the sleeve 13 is provided, at the axial end portion thereof facing the cam disc 10, with teeth 14, provided for engaging in, or disengaging from, upon axially displacing the sleeve 13, seats or recesses 15 formed on the cam disc 10.

As shown, said recesses 15 are advantageously provided with an arch configuration, of a predetermined amplitude, about said rotary axis 3a, in excess with respect to the size of the tooth elements 14.

The lock according to the present invention comprises moreover driving means for automatically driving or operating the bolts, including return resilient means, preferably constituted by a spring 16 which is restrained to the box-like construction 2 and operates by a portion thereof, against a shoulder 17 of the cam disc 10, so as to resiliently counterbias the rotary movement of the cam disc, in the direction thereof causing the opening movement of the bolts, and so as to cause the cam disc 10 to automatically turn in the direction causing the bolts to be slidably closed.

As, as in the shown embodiment, are provided several bolts, on one of these bolts, in the shown embodiment on the bolt 6, a pring 18 can be provided, said spring having an end portion thereof connected to the box-like construction 2 and the other end portion thereof connected to the body of the bolt 6, so as to resiliently counterbias the opening movement of the bolt 6 in order to provide, by a resilient reaction, the closing movement of the bolt 6, by cooperating with the spring 16 affecting the cam disc 10.

The lock according to the present invention comprises furthermore, deactuating means for deactuating the coupling means coupling the handle to the cam disc 10, which comprise a slide 20 which can slide along a cross direction of the axis 3a.

The slide 20 is provided with a portion 20a connected with a slanted plane 21, constituted by a tab element, or tongue element, 22 of the box-like construction 2, inwardly deflected or bent, so that the translation of the slide 20, transversely of the axis 3a, will also cause a translation in a direction substantially parallel to the mentioned axis.

The slide 20 engages with a slot 23 provided on the sleeve 13, so that the slide 20, as it is driven along the axis 3a in a direction, will cause the sleeve 13 to be driven in that direction causing the teeth 14 to disengage from the recesses 15.

This displacement of the sleeve 13 will be resiliently counterbiased by a spring 24, arranged between the sleeve 13 and a wall of the box-like construction 2.

The displacement of the slide 20 in the opposite direction, i.e. that direction causing the sleeve 13 to be

engaged with the cam disc 10, is resiliently counterbiased by a spring 25.

The displacement of the slide 20, in the direction opposite to the operating direction of the spring 25, i.e. that direction causing the sleeve 13 to be engaged with the cam disc 10, is obtained by a key device 26, which is connected to the box-like construction 2 and being provided with a cam 27 provided for operating, upon rotating a key engaged in the device 26, on the slide 20.

On the box-like construction 2 side provided for facing inwardly of the room closed by the door on which the subject lock is assembled, is provided a pin 28, affixed to the slide 20 and projecting from the box-like construction through a hole 29.

The above mentioned pin 28, in particular, can be manually operated so as to allow the lock to be opened from the inside part of the door.

The subject lock operates as follows.

With the lock in its closure position, as is shown in particular in figures 1 and 2, the key is introduced into the device 26, and by turning said key so as to bring the cam 27 to operate on the slide 20, the slide is upwardly driven, as shown in the figures.

Alternately, the upwardly displacement of the slide 20 can be obtained by manually operating the pin 28 from the inner side of the door.

As the slide 20 is driven, it will cause the sleeve 13 to be displaced along the axis 3a so as to cause the tooth element 14 to be engaged in the recessed 15 of the cam disc 10.

Such an operation is made possible because of the operation of the spring 24.

Thus, the cam disc 10 will be coupled, in its rotary movement about the axis 3a, with the nose or noix element 8 and, accordingly, with the handle 3.

By turning the handle 3, the cam disc 10 is turned about the rotary axis 3a thereof, with a consequent sliding movement of the bolts toward the box-like construction 2, i.e. in the opening direction.

The opening rotary movement of the cam disc 10 will also load the spring 16.

As the key, engaged in the device 26, is turned in the disabling direction, the cam 27 is caused to be disengaged from the slide 20.

The disengagement of the cam 27 from the slide 20 will also cause, because of the provision of the spring 25, the slide 20 to be displaced in its return stroke, with a consequent disengagement of the sleeve 13 from the cam disc 10, thereby the handle 3 can freely rotate about the rotary axis thereof, without further affecting the cam disc 10.

Thus, any tampering operations exerted on the lock, by causing the handle 3 to be forcibly turned, will have no effect, since the handle, with the lock in the closing position thereof, will idly turn.

From the above disclosure and from the observation of the figures of the accompanying drawings, it should be apparent that the invention fully achieves the

intended aim and objects.

In particular, the fact is to be pointed out, that an automatically closed lock has been provided which, in addition to providing a quick closing as the key is removed therefrom, will efficiently prevent any tampering attempts exerted on the operating handle.

The invention, as disclosed, is susceptible to several variations and modifications, all of which will come within the scope of the inventive idea.

Moreover, all of the details can be replaced by other technically equivalent elements.

In practicing the invention, the used materials, as well as the contingent size and shapes, can be any, depending on requirements.

Claims

1. A highly safe automatically closed lock for overhead doors, gates or the like, comprising a box-like construction, supporting a rotatable handle and at least a slidable bolt, projecting from said box-like construction, coupling means being provided for coupling the handle to the bolt, to allow said bolt to slide for opening the lock, as the handle is turned, characterized in that said lock comprises moreover driving means for automatically driving said bolt in its closing sliding movement, and deactuating means for deactuating said coupling means, said deactuating means being controllably driven in order to idly turn the handle.
2. An automatically closed lock, according to Claim 1, characterized in that said coupling means comprise a nose element which is rotatably supported about a rotary axis thereof by said box-like construction and being axially traversed by a polygonal hole, housing a shaft of said handle and a cam disc, rotatably supported about a rotary axis thereof, by said box-like construction and operating on at least a bolt, between said nose element and cam disc being arranged a clutch-in device, rotatably coupling the nose element and cam disc, said deactuating means controllably operating on said clutch-in device.
3. An automatically closed lock, according to Claims 1 and 2, characterized in that said clutch-in device comprises a sleeve, assembled about said nose element and rigid therewith, in its rotary movement about its rotary axis, said sleeve being axially slidable along said nose element and being provided, at one axial end portion thereof, facing said cam disc, with tooth elements engageable in or disengageable from, by axially displacing said sleeve, recesses provided on said cam disc.
4. An automatically closed lock, according to one or more of the preceding claims, characterized in that said deactuating means comprise a slide which is movable in a direction substantially parallel to the axis of said nose element and engaging with said sleeve, to disengage said tooth element from said recesses, by counter-biasing the first return resilient means.
5. An automatically closed lock, according to one or more of the preceding claims, characterized in that said slide can be controllably driven transversely of the axis of said nose element, and being moreover provided a portion of said box-like construction defining a slanted plane, cooperating with a portion of said slide, in order to displace the latter in parallel with the axis of said nose element as it is driven in a cross direction.
6. An automatically closed lock, according to one or more of the preceding claims, characterized in that said lock further comprises second return resilient means, which resiliently counterbias the displacement of said slide in the direction causing the sleeve to be engaged with the cam disc.
7. An automatically closed lock, according to one or more of the preceding claims, characterized in that said automatically operating means comprise return resilient means operating on said cam disc or on one of said bolts, in order to cause said cam disc to turn in that direction causing the bolts to slide to their closing position.
8. An automatically closed lock, according to one or more of the preceding claims, characterized in that said recesses have a predetermined amplitude arch extension, about the axis of said nose element.
9. An automatically closed lock, according to one or more of the preceding claims, characterized in that said lock comprises moreover a key device, operating on said slide, in order to cause said slide to be displaced in a direction transversely of the axis of said nose element, against said second return resilient means.
10. An automatically closed lock, according to one or more of the preceding claims, characterized in that said lock comprises moreover a pin, connected to said slide and projecting from the side of said box-like construction, facing the inside of the room closed by the door including said lock, said pin being manually operable for displacing said slide in a direction transversely of the axis of said nose element, against said second return resilient means.
11. An automatically closed lock, according to one or more of the preceding claims, characterized in that

said cam disc is provided with a plurality of recesses
for housing pin elements rigid with said bolts.

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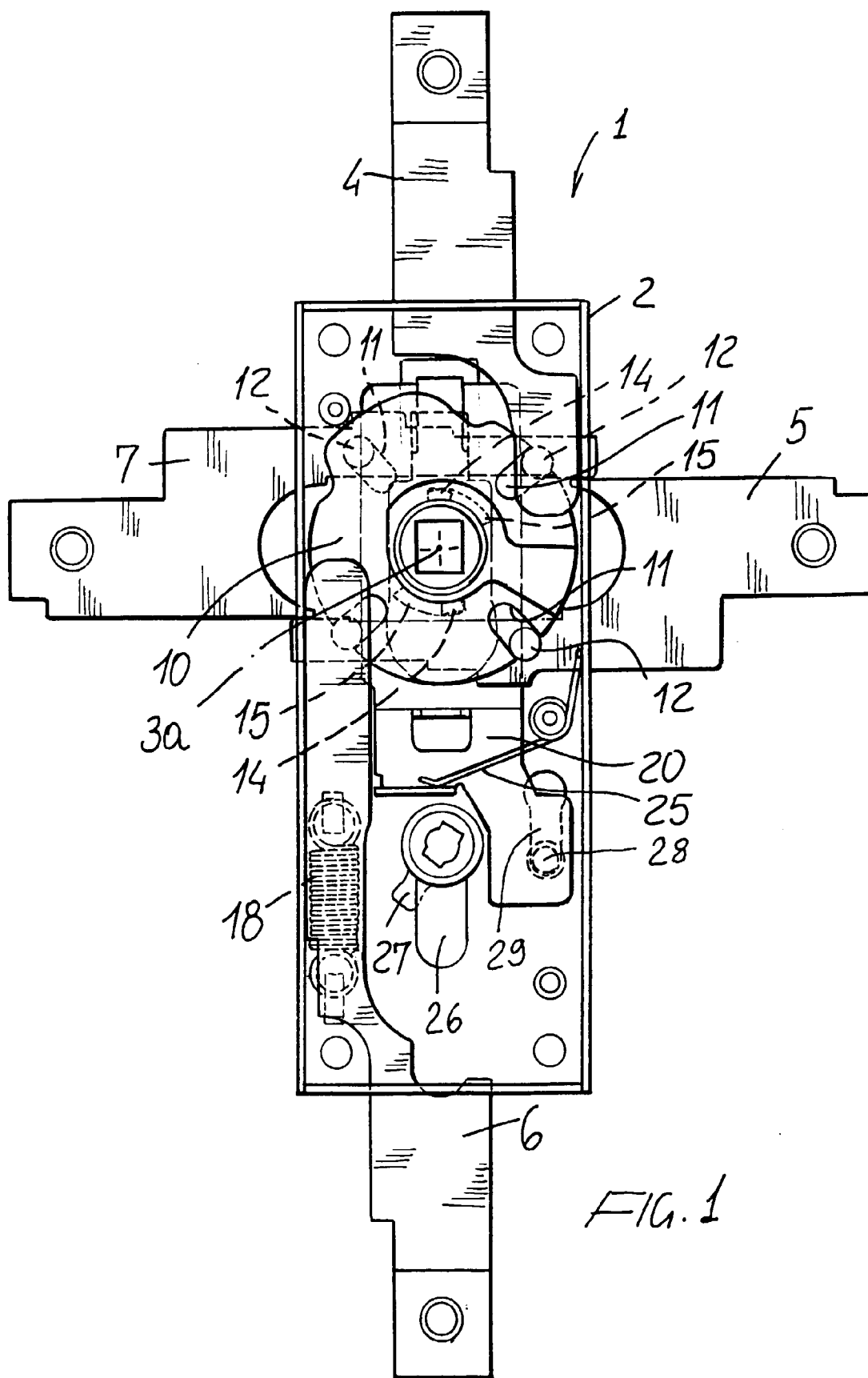
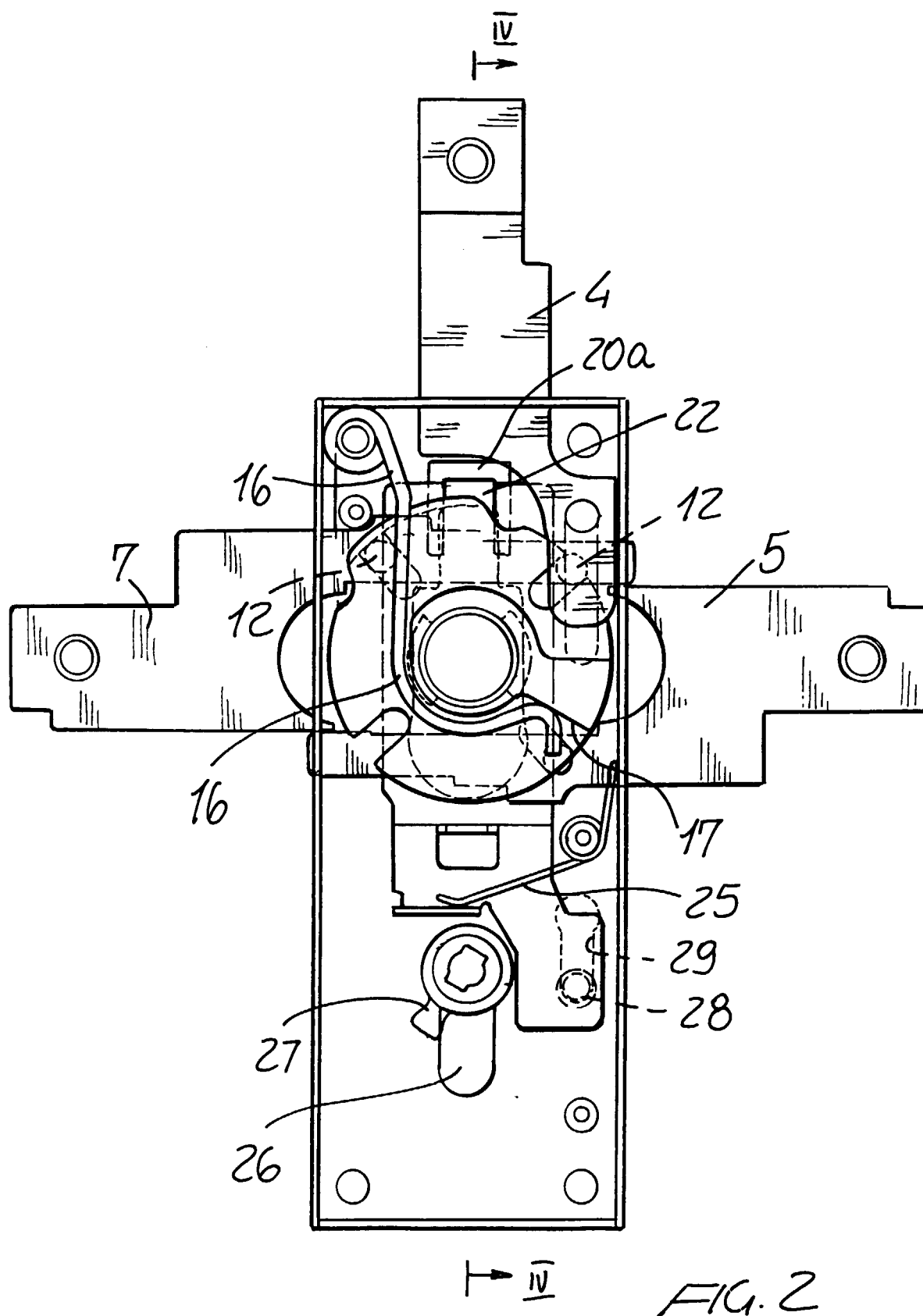
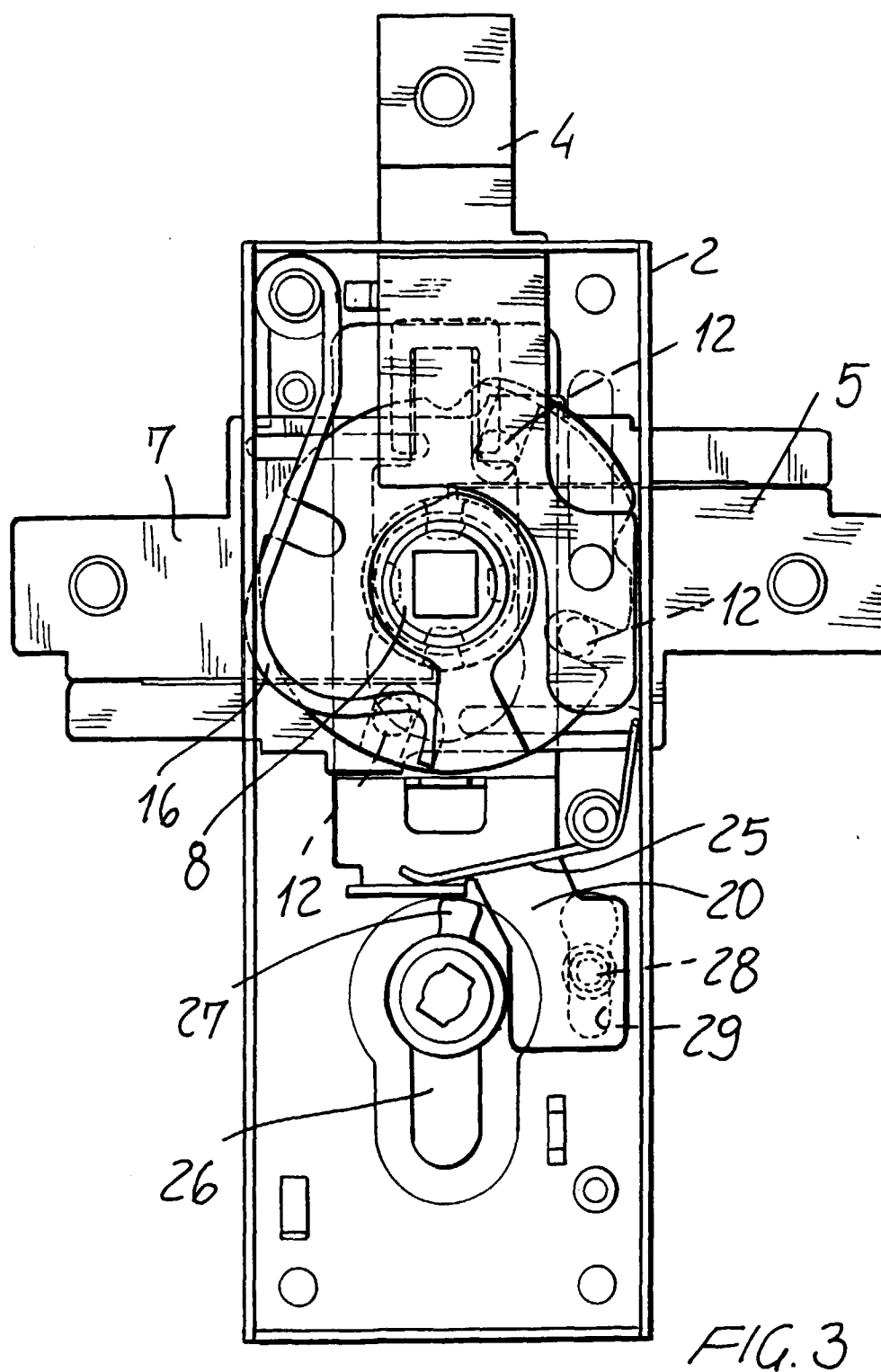
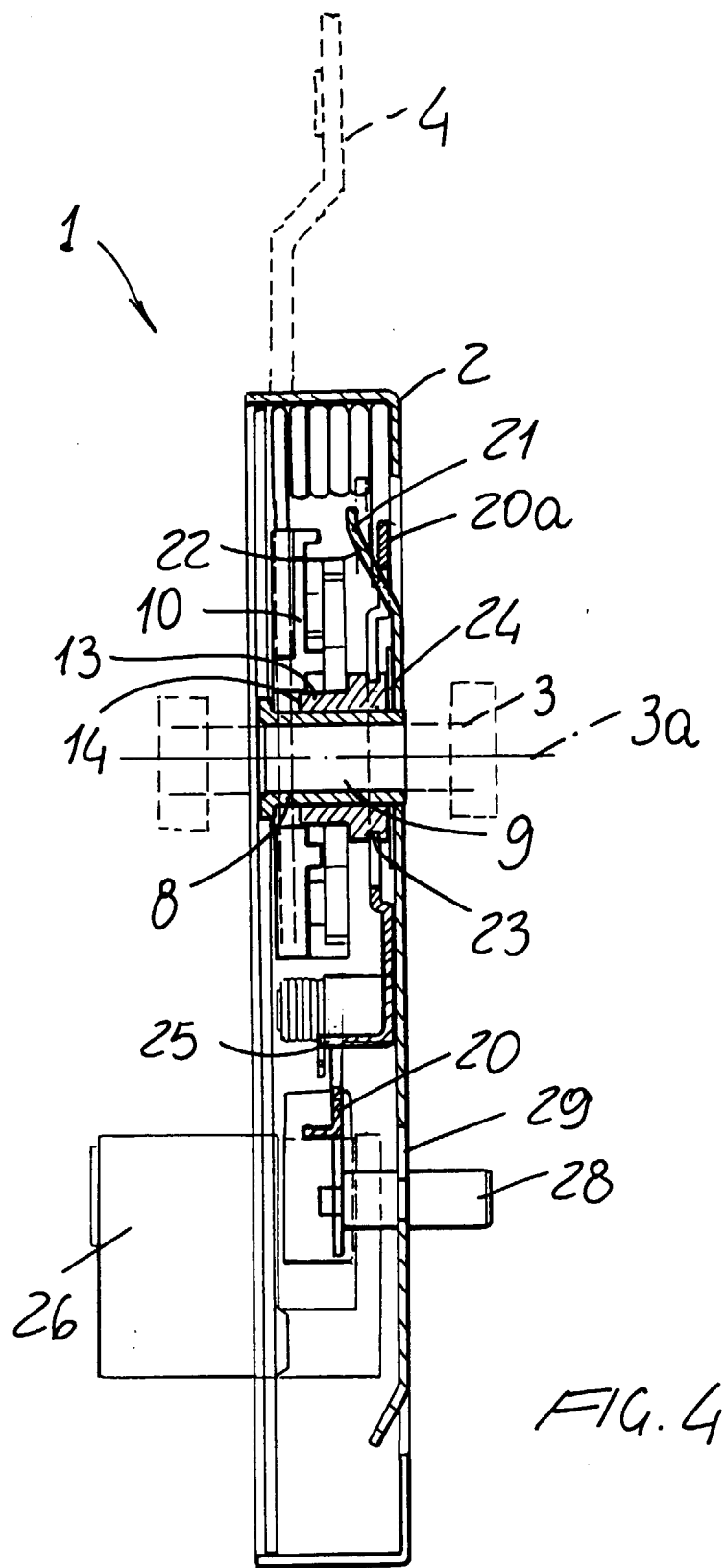


FIG. 1









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EUROPEAN SEARCH REPORT

Application Number
EP 96 83 0010

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	US-A-4 676 083 (SEDLEY BRUCE S ET AL) 30 June 1987	1-6,8	E05C9/06 E05B13/00
A	* column 2, line 64 - column 6, line 51; figures *	7	

X	GB-A-394 172 (W.NEWMAN & SONS LTD)	1-4,6-8	
	* page 1, line 70 - page 2, line 72; figures *		

X	US-A-1 505 865 (COSTA)	1-4,6,8	
A	* page 1, line 93 - page 4, line 14; figures *	7	

X	AU-A-600 646 (DANNY KO TUN WU) 2 July 1990	1,2,6,9	
A	* page 3, line 1 - page 7, line 5; figures *	10	

The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.6) E05B E05C
Place of search THE HAGUE		Date of completion of the search 26 April 1996	Examiner Henkes, R
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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