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(71) Applicant: **KALE Kilit ve Kalip Sanayi A.S.**
34610 Istanbul (TR)

(72) Inventor: **BASKAYA, Özgür**
34610 Istanbul (TR)

(74) Representative: **Sevinç, Erkan**
Istanbul Patent A.S.
Plaza-33, Büyükdere Cad. No: 33/16
Sisli
34381 Istanbul (TR)

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(54) **LOCK FOR AN INTERIOR DOOR**

(57) The present invention relates to a lock for an interior room. Said lock (10) for interior door comprises, a bolt (16) and bolt tail (17), a hub (20) being rotatable by operation of a handle, a latch (13) and a latch tail (25) engageable with a door frame, being positioned between a horizontal axis of the hub (Y_1) and the bolt (16). According to the present invention said lock further comprises said lock (10) further comprises a lever (15) being pivotable around a lever hinge (24) for retracting the latch (13) having a first arm (50) connected with the latch (13), and a second arm (60) being moveable by a hub tab (32) when the handle is operated. In addition to that length of the second arm (Z_2) is equal or longer than length of the first arm (Z_1) which leads the retraction of the latch to be obtained easily.

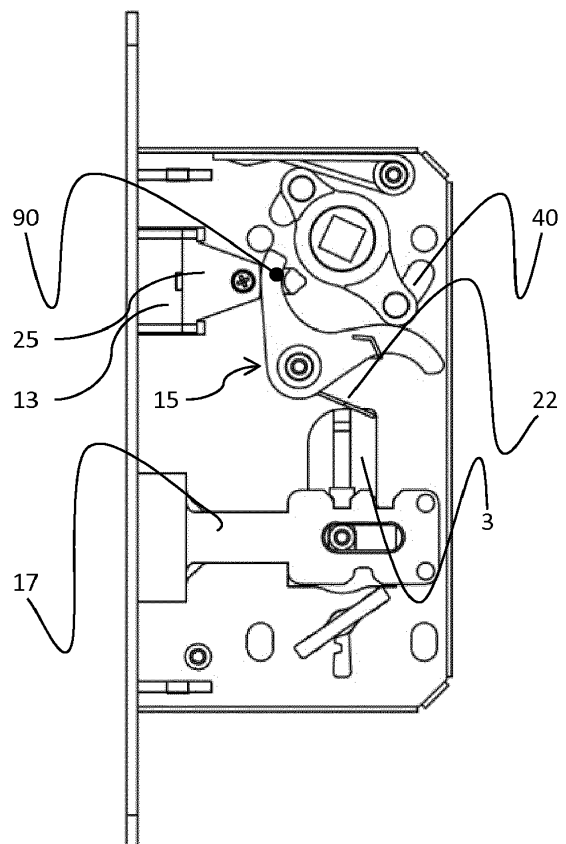


Fig. 2b

Description

Technical Field of Invention

[0001] This invention relates to a lock for an interior room of houses, hotels, apartments and other type buildings, and more particularly relates to a lock which allows retracting the latch bolt easily when it is minimized as a whole.

Background of the Invention

[0002] A mortise (mortice) lock for interior rooms of houses, hotels, apartments and other type buildings generally includes a latch operated by a handle from either side of a door, and a bolt operated by a key or a cylinder lock. Locks are set in a recess at an edge of a door and which includes latches or bolts which can be actuated (i.e., thrown or retracted) into and out of locking engagement with recesses formed in a door post or frame.

[0003] Generally, a latch also referred as a latch bolt, of mortise lock for inner rooms are placed at least partially higher than the hub of the lock. During movement of the door handle, when pressed downwardly by the user, the movement direction of the hub and latch is oriented to be same. In the state of art, a simple piece of material such as a lever can be used to retract the bolt by the movement of the hub. Similar types of locks used in interior rooms are preferred not only provide the easy and quiet operation but to be in simple structure.

[0004] Latch bolts and locking bolts used in locks have been provided in different sizes which have evolved as relative industry standards. More particularly, position of the handle and cylinder lock assumes one of several relatively standard dimensions. When it is desired similar type lock to be in a smaller size, the latch retracted by turning of the handle is needed to be used with complex parts thereof. Center length of the handle of the lock is preferred to be in a position appropriate with the standardized lock measures established in time. When the center length of the handle of the lock is kept appropriate with respect to the standardized measure in a smaller size lock, latch of the lock has to be positioned lower than hub and closer to the bolt at the same time. In this case, the direction of retraction of the latch has to be oriented reverse according to the direction of the hub of the lock. Therefore, when the lock size is minimized by keeping center length value of the handle in standardized ratio, it is needed a mechanism which retracts the latch easily inside the lock body at the same time eliminating the extra costs. Additionally, it is required that the position of the latch has to be changed according to the door where it is going to be used. More practical way of changing position of the latch will also provide easiness to the user and to whom mounting the lock. There is need to modify the lock in order to make it suitable for doors which open inward or outward and in which not only the knob and the handle reverse their position but it is necessary to

maintain the connection between the handle and the latch in this reversed position.

[0005] The distance between hub of the lock and rotational axis of the cylinder lock, referred as a handle axis distance, is standardized in time in a particular country and in a larger geographical area as well. Position of the parts of the lock is needed to be in a form to meet said standardized lock measures. Recently, for saving time and cost, it is desired to use smaller sized mortise lock by decreasing the area of the lock especially in fabricated wooden doors.

[0006] Besides, it is one of the aim that a lock which is in a smaller size at the same saving same materials which may lead deduction in price of the lock. However, while minimizing the size of the lock, said standardized measures has to be kept which leads to use complex pieces and increase in cost of the lock.

Objects of Invention

[0007] The general aim of the present invention is to provide an improved lock of the aforescribed general type which satisfies the requirements hereinbefore set forth.

[0008] Primary object of the invention is to provide a lock which is in minimized by using a lever for easily retracting the latch and keeping standardized lock measures constant at the same time.

[0009] Another object of the invention is to provide a lock which reduces the force to operate for retracting the latch.

[0010] Another object of the present invention is to provide a lock which is easy to handle by user where the latch can be retracted smoothly, and does not expose to any additional resistance in the system due to optimum force transmission.

[0011] Another object of the present invention is to provide a lock which allows using pieces to be in a smaller size by way of optimum force transmission of the lock.

[0012] Another object of the present invention is to provide a lock which can be designed in a simple manner without using complex pieces that leads saving labor cost of the lock.

[0013] Another object of the present invention is to provide a lock having long lasting pieces by way of using simple parts which are exposed to frictional forces at minimal ratio.

[0014] Another object of the present invention is to provide a lock having holes for door cover or rosette in spite of to be in smaller size.

[0015] Another object of the present invention is to provide a lock in which position of the latch lock can be easily replaced.

[0016] Another object of the present invention is to provide a lock having a latch mechanism includes an improved mounting arrangement for left - or right-hand together with a simplified latch retractor.

Summary of Invention

[0017] The present invention relates to a lock for use in interior room of schools or apartment like structure. Said lock for interior door comprises a bolt and bolt tail, a hub being rotatable by operation of a handle, a latch and a latch tail engageable with a door frame, being positioned between a horizontal axis of the hub and the bolt. According to the present invention said lock further comprises said lock further comprises a lever being pivotable around a lever hinge for retracting the latch having a first arm connected with the latch, and a second arm being moveable by a hub tab when the handle is operated. In addition to that length of the second arm is equal or longer than length of the first arm which leads the retraction of the latch to be easily.

Brief Description of the Drawings

[0018] Accompanying drawings are given solely for the purpose of exemplifying a lock whose advantages over prior art were outlined above and will be explained in brief hereinafter. The drawings are not meant to delimit the scope of protection as identified in the claims nor should they be referred to alone in an effort to interpret the scope identified in said claims without recourse to the technical disclosure in the description of the present invention.

Figure 1a shows a top view of the lock where the bolts are driven according to the present invention.

Figure 1b shows a top view of the lock where the top cover is removed according to the present invention.

Figure 1c shows a perspective view of the lock where the cover is removed and bolt are retracted according to the present invention.

Figure 2a shows a top view of the lock where the cover is removed, latch and bolt are retracted according to the present invention.

Figure 2b shows a perspective of the lock where the latch and bolt are retracted according to the present invention.

Figure 2c is a perspective view of the lock presented in Figure 2b.

Figure 3a shows a top view of the lock where the cover is removed and latch is in a position right before the door to be in closed position according to the present invention.

Figure 3b is a perspective view of the lock presented in Figure 3a.

Figure 4 shows a perspective view of the lock and

detailed view of the retracted latch according to present invention

Figures 5a-d is a series of perspective views showing the position change of the latch according to the present invention.

Figures 6a-d shows four detailed view of the lock where the position of the latch is changed according to the present invention.

Figure 7 shows two perspective view of the lock where the latch is, correspondingly, driven and retracted according to the present invention.

Figure 8a, shows a partially top view of the lock where the hub touches the lever according to the present invention.

Figure 8b, shows a partially top view of the lock where the hub exerts force to the lever such that the latch is retracted according to the present invention.

Figure 9a is a rear view of the lock according to the present invention.

Figure 9b is a rear view of the lock where the latch is retracted according to the present invention.

Figure 10a, is a partially top view of the lock which is in an open state and where the applying forces are shown.

Figure 10b, is a partially top view of the lock which is in a closed state (retracted) and where the applying forces are shown.

Disclosure of the Invention

[0019] Referring now to the figures outlined above, the present invention proposes a lock for inner doors. The following numerals are assigned to different parts demonstrated in the drawings:

10. Lock
13. Latch
15. Lever
16. Bolt
17. Bolt member
18. Key
19. Main body
20. Hub
21. Hub spring
22. Set spring
23. Latch housing
24. Lever hinge
25. Latch tail
26. Top cover

- 27. Connection means
- 28. Latch connection tab
- 29. Guiding hole
- 30. Plate
- 32. Hub tab
- Y1 Hub Horizontal Axis
- Y2 Latch Horizontal Axis
- 40. Hub slot
- 50. First arm
- 60. Second arm
- Z1 Length of the first arm
- Z2 Length of the second arm
- E Handle axial distance
- 70. Latch pin
- 71. Latch slot
- 72. Connection means hole
- 80. Convex edge
- 90. Concave edge

[0020] According to the present invention, as shown in fig 1a-1c, said lock (10) for interior doors comprises an extendable/retractable bolt (16) and bolt tail (17) which extends or retracts in response to rotation of a key (18); a hub (20) being rotatable by operation of a handle; a latch (13) and a latch tail (25) engageable with a door frame, being positioned between a horizontal axis of the hub (Y1) and the bolt (16). Said lock further comprises a lever (15) being pivotable around a lever hinge (24) for retracting the latch (13) having a first arm (50) connected with the latch (13), and a second arm (60) being moveable by a hub tab (32) when the handle is operated. In addition to that length of the second arm (Z2) is equal or longer than length of the first arm (Z1).

[0021] In the prior art, latch bolt, hereinafter referred to as a latch, of the lock used in the interior doors are placed higher than the hub and closer to the upper portion of the lock which is retracted inside of a main body (19) by movement of the handle. It suffers that when it is desired to produce a smaller sized lock for interior doors at the same keeping standardized measure ratio of the lock. According to present invention, as can be seen in Figure 1a, because of the handle axis distance (E) being kept appropriate with respect to standardized measures, said latch is positioned between a horizontal axis of the hub (Y1) and the bolt (16). In other words, for remaining handle axis distance (E) in a standard ratio, the latch has to be placed in lower position than the hub in minimized locks. Thus, the latch of the lock (10) is positioned being close to the bolt causing to use complex part for retracting the latch into the main body (19) of the lock. when the force applied to the arm which is shorter and latch pulling arm is longer relative to each other, then it is needed to apply more force than the force of the lever exposing to the latch. In this case, both lever and hinge of the lever is exposed to excessive load

[0022] one of the aims of the present invention is to provide a lock having a latch-pulling lever which retracts the latch easily and in a simply manner preventing need

of complex parts thereof when the size of the lock is minimized. According to present invention, the lever (15) using as a latch-puller is preferably used as one piece. As can be seen in Figure 1, the lever (15) moves with the latch (13) and latch tail (25) in a synchronized manner and operation of the handle cause to pivotal movement of the hub then which retracts the latch inside the main body (19). Referring to Figures 8a and 8b, the lever (15) for retracting the latch (13), is shaped in a form of "V" having two arms, a first arm (50) and the second arm (60), in a different length. In a preferred embodiment of the invention, length of the second arm (Z2) of the lever (15) is equal or longer than length of the first arm (Z1) of the lever (15). During the inward movement (retraction of the latch) friction is generated, and according to the present invention such friction is reduced by the lever having two different sized arms.

[0023] Again referring to the figures 8a and 8b, the first arm (50) of the lever (15) comprises a convex edge (80) which allows increasing the distance (X1) between a perpendicular axis of a point wherein the hub tab (32) and second arm (60) being in touch and the lever hinge (24), when the latch (13) is retracted. Said hub tab (32) is guided in the hub slot (40) by a corresponding pin. It is provided a lock having a latch which can be relatively easily retracted, when the arm forming a moment arm is longer, as a balanced load distributions obtained. Referring to Figure 3a, when the hub is pivoted by movement of the handle, the second arm (60) of the lever having a convex edge (80) is moved by the hub tab (32) that causes a pivotal movement of the lever (15). A resultant force is the single force and associated torque obtained by combining a system of forces and torques acting on a rigid body. Referring to the figure 10a, a resulting force (RF), as a perpendicular vector, occurs where the hub tab (32) touches convex edge of the second arm (60). In figure 10, said resulting force is shown with its component forces such as tangential force (TF) and drag force (D). Said tangential force (TF) is a vector which serves to rotate the lever (15) around the axis of the hinge (24), and the drag force is a vector having a direction to the center of the hinge (24) and has no contribution the rotation of the lever. In figure 10a, the latch is in an extended position and in figure 10b; the latch is in a retracted position, where the scalar quantities are shown. When the latch is brought to retracted position as shown in figure 10b from the extended position as shown in 10a, the drag force of radial force decreases and tangential force increases which in turn helps to obtain an easy retractable latch. Furthermore, referring to the figure 10a, the distance (L1) between latch housing (23) and center of the hinge center gradually decreases, and the distance (L2) is being shorter as shown in figure 10b, which helps to optimum force transmission thanks to different height of arm of the lever (15). By means of a concave edge (90) of the first arm (50) the force mostly apply in a right angle which prevents to create a scalar quantities that makes a resistance to the system. Said latch housing (23) is in a communication

with the first arm (50) of the lever (15).

[0024] Another advantage of the according to the invention, as mentioned before, is to provide a lock decreasing the unnecessary resistance as seen in figure 10a and 10b, which helps to not to expose excess load to latch pin for guiding the latch (15) in a latch slot (71) on a cover. During the operation of the lock does not contact friction to a level sufficient to prevent that does not touch the side surface of the slot and the latch. The latch pin (70) is guided in a latch slot (71) formed on rear cover.

[0025] One end of the lever (15) is attached with the latch tail (12). The lever (15) is under pressure of hub spring (21) placed higher than the hub, and is able to be moved by the hub. The plate member is under pressure of a set spring (22) keeping the lock in a locked state matching with corresponding teeth. Said set spring acts as a plate spring and the other end of the spring contacting with the spring helps to extend latch keeping the door in a closed state. Therefore, only a spring is provided instead of two springs which help to cut the costs. The set spring (22) abuts and presses the lever (15).

[0026] Main idea lying under the present invention as seen in figure 1, horizontal axis of the latch (Y2) is provided to be in a lower position than horizontal axis of the hub (Y1). Therefore, it is provided a lock to be in a smaller size by keeping standardized measure at the same time. Referring to the figure 1c, said bolt (16) and bolt tail (17) is produced as a one piece by plastic injection, so as not to limit the scope of the present invention said pieces can be used separately. The corresponding door handle is securely attached to the hub (20), when the hub (20) is rotated; at the time said lever (15) is pivoted around the hinge synchronously. When the rotation is obtained, said latch which is attached with first arm of the lever (15) is retracted to the main body. When the door is pushed for closing the door by user, the latch is brought to a position as seen in figure 3a and 3b. At a later stage, the latch is thrown to recesses formed in a door post or frame.

[0027] Even though present invention is related to a lock having standard lock tail actuated by the key (18), it is obvious to the skilled person in the art different locking mechanism for actuating the bolt can be used. As an example, the locking mechanism can be used as a cylindrical or double bit key lock. In addition, lock suitable for WC can also be used with the hub suitable for WC type locks. Besides, the lever (15) according to the present invention can vary in structure and design. Basically, the lever rotatable around an axis of the hinge (24) can be affected by the rotation of the hub such that height differences of the arm of the lever helps to retract or extend the bolt easily. The set spring biasing to the lever is also used for a plate (30) placed under the lever (15).

[0028] Another aspect of the present invention is to provide a lock which can be mounted for different type and sized doors. Essential feature of this advantage is that said latch can be rotated 180° and mounted thereof

easily. Accordingly, as it can be seen in figure 4 and figure 5, it is provided that a latch connection tab (28) having a guiding hole (29) for a connection means (27). Said connection means (27) preferably used as a screw, and said guiding hole (29) has a through hole which serves the screw secures itself by gripping the plastic in the hole.

[0029] By way of position change system of the latch (13), when the user want to change the position of the latch, connection means (27) can be reached from circular formed connection means hole (72), as seen in figure 5b and 4, for disengaging connection between latch and latch tail. Again referring to figure 5c and 5d, when the latch is disengaged, said latch (13) is rotated 180°, and then latch connection tab (28) is inserted completely within the housing on latch tail (25). Thus, hole formed on latch tail (25) and the guiding hole (29) of the latch connection tab (28) is aligned and connection means is passed through them.

[0030] Figure 6a and 6c show a position of the latch where it is fully retracted. In this case the connecting element (27) in the upper setting of top cover (26) connection means hole (72) is only partially seen through. In this case the connection means (27) spontaneously loosen, even if the top cover (26) remains at the location for that obstacle. Figures 6b and 6d shows the latch (13) in preparation before the position change where it is pressed so far as it can go with the finger and connection means (27) on the top cover (26) about the fastener connection means hole (72) a precise alignment is achieved. In this case, preferably a screwdriver or similar tool with a suitable connection means (27) are removed and the position change of the latch is performed.

[0031] Another advantage obtained by the present invention is provide a lock having the puller screw used for screwing the door handle rosettes enter from one end is able to be possible in the design of the screw hole that allows the exit from the other end This feature is not founded in the majority of such small sized lock, according to the invention it can be used in different ways, allowing the door handle to door handle badges/rosettes on the doors makes it advantageous compared to others. It is obvious for the skilled person in the prior art, the pin hole slots can be in the form of a circular or any polygonal shape.

[0032] The number of connection means (27) and the related upper cover connection means hole (72) may vary and can be more than one. In a different embodiment of the present invention, the lock can be used for doors of the bathrooms and toilets; in this case, there could a second hub with cylinder lock which is used to extend/retract the bolt.

Claims

1. a lock (10) for an interior door comprising:

a main body (19);

a bolt (16) and bolt tail (17);
 a hub (20) being rotatable by operation of a handle;
 a latch (13) with a latch tail (25) engageable a door frame, being positioned between a horizontal axis of the hub (Y1) and the bolt (16) **characterized in that**; said lock (10) further comprises a lever (15) being pivotable around a lever hinge (24) for retracting the latch (13) having a first arm (50) in a connection with the latch (13), and a second arm (60) being moveable by a hub tab (32) when the handle is operated, **in that** length of the second arm (Z2) is equal to or longer than length of the first arm (Z1).

2. A lock (10) as in claim 1 **characterized in that**, the first arm (50) of the lever (15) comprises a convex edge (80) which allows increasing the distance (X1) between a perpendicular axis of a point wherein the hub tab (32) and second arm (60) being in touch and the lever hinge (24), when the latch (13) is retracted.
3. A lock (10) as in claim 1 **characterized in that**; said latch (13) and latch tail (25) is connected with a connection means (27).
4. A lock (10) as in claim 1 **characterized in that**, said lock (10) comprises a latch housing (23) which is in a communication with the first arm (50) of the lever (15).
5. A lock (10) as in claim 1 **characterized in that**; said lock (10) comprises a set spring (22) which abuts and presses the lever (15).
6. A lock (10) as in claim 3 **characterized in that**; said lock (10) comprises a connection means hole (72) formed on upper cover which allows reaching said connection means (27).
7. A lock (10) as in claim 1 **characterized in that**; said lock (10) comprises a latch connection tab (28) which allows mounting in two different position by obtaining connection between latch (13) and latch tail (25).
8. A lock (10) as in claim 1 **characterized in that**, said lock (10) further comprises a plurality of plates, a second cylinder lock or a second hub for actuating the bolt (16).
9. A lock (10) as in claim 1 **characterized in that**; said lock (10) comprises a latch pin (70) which is guided in a latch slot (71) formed on rear cover.

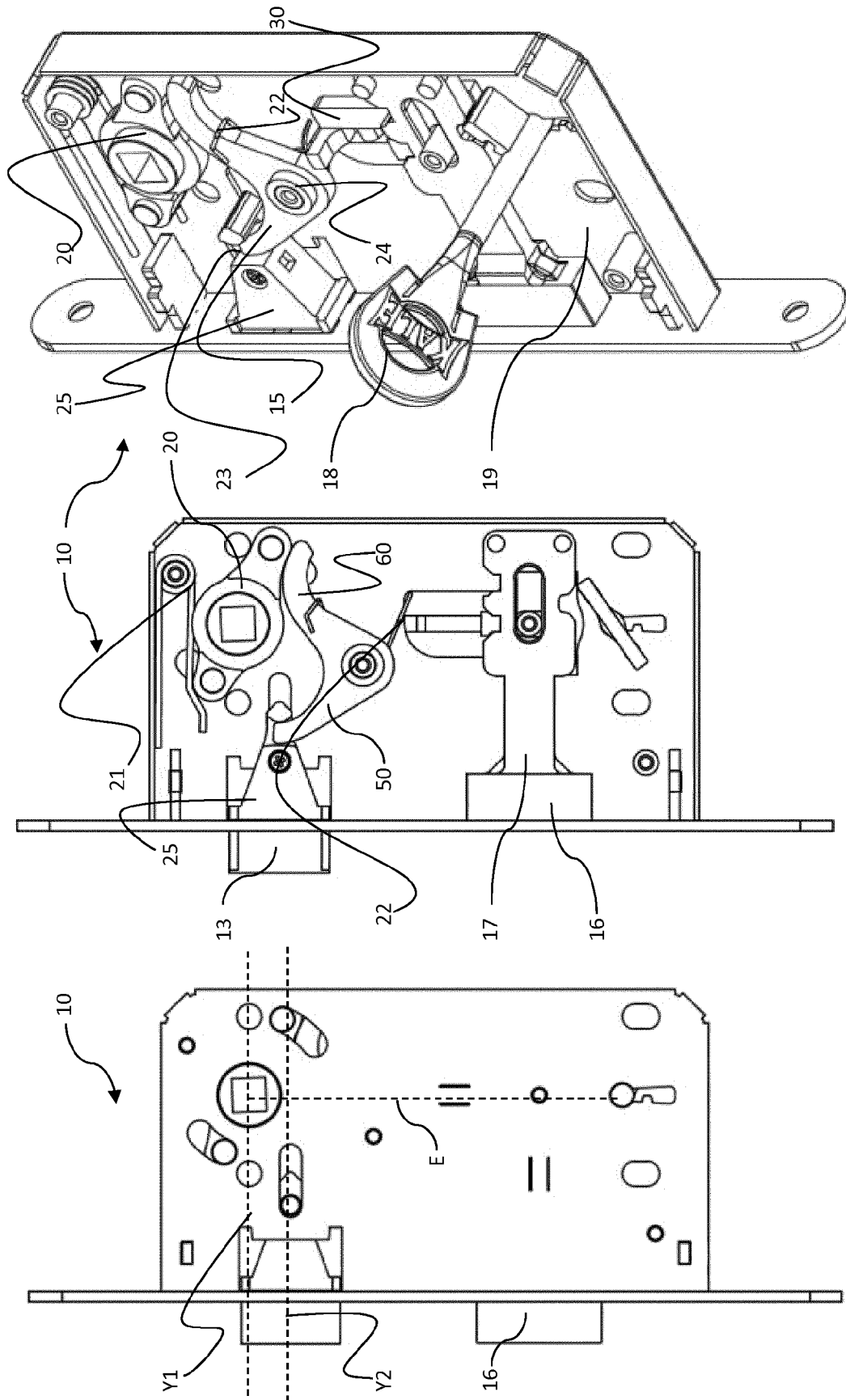


Fig. 1c

Fig. 1b

Fig. 1a

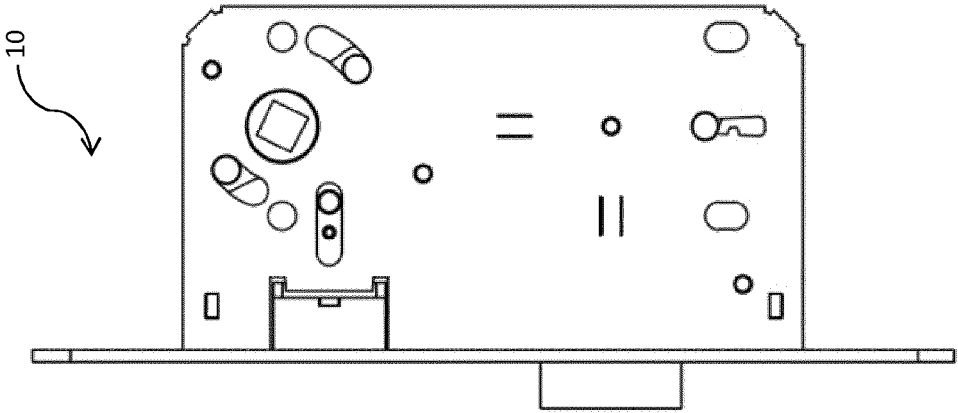


Fig. 2a

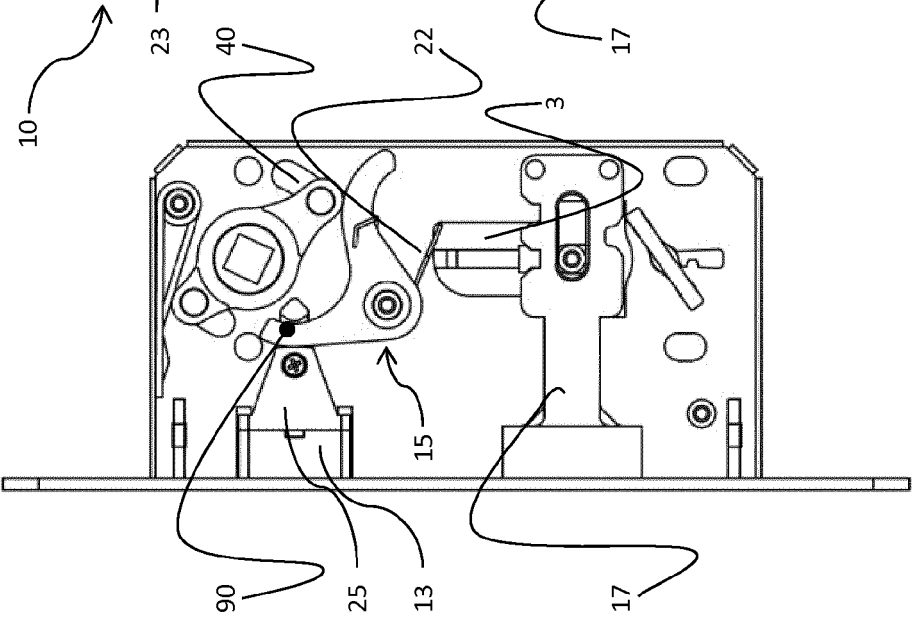


Fig. 2b

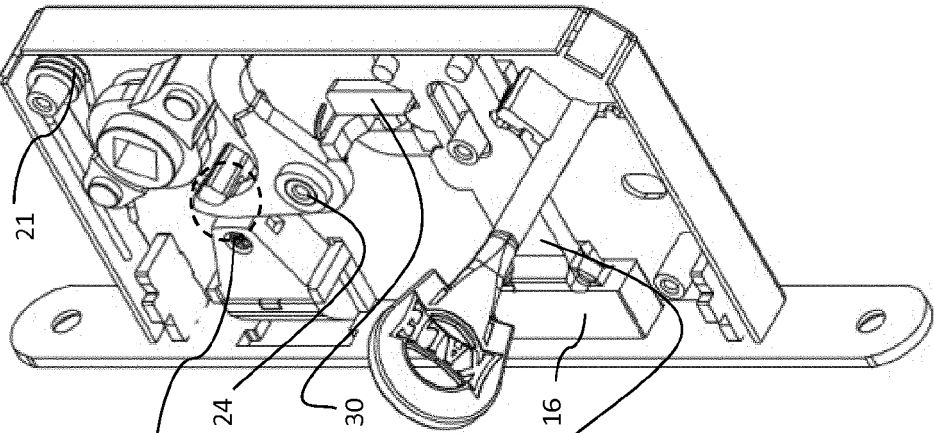


Fig. 2c

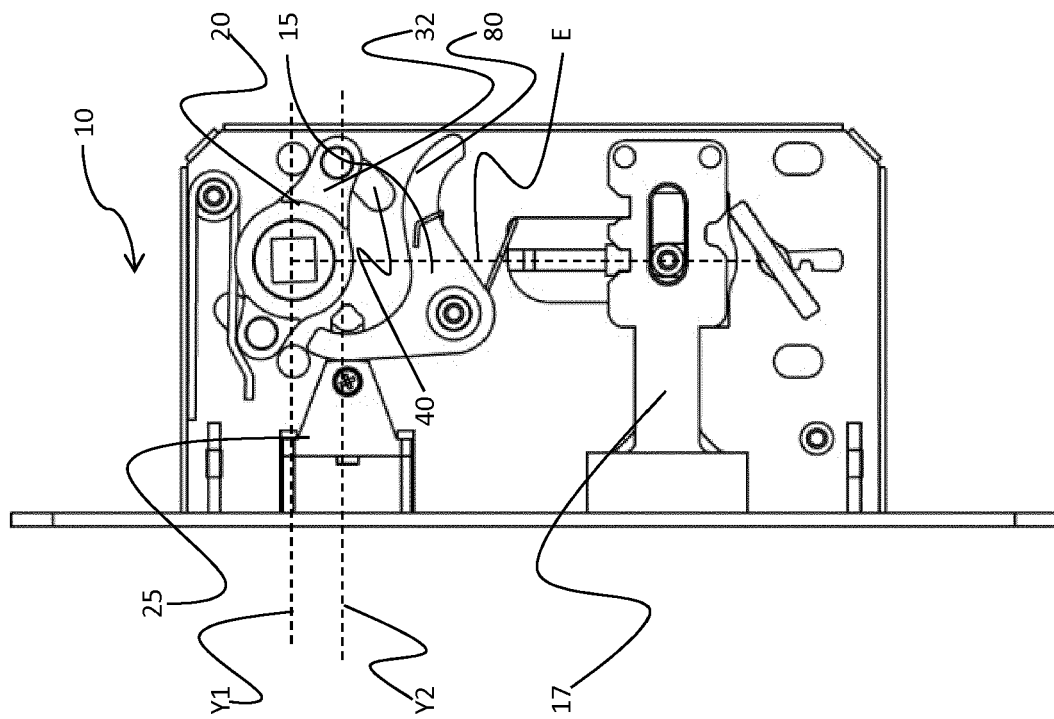


Fig. 3a

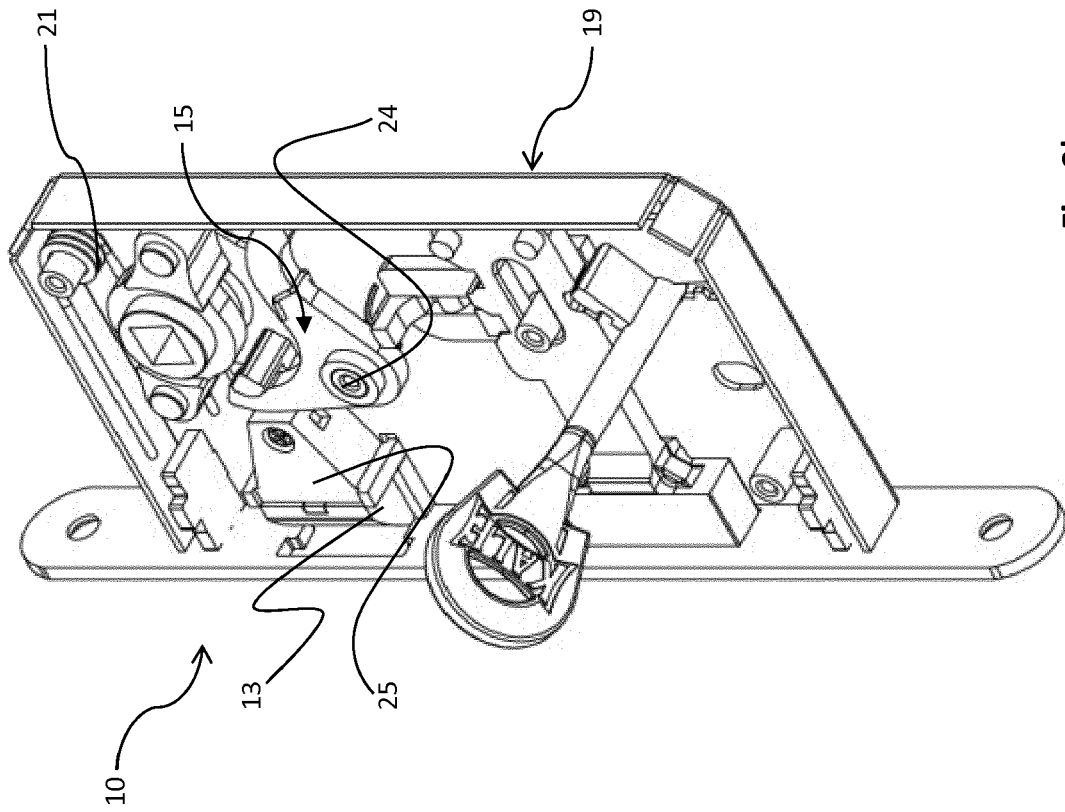


Fig. 3b

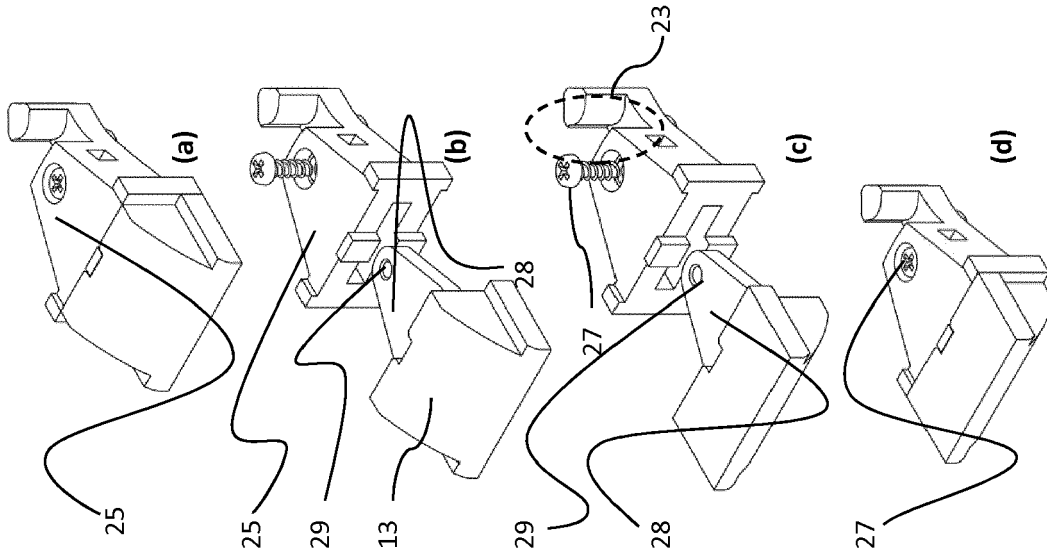


Fig. 5

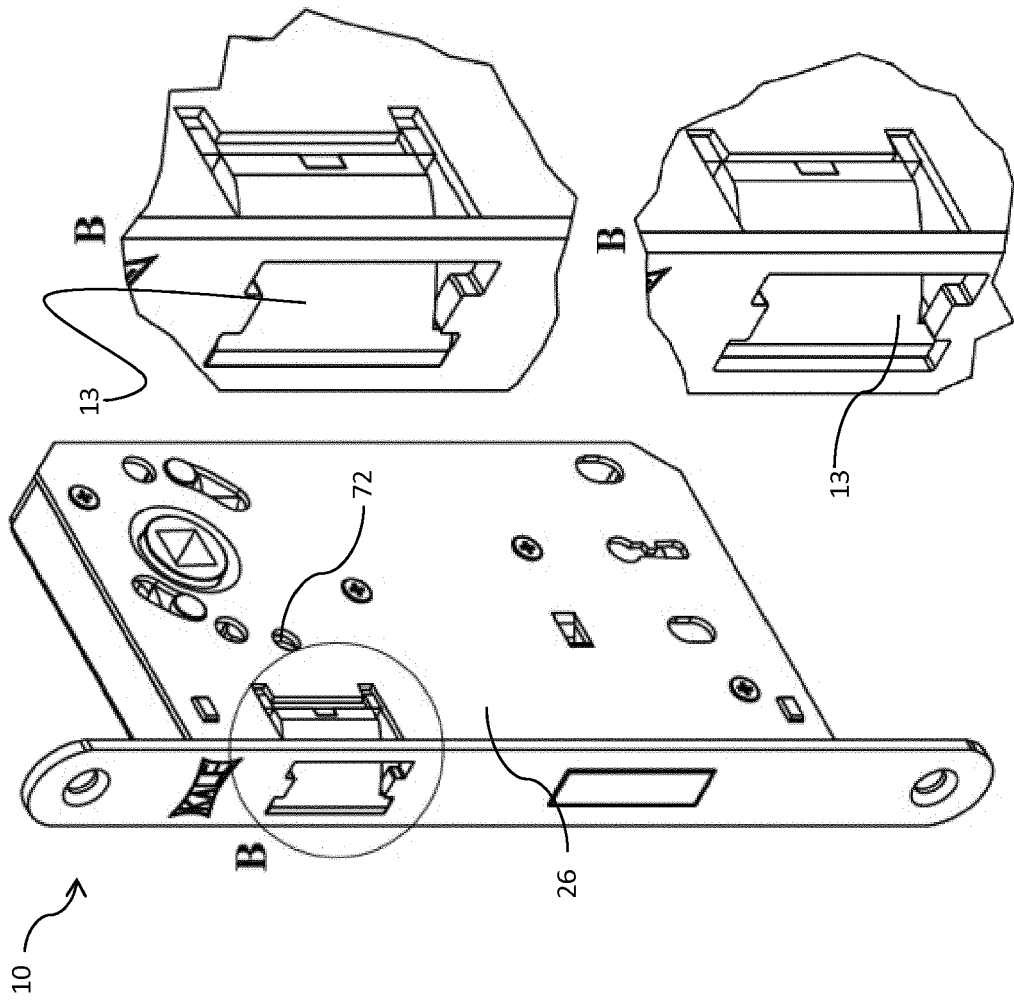


Fig. 4

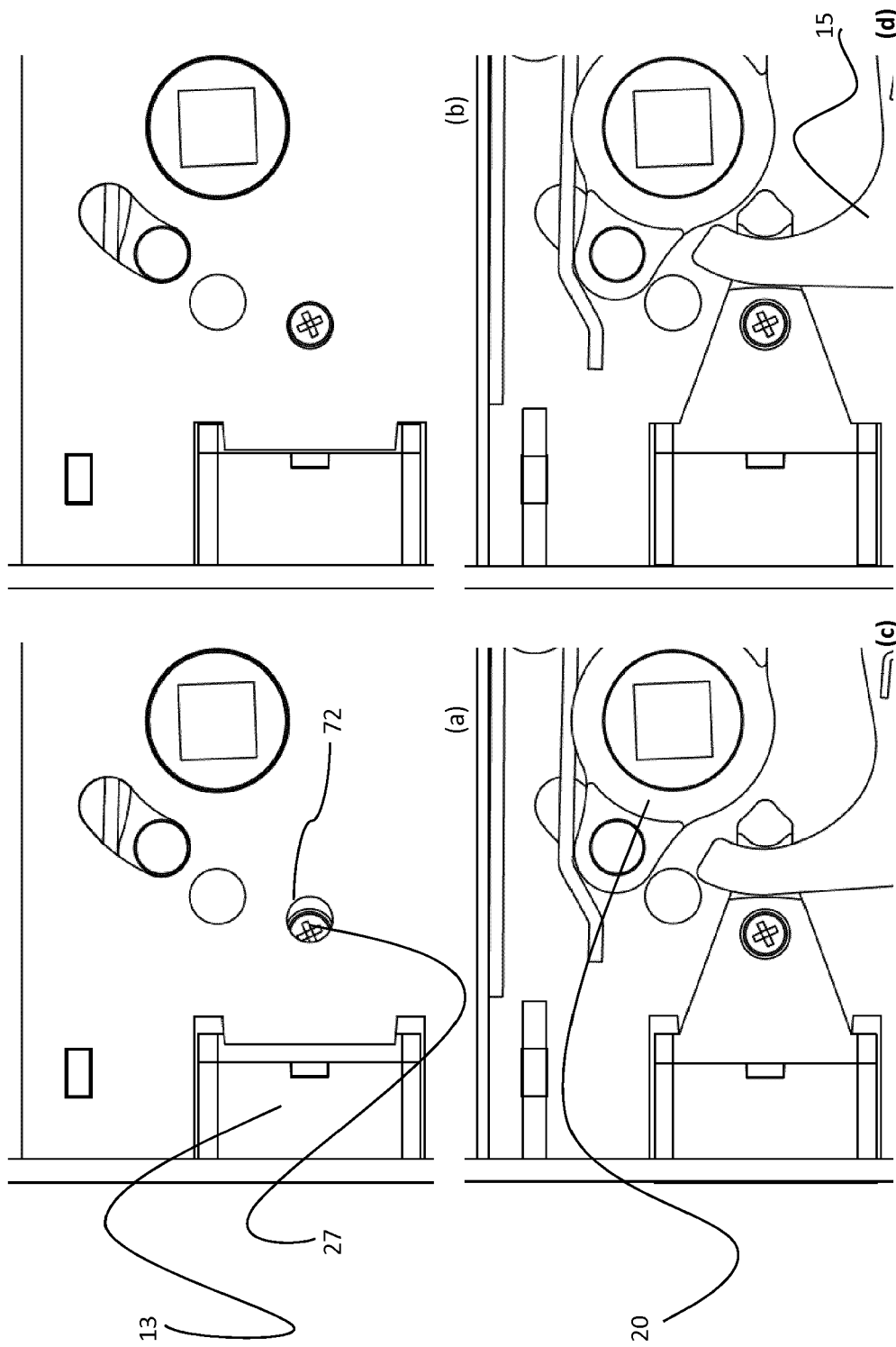


Fig. 6

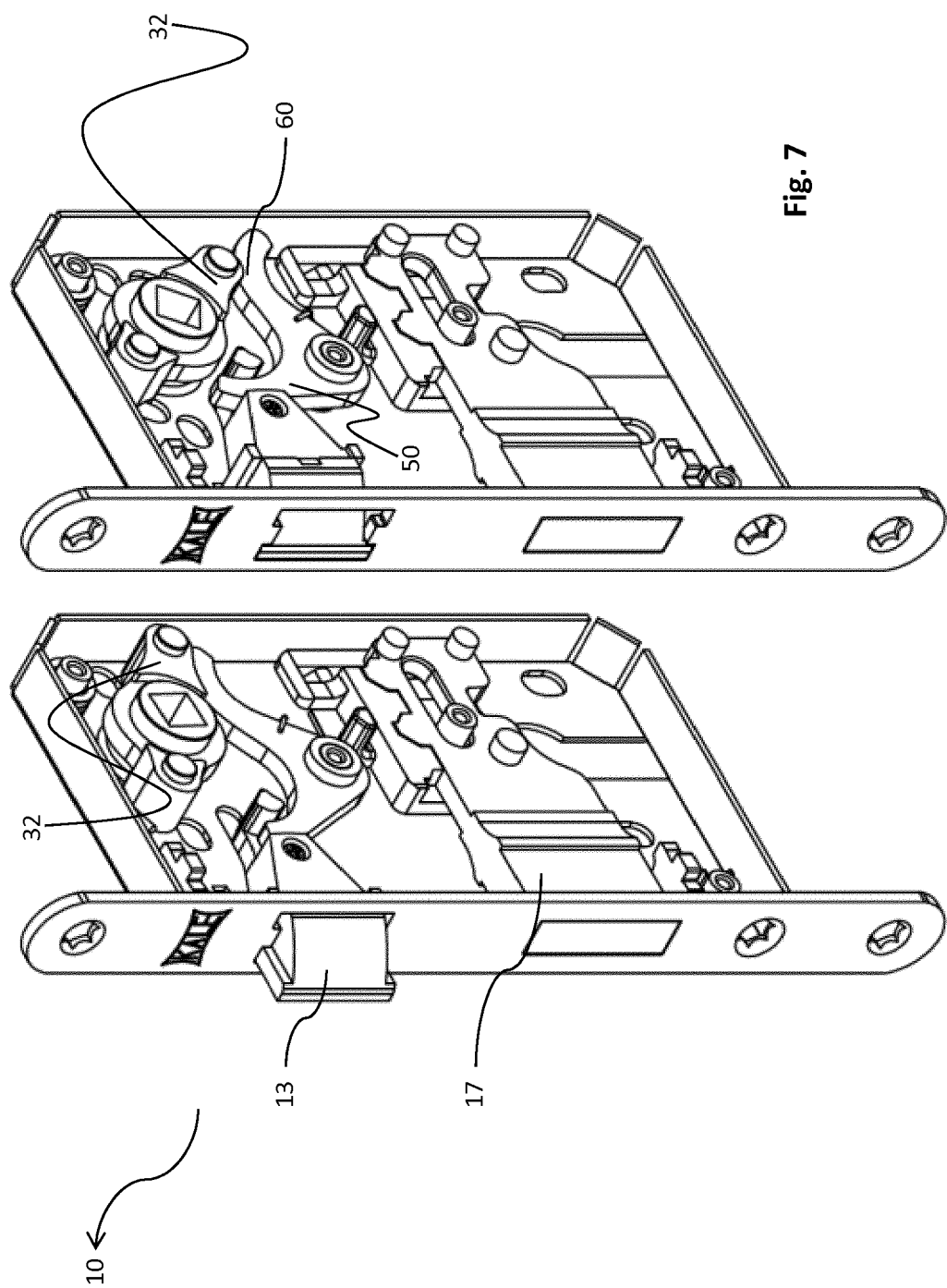


Fig. 7

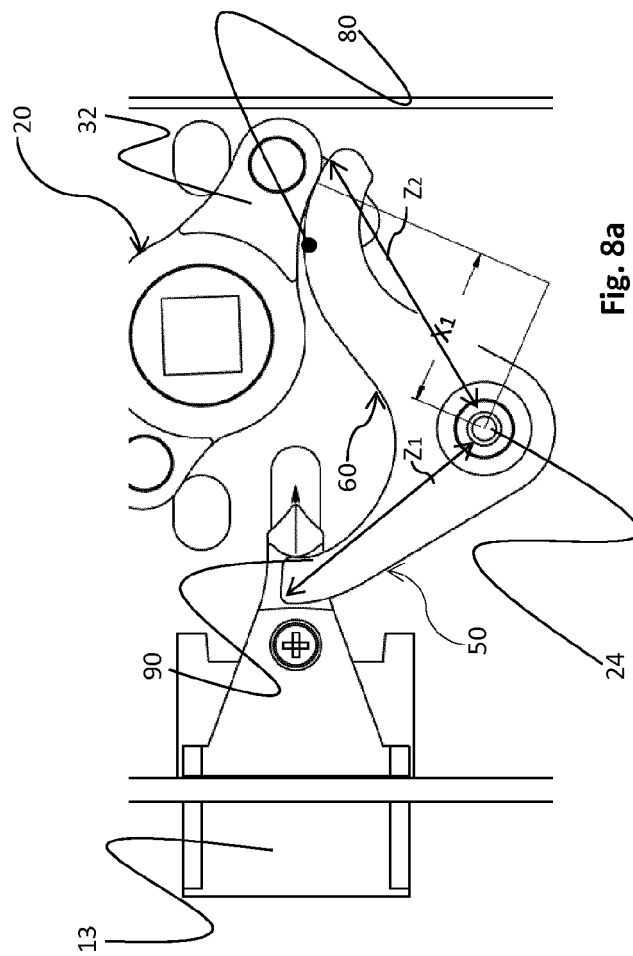


Fig. 8a

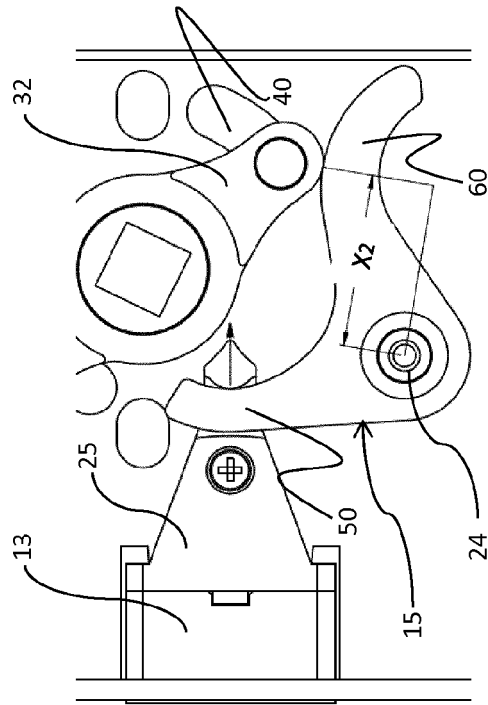


Fig. 8b

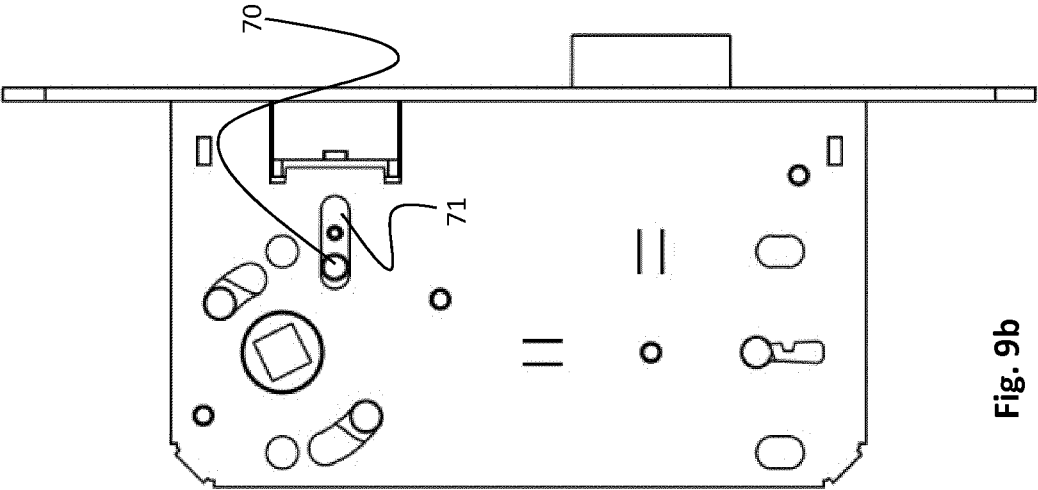


Fig. 9b

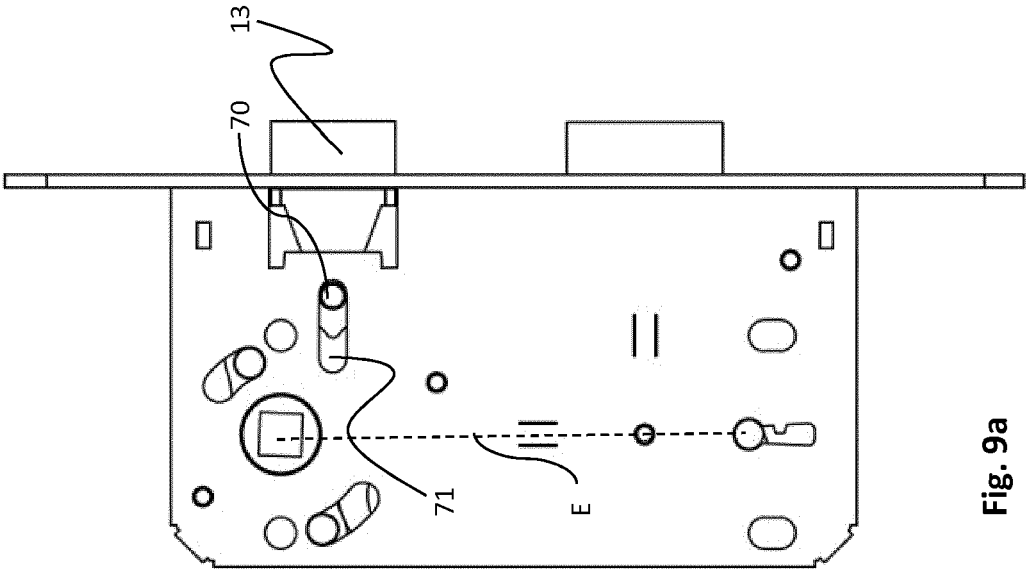


Fig. 9a

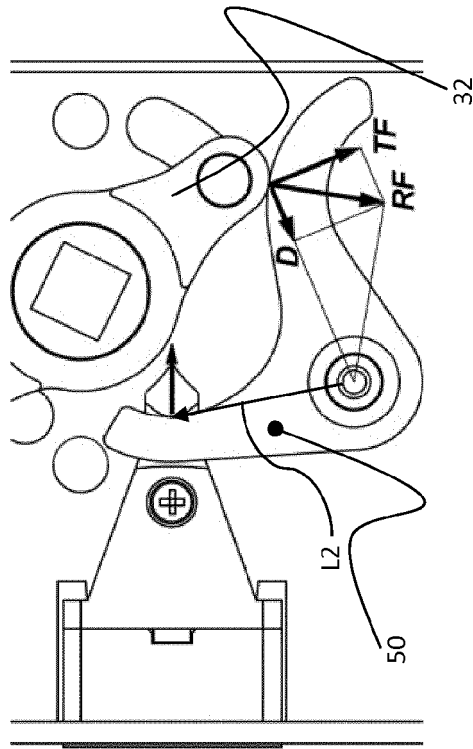


Fig. 10b

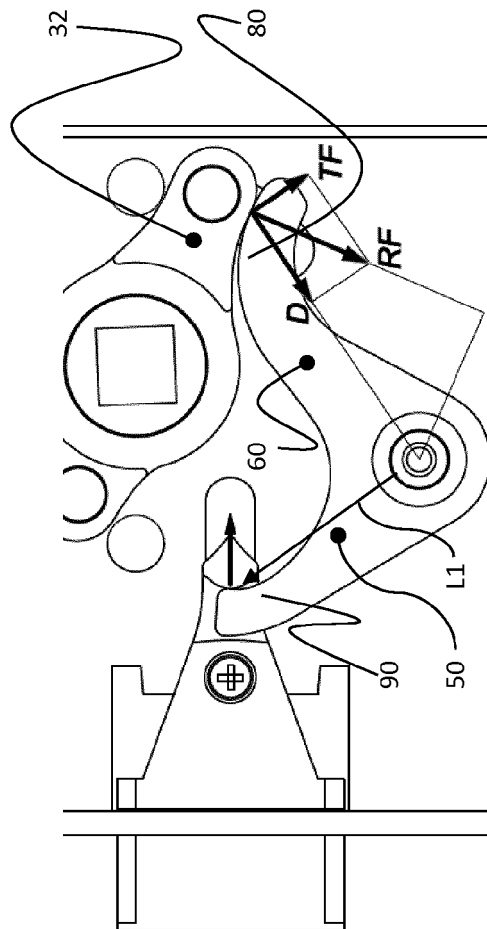


Fig. 10a



EUROPEAN SEARCH REPORT

Application Number
EP 16 17 6955

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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 395 963 A (JOSEPH KAYE & SONS LTD) 27 July 1933 (1933-07-27)	1	INV. E05C1/16
A	* the whole document *	2	
X	PT 103 775 A (ACESSORIOS Y RESORTES S L) 3 January 2008 (2008-01-03)	1	
A	* figures 29-32 *	2	
X	GB 634 963 A (PARKES JOSIAH & SONS LTD) 29 March 1950 (1950-03-29)	1	
A	* figures 1,2 *	1	
X	GB 682 290 A (BIENAIME) 5 November 1952 (1952-11-05)	1	TECHNICAL FIELDS SEARCHED (IPC) E05C E05B
A	DE 309 519 C (HÜTTEMAN) 27 November 1918 (1918-11-27)	1	
A	EP 0 351 484 A2 (PREFER COMMERCIALE SRL) 24 January 1990 (1990-01-24)	1	
A	* the whole document *	1,7	
A	US 4 726 613 A (FOSHEE) 23 February 1988 (1988-02-23)	1	
A	* figures *	1	
A	WO 2005/118988 A1 (YARRA RIDGE PTY LTD) 15 December 2005 (2005-12-15)	1	
A	* figure 8 *		
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 3 November 2016	Examiner Van Beurden, Jason
<p>CATEGORY OF CITED DOCUMENTS</p> <p>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</p> <p>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</p>			

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 16 17 6955

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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