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(54) **Safety lock**

(57) A safety lock comprising:
- a casing (12);
- at least one bolt (32), which is able to move with respect to the casing (12) between an opening position and at least one closing position; and
- an actuation plate (24), which is able to move within the casing (12) in a rectilinear direction of actuation (26) and is connected to said bolt (32) for moving the bolt from the opening position to a closing position and vice versa. The bolt (32) is substantially hook-shaped and is connected to the actuation plate (24) by means of a pin-and-slit transmission device (30, 40), which allows a movement of the bolt (32) with respect to the actuation plate (24) in a direction orthogonal to said direction of actuation (26). The bolt (32) is connected to the casing (12) by means of a pin-and-slit guide device (40, 42, 46a, 46b) that guides the bolt (32) along a path of closing or of opening, which comprises at least one rectilinear stretch parallel to the direction of actuation (26) and at least one stretch inclined with respect to the direction of actuation (26).

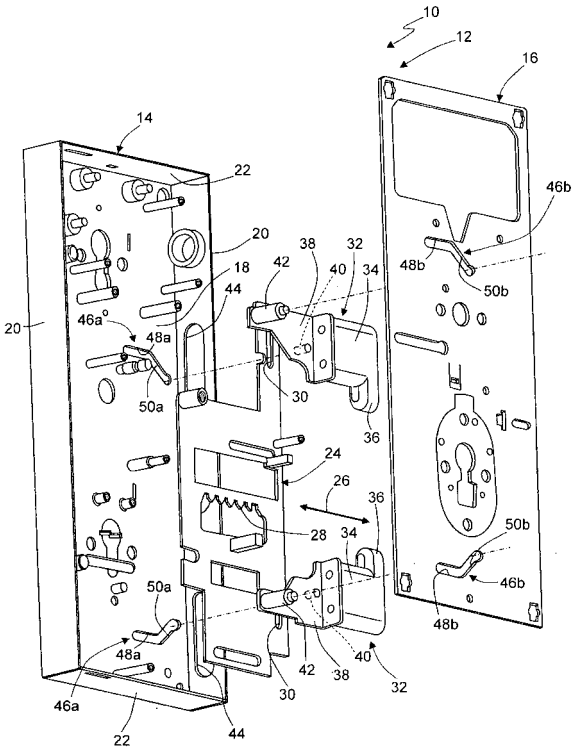

Fig.1

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Description

[0001] The present invention relates to a safety lock comprising: a casing, at least one bolt, which is able to move with respect to the casing between an opening position and at least one closing position, and an actuation plate, which is able to move within the casing in a rectilinear direction of actuation and is connected to said bolt for moving the bolt from an opening position to at least one closing position and vice versa.

[0002] In traditional solutions, bolts of safety locks consist of sturdy metal pins that extend parallel to the direction of actuation of the plate and are fixed to said plate.

[0003] One of the most frequent attempts at effraction consists in forcing the openable vertical edge of the door away from the fixed frame in an attempt to get the bolts to come out of the respective seats provided in the fixed frame.

[0004] Various types of safety lock have already been contemplated that tend to hinder any attempt at effraction made by forcing the openable longitudinal edge of the door. For example, the Italian patent No. 1319951 filed in the name of the present applicant describes a safety lock in which the bolts have the form of hooks that turn about respective horizontal axes between an opening position and a closing position and that, in the closed position, engage respective seats in the frame and hamper any attempt at effraction made by trying to force the openable edge of the door away from the fixed frame.

[0005] The object of the present invention is to provide a safety lock, which is designed to counteract any attempt at effraction that tend to deform the openable edge of the door and has a simple and inexpensive structure consisting of a small number of components.

[0006] According to the present invention, said object is achieved by a safety lock having the characteristics forming the subject of Claim 1.

[0007] The present invention will now be described in detail with reference to the annexed drawings, which are provided purely by way of non-limiting example and in which:

- Figure 1 is an exploded perspective view of a lock according to the present invention;
- Figure 2 is a perspective view of the lock of Figure 1 from a different angle;
- Figure 3 is a plan view of the lock according to the invention in the open position; and
- Figures 4-7 are plan views illustrating the sequence of movement of the bolts during closing of the lock.

[0008] With reference to Figures 1 and 2, designated by 10 is a safety lock according to the present invention. The lock 10 comprises a casing 12 with a generally flattened parallelepipedal shape, including a case 14 and a lid 16. The case 14 has substantially the shape of a box with a side open and comprises a bottom wall 18 and four side walls 20, 22. The lid 16 is fixed on the open side of the case 14 and extends parallel to the bottom wall 18.

[0009] An actuation plate 24 is housed within the casing 12. The actuation plate 24 is constrained to the case 14 in such a way that it exclusively presents a movement in a rectilinear direction of actuation, indicated by the double-headed arrow 26. The direction of actuation 26 is parallel to the bottom wall 12 and orthogonal to the larger side walls 20. The actuation plate 24 comprises a rack formation 28, which cooperates with a key-operated actuation device (not illustrated), designed to control the movement of the plate 24 in the direction of actuation 26. The lock 10 can be equipped with a key-operated actuation device of the cylinder type or else of the double-bit type. The key-operated actuation device designed to control the movement of the plate 24 is not illustrated both to simplify understanding of the drawings and because it lies outside of the scope of the present invention. For the purposes of the present invention, it is sufficient to note that the actuation plate 24 can be associated to any key-operated device designed to control movement of the plate in the direction of actuation 26.

[0010] The actuation plate 24 comprises two through slits 30, which extend in a direction orthogonal to the direction of actuation 26 and the function of which will emerge clearly in what follows.

[0011] The lock 10 comprises two bolts 32 configured as components separate from the actuation plate 24. Each bolt 32 is substantially hook-shaped, with a main body 34 having a main axis parallel to the direction of actuation 26 and provided at one of its ends with a hook-shaped portion 36 that extends in a direction orthogonal to the direction of actuation 26. Each bolt 32 comprises a plate 38 fixed to the internal end of the main body 34. The plate 38 carries two pins 40, 42, the axes of which extend in a direction orthogonal to the bottom wall 18 and to the lid 16. The bolts 32 extend through respective openings 44 formed in one of the two larger side walls 20.

[0012] The bottom wall 18 and the lid 16 are provided with two guide slits 46a, 46b, each of which has a first rectilinear stretch 48a, 48b parallel to the direction of actuation 26 and a second stretch 50a, 50b inclined with respect to the direction of actuation 26. The guide slit 46a of the bottom wall 18 and the guide slit 46b of the lid 16 are set at a distance from one another in the direction of actuation 26b and in a direction orthogonal to the direction of actuation 26.

[0013] The pin 40 of each bolt 32 simultaneously engages the respective slit 30 of the actuation plate 24 and the respective slit 46a of the bottom wall 18. The pin 42 of each bolt 32 engages the respective slit 46b of the lid 16. The engagement between the pin 40 and the slit 30 constitutes a transmission device that imparts on each bolt 32 a movement of opening or closing according to the movement of the actuation plate 24 in the direction of actuation 26. The engagement between the pin 40 and the slit 46a and between the pin 42 and the slit 46b of each bolt 32 constitutes a guide device that defines a pre-set path of movement of each bolt 32.

[0014] The movement of the bolts 32 from the opening position to the closing position is illustrated in Figures 3-7. With reference to said figures, the side wall 20 of the lock 10, from which the bolts 32 come out, faces a fixed plate 52 forming part of the frame of the door. The fixed plate 52 is provided with openings 54, within which the bolts 32 engage in the closing position. The openings 54 preferably have the same shape and the same dimensions as the openings 44 of the wall 20.

[0015] Figure 4 shows the lock 10 in the open position. In this position, the bolts 32 are in their most retracted position. The bolts 32 project slightly from the openings 44 but do not engage the openings 54 of the fixed plate 52. Figures 4-7 illustrate the positions of the lock 10 corresponding to subsequent throws of the key-operated actuation mechanism. The lock 10 is designed to be used with a key-operated four-throw actuation mechanism, each throw corresponding to a rotation of 180° of the key.

[0016] Figures 4 and 5 illustrate the positions of the lock 10 respectively at the end of the first throw and of the second throw. During this movement, the pins 40 and 42 of each bolt 32 engage only the first rectilinear stretch 48a, 48b of the slits 46a, 46b. Consequently, during this movement the bolts 32 move exclusively in a rectilinear direction parallel to the direction of movement 26 of the actuation plate 24. At the end of the second throw (Figure 5), the hook-shaped portion of each bolt 32 extends through the respective opening 54 of the fixed plate 52.

[0017] Figures 6 and 7 illustrate the lock 10 respectively at the end of the third and fourth throws of the key-operated actuation mechanism. In this step, the pins 40, 42 of each bolt 32 engage the inclined stretches 50a, 50b of the slits 46a, 46b. Consequently, each bolt 32 moves in an inclined direction with respect to the direction of movement 26 of the actuation plate 24. The movement of each bolt 32 along an inclined path carries the hook-shaped portions 36 into a position out of line with respect to the corresponding positions of the openings 54, as illustrated in Figures 6 and 7. Figure 7 illustrates the lock in the completely closed position that is reached after four throws of the key-operated actuation mechanism. It may be noted that the hook-shaped portions 36 are out of line with respect to the corresponding openings 54. Consequently, any attempt at effraction that were to seek to force the vertical openable edge of the door away from the fixed plate 52 would bring the hook-shaped portions 36 into a condition of interference against the fixed plate 52.

[0018] The movement in the inclined direction of the bolts 32 is allowed by the fact that the slits 30 of the actuation plate 24 extend in a direction orthogonal to the direction of movement 26 of the actuation plate 24. As may be noted from Figures 3-7, the pins 40, 42 of each bolt 32 are set at a distance from one another both in a direction parallel to the direction of actuation 26 and in a direction orthogonal to the direction of actuation 26. This enables the bolts 32 to be withheld with a stable orientation.

[0019] A particularly advantageous characteristic of the lock according to the present invention is the possibility of providing an alternative model of lock, in which the bolts 32 are fixed with respect to the actuation plate 24, keeping the structure of the lock substantially unvaried. This variant (not falling within the scope of protection of the present invention) substantially corresponds to a traditional lock with purely rectilinear movement of the bolts. A particularly advantageous feature is represented by the fact that it is possible to keep the major part of the structure of the lock 10 substantially unaltered to provide two different types of locks, one with purely rectilinear movement of the bolts and one with the inclined movement described previously and with greater security against effraction.

Claims

1. A safety lock comprising:

- a casing (12);
- at least one bolt (32), which is able to move with respect to the casing (12) between an opening position and at least one closing position; and
- an actuation plate (24), which is able to move within the casing (12) in a rectilinear direction of actuation (26) and is connected to said bolt (32) for moving the bolt from the opening position to said closing position and vice versa,

said safety lock being **characterized in that** said bolt (32) is substantially hook-shaped, with a main body having an axis parallel to said direction of actuation (26) and a hook-shaped portion (36) that projects from the main body (34) in a direction orthogonal to said direction of actuation (26), in which said bolt (32) is mobile with respect to the actuation plate (24) and is connected to the actuation plate (24) by means of a pin-and-slit transmission device (30, 40) that allows a movement of the bolt (32) with respect to the actuation plate (24) in a direction orthogonal to said direction of actuation (26), and in which said bolt (32) is connected to the casing (12) by means of a pin-and-slit guide device (40, 42, 46a, 46b) that guides the bolt (32) along a path of closing or of opening that comprises at least one rectilinear stretch parallel to the direction of actuation (26) and at least one stretch inclined with respect to the direction of actuation (26).

2. A safety lock according to Claim 1, **characterized in that** each bolt (32) comprises a first pin (40) and a second pin (42), the first pin (40) engaging a guide slit (46a) formed in a bottom wall (18) of the casing (12) and the second pin (42) en-

gaging a guide slit (46b) formed in a lid (16) of the casing (12).

3. A safety lock according to Claim 2, **characterized in that** said first pin (40) also engages a slit (30) of the actuation plate (24) that extends in a direction orthogonal to said direction of actuation (26).

4. A safety lock according to Claim 2, **characterized in that** said pins (40, 42) are set at a distance from one another both in a direction parallel to the direction of actuation (46) and in a direction orthogonal to said direction of actuation (26).

5. A safety lock according to Claim 3, **characterized in that** said guide slits (46a, 46b) are set at a distance from one another both in a direction parallel to the direction of actuation (26) and in a direction orthogonal to said direction of actuation (26).

6. A safety lock according to Claim 3, **characterized in that** each of said guide slits (46a, 46b) comprises a first rectilinear stretch (48a, 48b) parallel to said direction of actuation (26) and a second stretch (50a, 50b) inclined with respect to said direction of actuation (26).

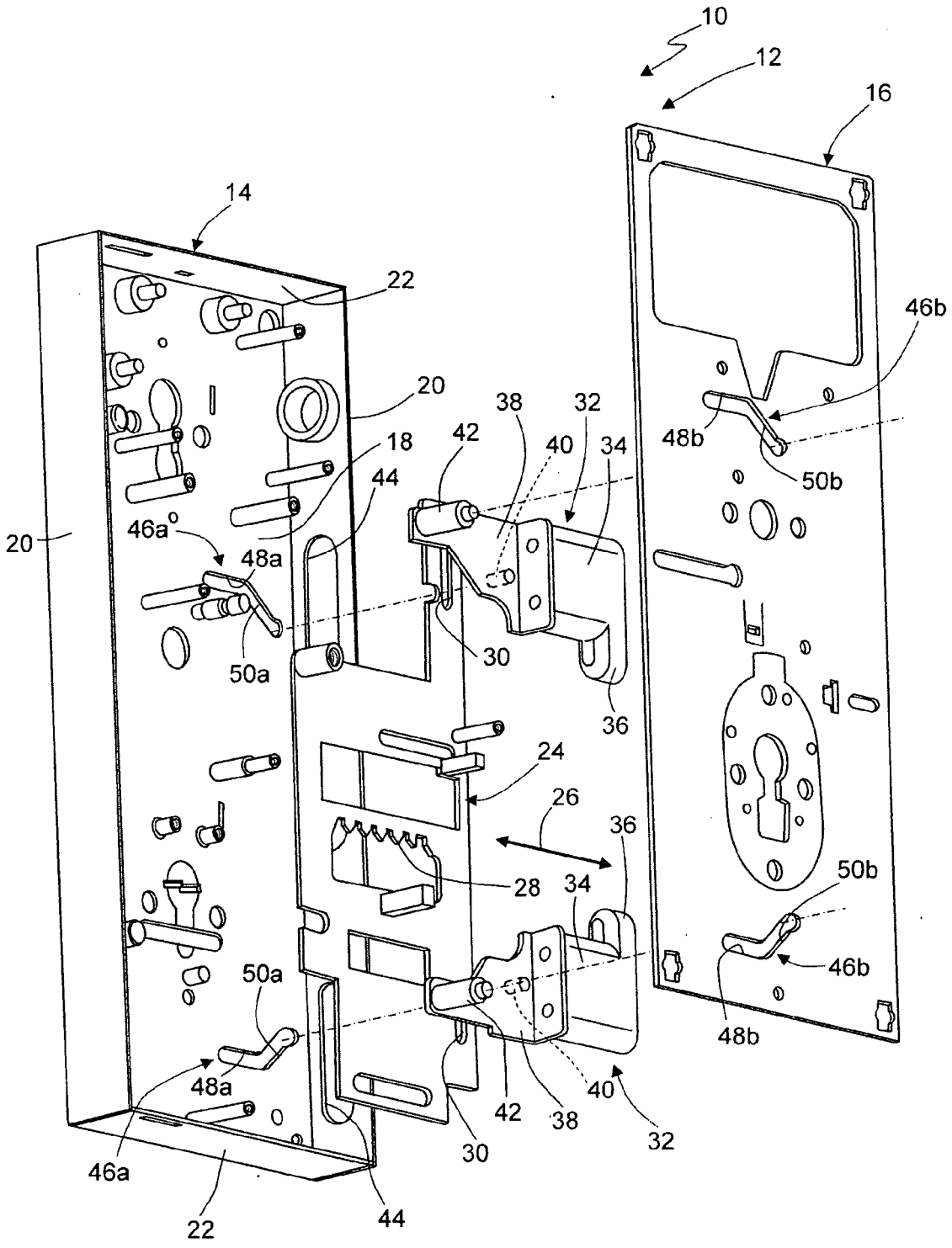
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Fig.1

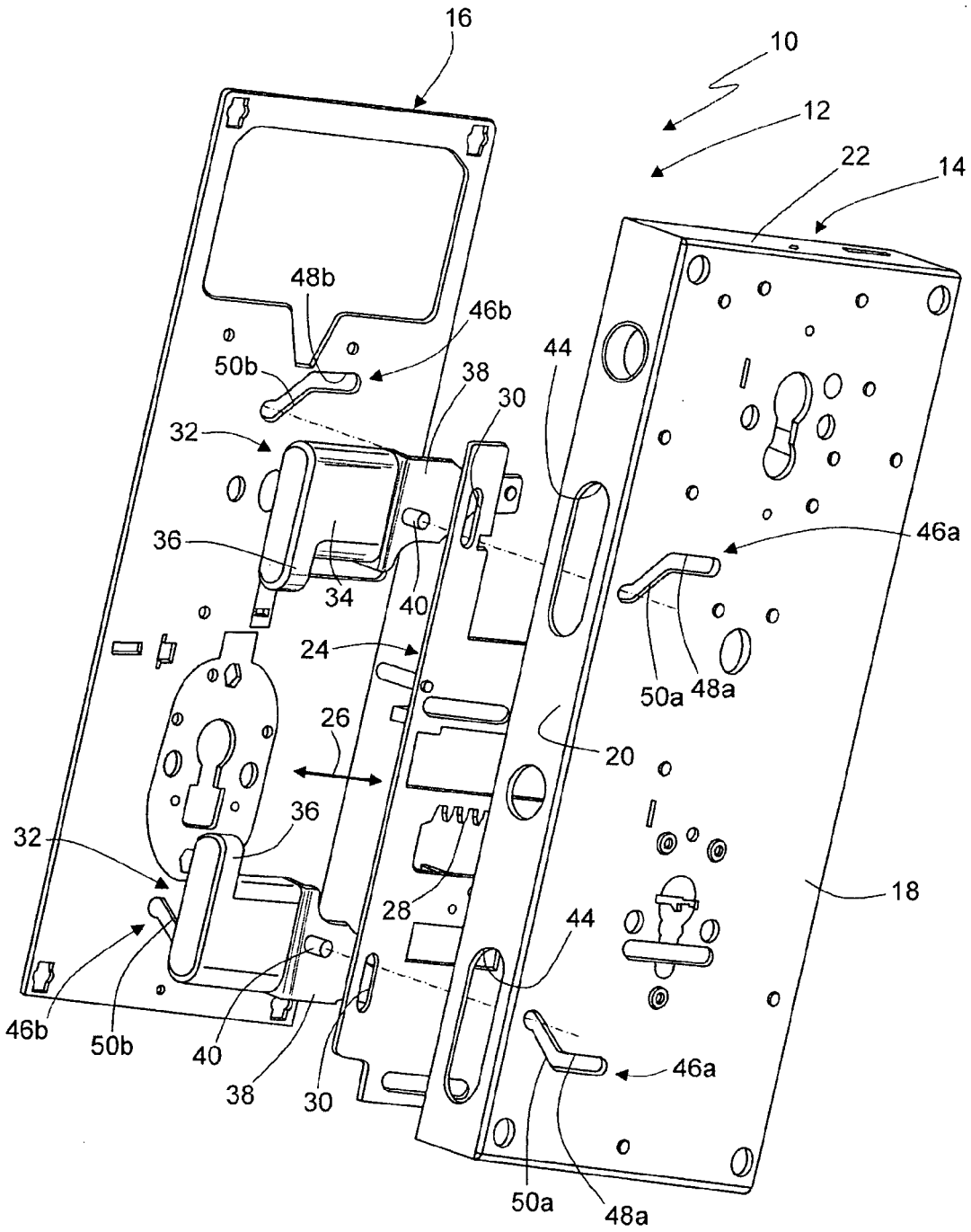
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Fig.2

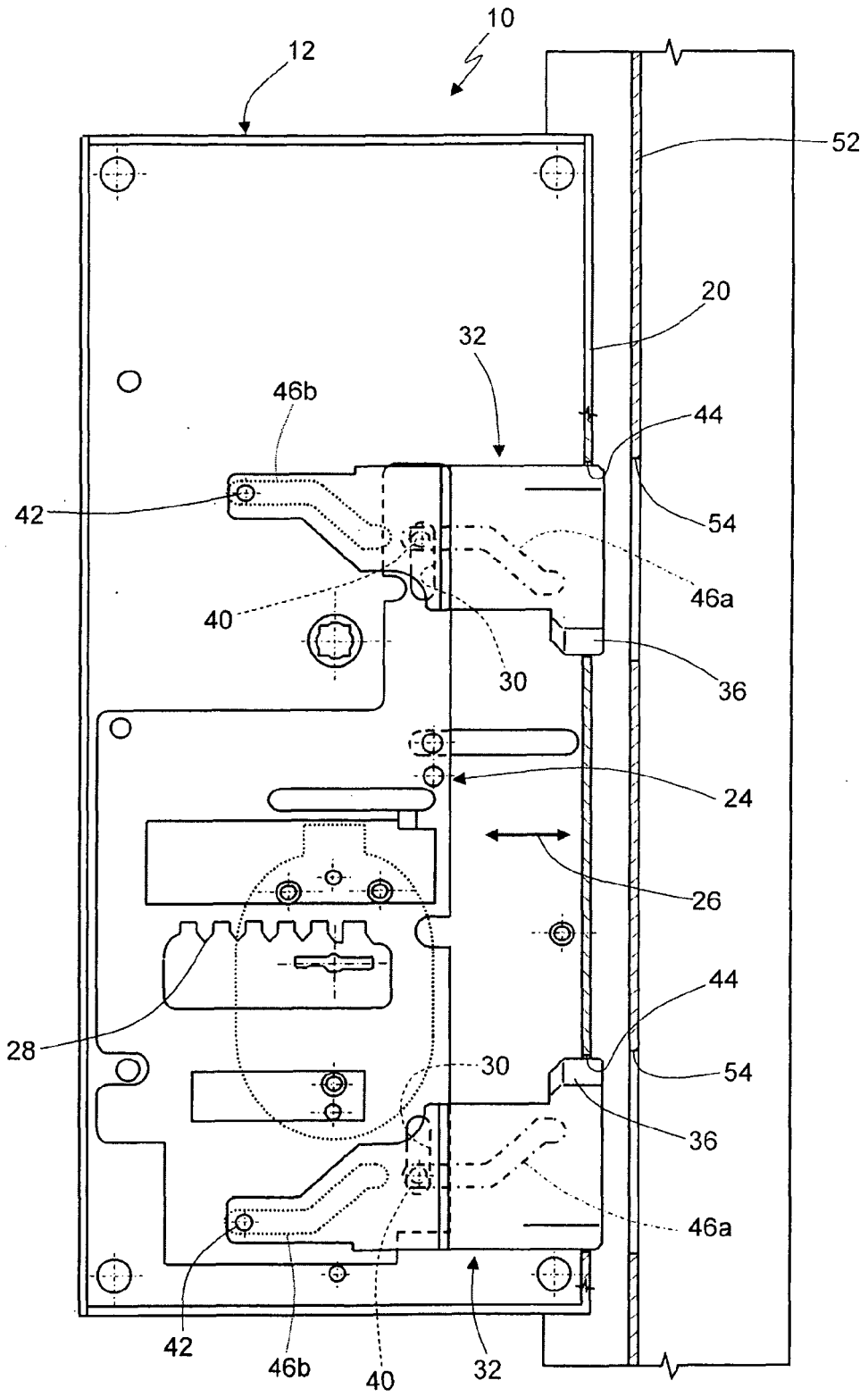
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Fig.3

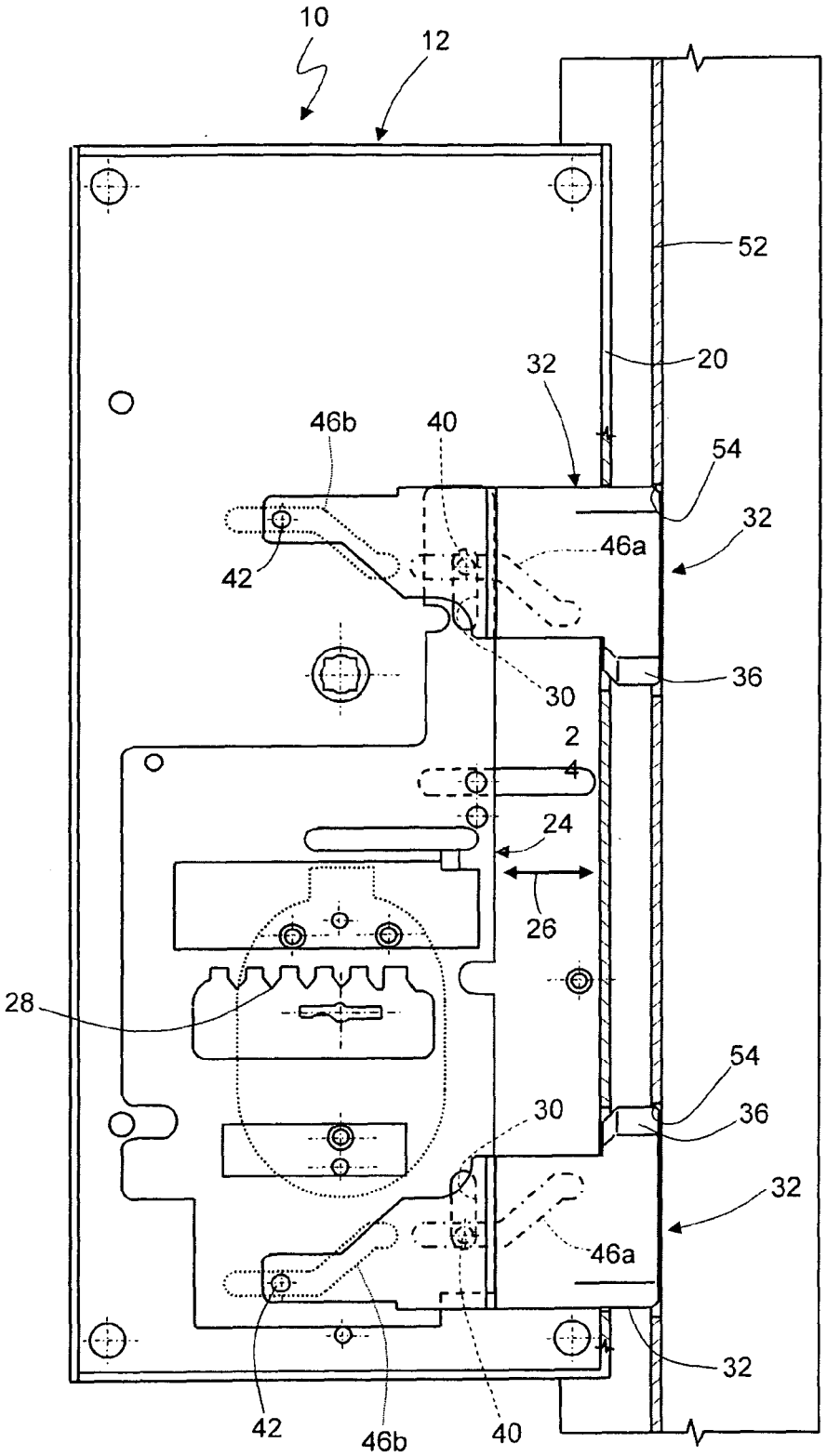
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Fig.4

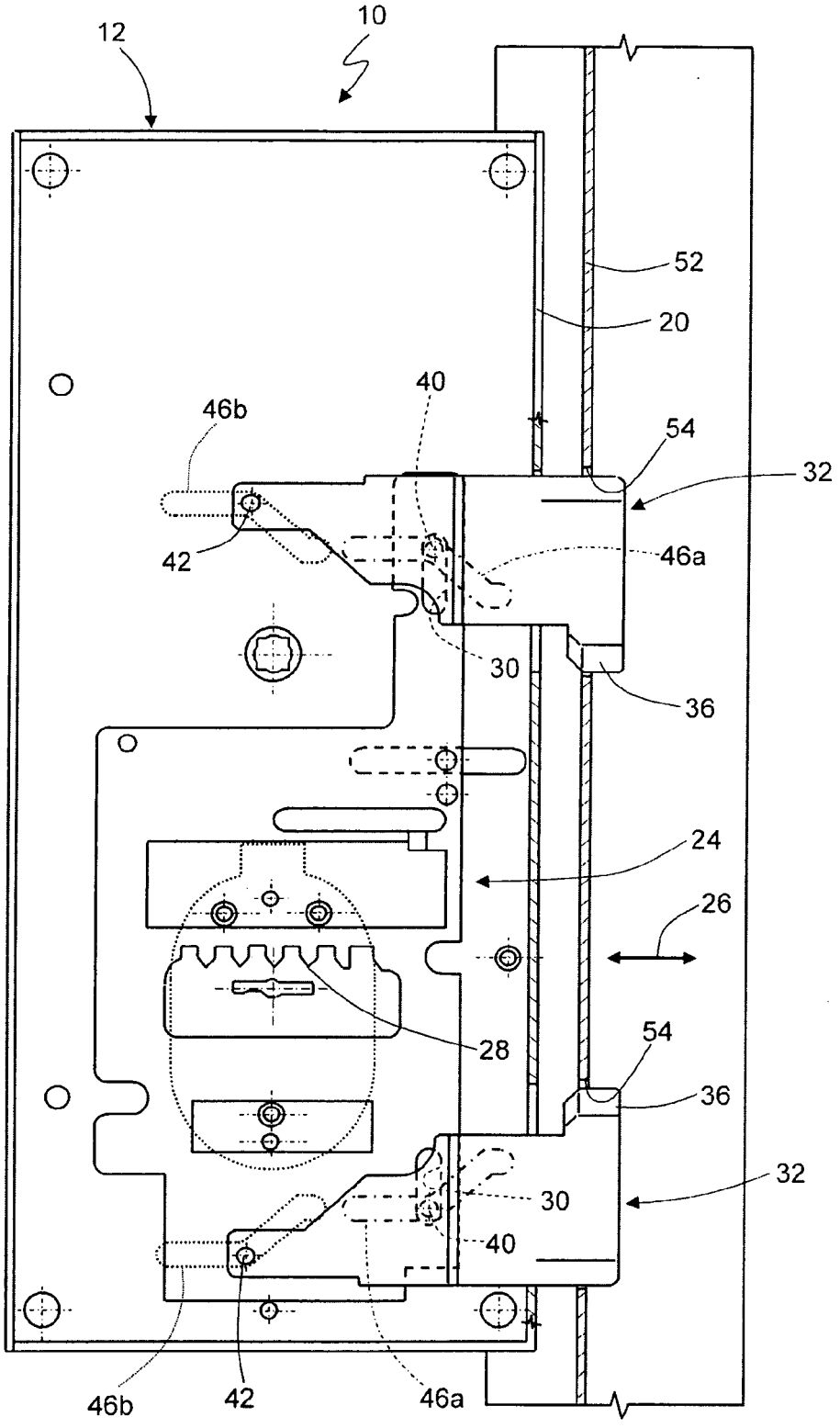
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Fig.5

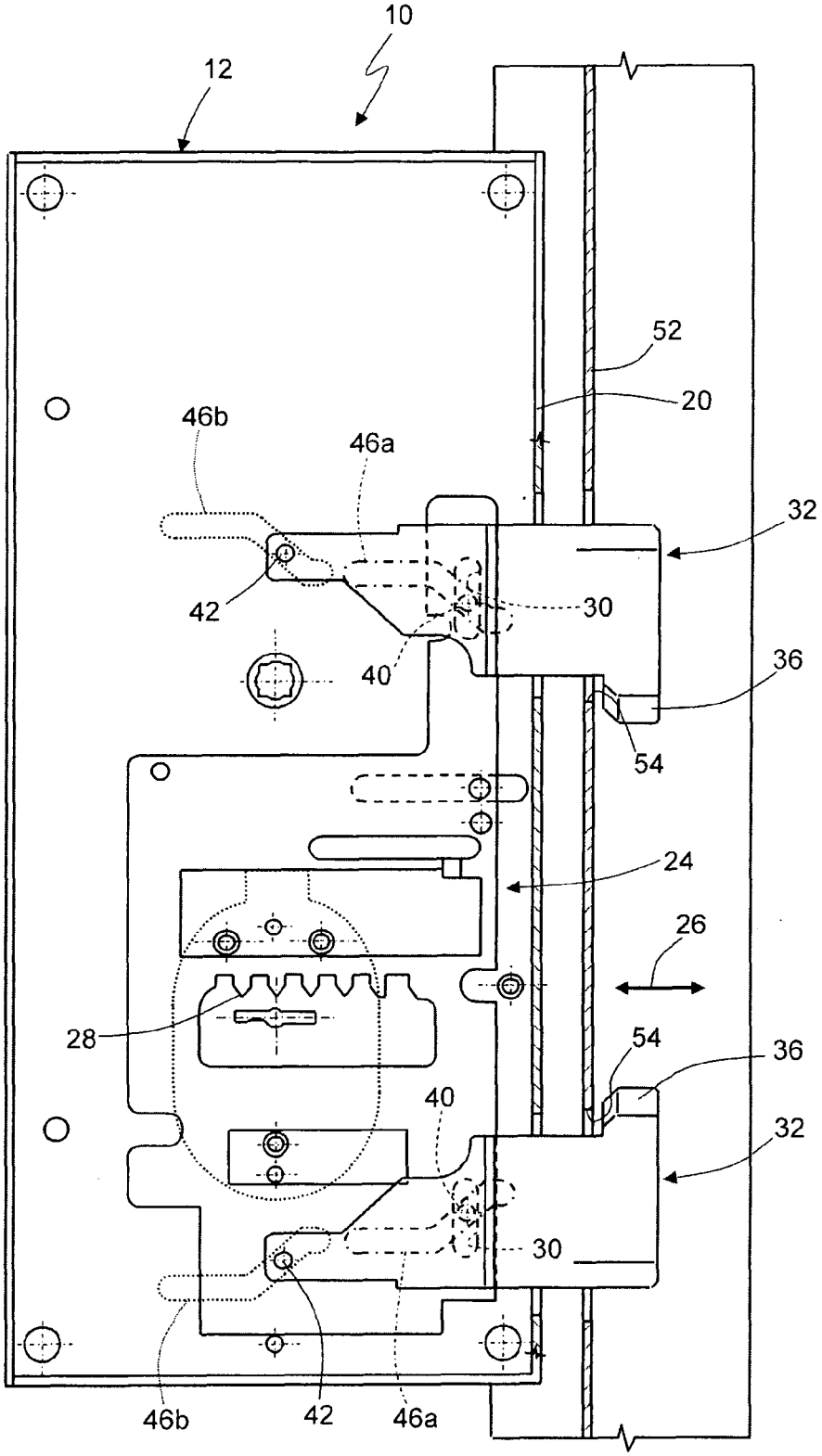
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Fig.6

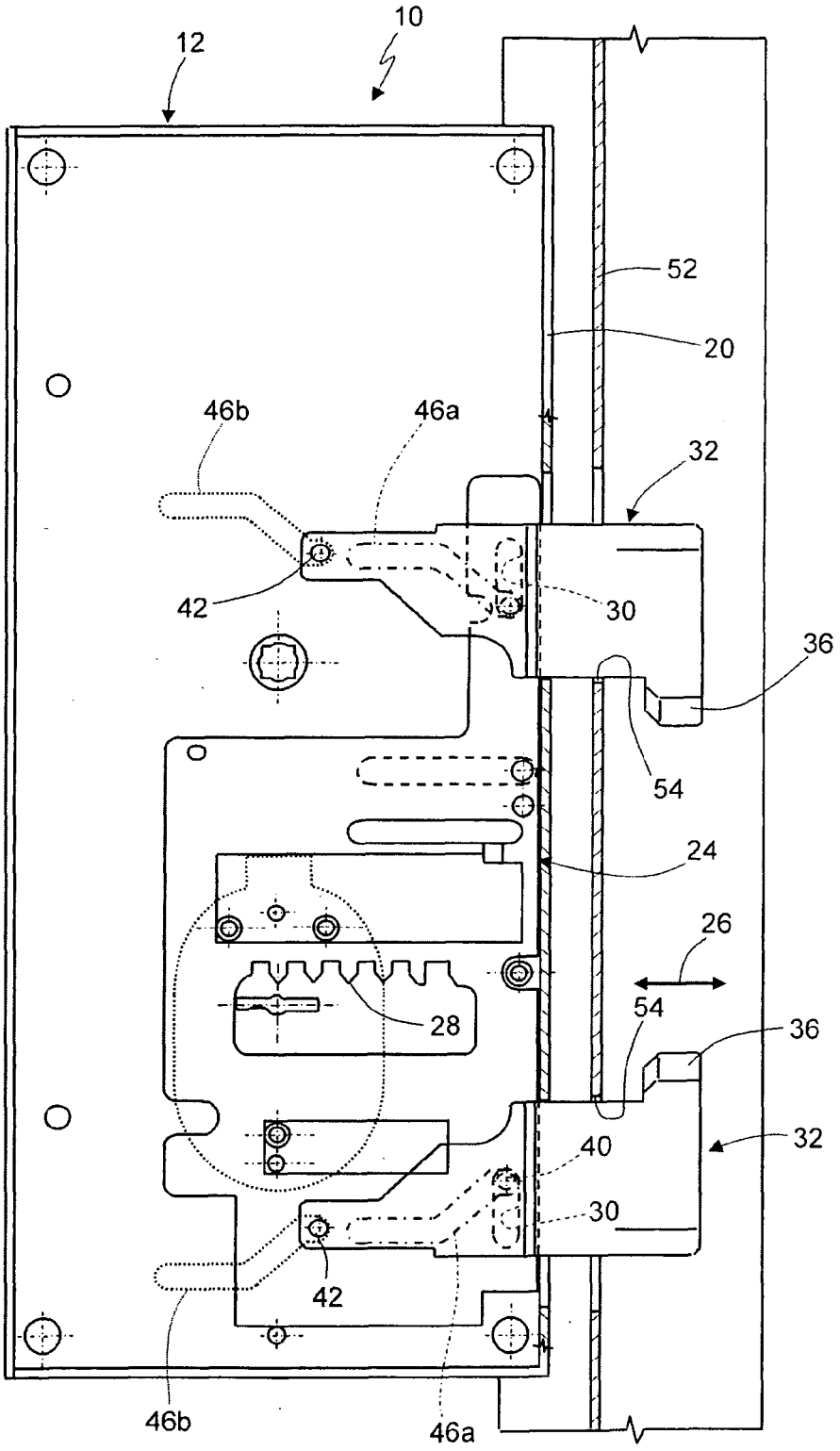

Fig.7

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EUROPEAN SEARCH REPORT

Application Number
EP 08 42 5057

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	GB 2 217 770 A (YU TSENG TSAI) 1 November 1989 (1989-11-01) * the whole document * -----	1-6	INV. E05B63/12
X	US 5 009 089 A (LIN EMILY M Y [TW]) 23 April 1991 (1991-04-23) * the whole document * -----	1-3,6	
A	GB 630 379 A (ERNEST CYRIL HANSOR) 12 October 1949 (1949-10-12) * the whole document * -----	1,4-6	
			TECHNICAL FIELDS SEARCHED (IPC) E05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	8 September 2008	Westin, Kenneth

CATEGORY OF CITED DOCUMENTS

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08-09-2008

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 2217770 A	01-11-1989	NONE	
US 5009089 A	23-04-1991	NONE	
GB 630379 A	12-10-1949	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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Patent documents cited in the description

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