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(54) **Plate element for lock device**

Plattenelement für Verriegelungsvorrichtung

Élément de plaque pour dispositif de verrouillage

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## Description

### FIELD OF INVENTION

[0001] The present invention relates generally to a plate element for inclusion in a lock arrangement and more specifically to a lock arrangement that includes such plate element which has integrated therewith front functions, such as latch bolt and lock bolt controlling and driving functions.

### DESCRIPTION OF THE BACKGROUND ART

[0002] Certain known locks include a face plate and a box which can be releasably connected to the face plate and which houses the lock mechanism. This enables specific products to be handled in a fairly rational manner. Swedish Patent Specification SE7601429-9 in the name of GKN-Stenman AB describes one such solution.

[0003] However, ever-higher demands are placed on present-day manufacturing industries with respect to automation and modularization, in order to minimise stock-keeping costs and to simplify assembly. This requirement is particularly expressed in the lock industry, in which locks of many different variations are manufactured. For example, it must be possible to supply locks of different dimensions, different bolt configurations, functions, etc.

[0004] Demands relating to greater security are also placed on lock manufacture. Customers and authorities require a lock to fulfil certain conditions with respect to security against forcing of the lock and with respect to its protection against other forms of manipulation.

[0005] Thus, one problem resides in the production of safer lock designs that can be produced on a large scale with retained flexibility, while holding stock-keeping costs down to a minimum at the same time.

### SUMMARY OF THE INVENTION

[0006] One object of the present invention is to provide a lock arrangement of the kind mentioned in the introduction, with which manufacture can be automated with simplified stock-keeping on the one hand, and which fulfils high security demands on the other hand.

[0007] The invention is based on the realisation that all front-located functions, such as controlling and driving the bolts included in the lock arrangement can be accommodated in a plate element, provided that said unit is designed correctly.

[0008] Accordingly, there is provided in accordance with a first aspect of the invention a plate element for inclusion in a lock arrangement as defined in the accompanying Claim 1.

[0009] According to a second aspect of the invention, there is provided a lock arrangement as defined in the accompanying Claim 2.

[0010] Other preferred embodiments of the invention are defined in the dependent Claims.

[0011] The inventive lock arrangement avoids the aforesaid drawbacks associated with known technology. The inventive lock arrangement includes a plate element that surrounds the front-located functions. The functions are therewith protected against damage, particularly when the plate element is comprised of high strength material. Moreover, integration of the front-located functions in the plate element enables modularization of the lock arrangement, thereby requiring a smaller number of component parts to be kept in stock and/or a greater variation of lock arrangements to be on offer.

### BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The invention will now be described in more detail by way of example and with reference to the accompanying drawings, in which

Fig. 1 is a perspective exploded view of an inventive lock arrangement;

Figs. 2a-c are respective views of a plate element included in the lock arrangement of Fig. 1;

Figs. 3a and 3b are respectively a perspective view and a side view of an alternative plate element according to the invention;

Figs. 4a and 4b are respectively a perspective view and a side view of a further alternative plate element according to the invention;

Figs. 5a and 5b are respective views of follower units included in the lock unit according to the invention; and

Figs. 5c and 5d are respective views of the follower units of Figs. 5a and 5b when fitted in the lock housing at different back sets.

### DESCRIPTION OF PREFERRED EMBODIMENTS

[0013] Preferred embodiments of a lock arrangement and a plate element according to the invention will now be described, initially with reference to Fig. 1. Fig. 1 is a perspective illustration of the lock arrangement with the box and the lock cover removed. The lock arrangement comprises a plate element 10 that includes a face plate 11 and a bar 12 of U-shaped cross-section welded to the face plate. The shape of the U-bar will be apparent from Fig. 2c for example, from which it will be seen that said bar surrounds all front-located lock functions, such as the control and drive of a latch bolt 13 and a lock bolt 14. The plate element 10 will be described in more detail hereinafter with reference to Figs. 2a-c.

[0014] The lock arrangement also includes a housing that comprises a box 21 and a cover 22. These lock components are a mirror image to otherwise identical com-

ponents fitted to the U-bar 12 by means of fasteners, in the illustrated case screws and screw-threaded sleeves 23a, 23b, which extend through holes 21d in the box and corresponding holes 22d in the lock cover. The U-shaped bar therewith encloses the control and drive functions of the bolts in a sideways direction, i.e. in a direction towards the main surfaces of the box and the lock cover. The holes 21d and 22d coincide with through-penetrating holes 12a, 12b in the plate element. The box and the lock cover also include respective lips 21a-c and 22a-c which extend at right angles to the bottom and cover and which function as side surfaces in the assembled state of the lock arrangement.

**[0015]** The lock arrangement also includes follower units or follower modules, in the illustrated case a cylinder follower unit 30 and a handle follower unit 40, these units being described below in more detail with reference to Figs. 5a-c. The follower units are fitted between the box 21 and the lock cover 22 and are provided to this end with through-penetrating holes that coincide with holes 22a in the cover 22 and corresponding pins 21e provided in said box, said pins co-acting with threaded sleeves 23c inserted through the holes 22e.

**[0016]** The plate element 10 will now be described in detail with reference to Figs. 2a-c. The view shown in Fig. 2a corresponds to the view shown in Fig. 1, but with the box and the follower units omitted. Fig. 2b is a side view in which the U-bar 12 have been partly cut away in the region of the latch bolt bearing and control means. The latch bolt is adapted to move forwards and backwards in a space defined partly by the actual U-bar 12 and partly by a generally U-shaped element 15 shown in section in Fig. 2b. The U-shaped element 15 is comprised of bent metal sheet riveted or welded to the U-bar 12 and comprised of the same material as said bar. The U-shaped element includes an opening for receiving an arm 16 which is pivotally mounted on a hollow pin which coincides co-axially with the anchoring element disposed in the hole 12b and which functions to control movement of the bolt 13. The arm 16 engages a waist 13a on the bolt 13 and causes the bolt to move between a first outwardly extended position shown in the figure, and an inwardly withdrawn second position (not shown), as the arm is rotated about its pivot point. The arm 16 includes a lower end surface 16a which functions as a pressure point when manoeuvring the bolt 13.

**[0017]** The U-shaped element 15 has several functions. Firstly, it functions as a guide for the bolt 13. Secondly, it functions to reinforce the U-bar 12, therewith stiffening the bar and thereby enhancing its resistance to damage. Thirdly, said element functions as a guard against manipulation of the lock; it prevents manipulation from outside the lock through the opening that is formed when the latch bolt is pressed into its withdrawn position.

**[0018]** That part of the lock bolt 14 hidden by the U-bar 12 has been shown in a broken line in Fig. 2b. It will be seen that the bolt is pivotally mounted about the point 12a, i.e. the anchoring hole that coincides with the

hole 23a in the lock cover. This provides several advantages. Because the U-bar, which is made of high strength material, such as high-strength steel, encloses the control means and the pivotal bearing means of the lock bolt, a higher degree of security is achieved. Moreover, an existing component - an existing anchoring element - can be used as the shaft about which the lock bolt rotates, therewith reducing the total number of components of the lock arrangement. Alternatively, the latch bolt 14 may be pivotally mounted on a tubular element. When fitting the box 21 and the lock cover 22, a fastener, such as a rivet or a screw, is inserted through the hollow pin. This results in a very strong pivot shaft.

**[0019]** Because the pivot bearing is provided in the U-bar, the bearing point can be placed close to the face plate 11. This enables the lock bolt to be configured or designed to fill substantially all of the hole provided in the face plate for accommodating the bolt, in the state of the lock shown in the figures. As a result, an unauthorised person wishing to manipulate the lock will have more difficulty in accessing the lock interior from the face plate side of said lock.

**[0020]** The element that functions as a lock bolt pivot shaft is preferably a combination of a screw and sleeve 24a, 24b. Alternatively, said element may consist of a rivet joint.

**[0021]** The U-bar can be strengthened still further by providing respective edges of the track along which the bolt moves with an inwardly facing flange (not shown) that functions as a force-absorbing zone.

**[0022]** Because the pivot bearings are anchored in a single fixed part of the lock, the U-bar 12, the locking forces can be taken up more efficiently than if said bearings were anchored in the box.

**[0023]** Moreover, integration of all front-located functions in the plate element enables the use of a smaller back set or follower hole distance, i.e. the distance from the front edge of the face plate to the handle and knob pivot point, see Fig. 5c in which this distance is referenced "d". In turn, this enables a smaller back measurement to be used than in the case of locks, whereby the total depth of the lock arrangement can be made smaller.

**[0024]** Figs. 2a-c illustrate a plate element that includes a lock bolt and a latch bolt. The inventive plate element may, of course, be provided with other bolt combinations. Figs. 3a and 3b illustrate a plate element 10' which is provided with two latch bolts 13, 13', of which the lower latch bolt 13 is mounted in precisely the same way as the bolt described with reference to Figs. 2a-c and the upper bolt 13' is mounted in a corresponding manner, i.e. with the aid of a U-shaped element (not shown) provided in the U-bar 12. In this case, the face plate 11' is provided with two latch bolt accommodating openings and the construction is mirror-imaged vertically. The face plate also includes an opening for accommodating an interlocking bolt 17 which is used typically for daytime locking purposes and which is also constructed in the form of a module (not shown). It will be noted

that the U-bar is identical with the earlier described bar, thereby simplifying and facilitating stock-keeping and assembly of respective lock components.

**[0025]** Figs. 4a and 4b illustrate a further embodiment of the inventive plate element, referenced 10". This plate element does not include a latch bolt, but does, on the other hand, include a lock bolt 14 which is identical to the bolt described above with reference to Figs. 2a-c.

**[0026]** The follower units 30 and 40 will now be described in more detail with reference to Figs. 5a-c in which non-assembled units are shown respectively in perspective and in plan view in Figs. 5a and 5b and in an assembled state in Figs. 5c and 5d.

**[0027]** The cylinder follower unit 30 is generally square and includes the drive means found with conventional cylinder followers. Thus, the unit 30 includes a through-penetrating opening 31 for receiving a dogging element (not shown) at a lock cylinder or a knob. In the case of the illustrated example, the follower is of the so-called "butterfly" type, where the follower is adapted to rotate through about 90 degrees. It will be understood, however, that this does not exclude the use of other types of followers, such as cruciform followers where the follower is adapted for rotation through 360 degrees.

**[0028]** The cylinder follower unit 30 is adapted to communicate with the bolt 14 through the medium of a pin 32 and a link arrangement 14a. The pin 32 is thus moved up or down, depending on the direction of rotation of the follower and of the movement of the pin, wherewith the bolt 14 rotates about the shaft 12a between the outwardly extended position shown in the figures and an inwardly withdrawn position (not shown).

**[0029]** The cylinder follower unit 30 and the handle follower unit 40 are mutually connected by a link arrangement 35 in the case of the illustrated embodiment, thereby enabling withdrawal of the latch bolt 13 to be achieved by rotation of the cylinder follower unit 30.

**[0030]** Fig. 5c shows the cylinder follower unit fitted in a lock that has a back set referenced "d" in the figure. When a larger key insertion distance is desired, see Fig. 5d, the cylinder follower unit is mounted in a box 21' of greater width. The gap between the bolt drive and the pin 32 is bridged by giving the link arrangement 14a an appropriate length. This provides complete flexibility with regard to the back set and box measurement, with the lower limit given by the minimum measurement shown in Fig. 5c.

**[0031]** The handle follower unit 40 is adapted to communicate with the arm 16 that controls movement of the latch bolt 13 between its extended and withdrawn positions. In this regard, there is used a pressure rod 42 of appropriate length, referenced 42 in Fig. 5c and 42' in Fig. 5d. The handle follower is caused to rotate by means of a handle, or knob (not shown), that has a square pin inserted in a square opening 41 in the handle follower. The handle follower unit 40 includes an arrangement which when the follower is rotated clockwise, as shown in the figure, the rod 42 presses against the surface 16a

of the arm 16. to the left in the figure. Thus, as will be apparent from Fig. 2b, the arm 16 is therewith caused to rotate clockwise so that the upper part of the arm that engages the waist 13a in the bolt 13 steers the bolt positively or forcibly towards its withdrawn position (not shown). When the spring-loaded handle follower is caused to return to its starting position, the similarly spring-loaded latch bolt will be moved to its outwardly extended position.

**[0032]** Because the force transmission between the handle follower unit 40 and the arm 16 is effected by means of a pressure rod of selective length, full flexibility is permitted with respect to the back set "d" in the same way as that associated with the cylinder follower unit.

**[0033]** Although the invention has been described with reference to preferred embodiments of a lock arrangement and associated plate elements, it will be understood by the person skilled in this particular field that these embodiments can be varied within the scope of the accompanying Claims. For example, the lock bolt 14 can also be surrounded by a U-shaped element corresponding to the element 15 surrounding the latch bolt.

## Claims

1. A plate element (10) for inclusion in a lock arrangement, wherein said plate element includes a face plate (11) and a bar (12) having a generally U-shaped cross-section and being attached to said face plate (11), and wherein the face plate (11) includes openings for accommodating at least one bolt (13; 14),  
**characterised by**
  - at least one bolt (13; 14) fitted to said plate element (10) and adapted for movement between an extended and a withdrawn position, wherein when in said withdrawn position the bolt (13, 14) is essentially surrounded sideways by said bar (12); and
  - a drive element (14a; 16) connected mechanically to said bolt (13, 14);
  - wherein said drive element (14a, 16) is adapted to be manoeuvred by a lock mechanism.
2. A lock arrangement comprising a plate element (10) according to claim 1 and a lock housing (21,22) fitted to said plate element (10) and housing a lock mechanism (30,40).
3. The lock arrangement according to Claim 2, which comprises a U-shaped element (15) attached to the bar (12), wherein said at least one bolt (13) is adapted to move forwards and backwards in a space defined by said bar (12) and said U-shaped element (15).
4. The lock arrangement according to Claim 3, wherein

said at least one bolt (13) is a latch bolt.

5. The lock arrangement according to any one of Claims 2-4, wherein said at least one bolt (14) is pivotally mounted on a hollow pivot element that coincides with a first through-penetrating opening (12a) in said bar (12).
6. The lock arrangement according to any one of Claims 2-4, wherein the drive (16) of said at least one lock bolt (13) is pivotally mounted on a hollow pivot element that coincides with a second through-penetrating opening (12b) in the bar (12).
7. The lock arrangement according to Claim 5 or 6, wherein at least one of said first and second through-penetrating openings (12a, 12b) is adapted to receive a lock housing mounting joint (23a, 23b).
8. The lock arrangement according to any of claims 2-7, wherein said lock mechanism (40) communicates with said at least one bolt (13) through the medium of a separate pressure rod (42) whose length has been adapted to the relevant key insertion depth.
9. The lock arrangement according to any of claims 2-8, comprising two bolts (13, 13') with vertically mirror-imaged control and drive means.

#### Patentansprüche

1. Plattenelement (10) zum Einschließen in einer Verriegelungsanordnung, wobei das Plattenelement eine Stirnfläche (11) einschließt und einen Stab (12) mit einem im Allgemeinen U-förmigen Querschnitt, der an der Stirnflächenplatte (11) befestigt ist, und wobei die Stirnflächenplatte (11) Öffnungen zum Aufnehmen zumindest eines Bolzens (13; 14) einschließt,  
**dadurch gekennzeichnet, dass**
  - zumindest ein Bolzen (13; 14) an das Plattenelement (10) angepasst ist, und angepasst zur Bewegung zwischen einer ausgefahrenen und einer zurückgezogenen Position, und wobei in der zurückgezogenen Position der Bolzen (13, 14) im Wesentlichen seitwärts durch die Stange (12) umgeben ist; und
  - ein Antriebselement (14a; 16) mechanisch mit dem Bolzen (13, 14) verbunden ist;
  - wobei das Antriebselement (14a, 16) angepasst ist, um durch einen Verriegelungsmechanismus manövriert zu werden.
2. Verriegelungsanordnung umfassend ein Plattenelement (10) nach Anspruch 1 und ein Verriegelungsgehäuse (21, 22), welches zu dem Plattenelement

(10) passt, und einen Verriegelungsmechanismus (30, 40) aufnimmt.

3. Verriegelungsanordnung nach Anspruch 2, welche ein U-förmiges Element (15) umfasst, welches an der Stange (12) befestigt ist, wobei der zumindest eine Bolzen (13) angepasst ist zur Bewegung vorwärts und rückwärts in einem Raum, welcher durch die Stange (12) und das U-förmige Element (15) definiert ist.
4. Verriegelungsanordnung nach Anspruch 3, wobei der zumindest eine Bolzen (13) ein Sperrbolzen ist.
5. Verriegelungsanordnung nach irgendeinem der Ansprüche 2 bis 4, wobei der zumindest eine Bolzen (14) drehbar auf einem hohlen Drehelement befestigt ist, das mit einer ersten Durchgangsöffnung (12a) in der Stange (12) zusammenfällt.
6. Verriegelungsanordnung nach irgendeinem der Ansprüche 2 bis 4, wobei der Antrieb (16) des zumindest einen Verriegelungsbolzens (13) drehbar auf einem hohlen Drehelement befestigt ist, das mit einer zweiten Durchgangsöffnung (12b) in der Stange (12) zusammenfällt.
7. Verriegelungsanordnung nach Anspruch 5 oder 6, wobei zumindest eine der ersten und zweiten Durchgangsöffnungen (12a, 12b) angepasst ist zum Empfangen einer Verriegelungsgehäuse-Befestigungsverbindung (23a, 23b).
8. Verriegelungsanordnung nach irgendeinem der Ansprüche 2 bis 7, wobei der Verriegelungsmechanismus (40) mit dem zumindest einen Bolzen (13) kommuniziert durch das Medium einer separaten Druckstange (42), deren Länge angepasst wurde an die relevante Schlüsseleinfügetiefe.
9. Verriegelungsanordnung nach irgendeinem der Ansprüche 2 bis 8, umfassend zwei Bolzen (13, 13') mit vertikalen spiegelförmigen Steuer- und Antriebsmitteln.

#### Revendications

1. Élément plat (10) à inclure dans un système formant serrure, dans lequel ledit élément plat comprend une tête (11) et un palâtre (12) ayant une section transversale globalement en forme de U et attachée à ladite tête (11), et dans lequel la tête (11) comprend des ouvertures pour loger au moins un pêne (13 ; 14), **caractérisé par** :
  - au moins un pêne (13 ; 14) ajusté audit élément plat (10) et conçu pour se déplacer entre une

- position étendue et une position retirée, dans lequel, quand il est dans ladite position retirée, le pêne (13, 14) est sensiblement entouré latéralement par ledit palâtre (12) ; et
- un élément d'entraînement (14a ; 16) relié mécaniquement audit pêne (13, 14) ;
  - dans lequel ledit élément d'entraînement (14a, 16) est conçu pour être manoeuvré par un mécanisme de verrouillage.
- 10
2. Système formant serrure comprenant un élément plat (10) selon la revendication 1 et un logement de serrure (21, 22) ajusté audit élément plat (10) et logeant un mécanisme de verrouillage (30, 40).
- 15
3. Système formant serrure selon la revendication 2, qui comprend un élément en forme de U (15) attaché au palâtre (12), dans lequel ledit au moins un pêne (13) est conçu pour se déplacer en avant et en arrière dans un espace défini par ledit palâtre (12) et ledit élément en forme de U (15).
- 20
4. Système formant serrure selon la revendication 3, dans lequel ledit au moins un pêne (13) est un pêne de verrouillage.
- 25
5. Système formant serrure selon l'une quelconque des revendications 2 à 4, dans lequel ledit au moins un pêne (14) est monté de manière pivotante sur un élément de pivot creux qui coïncide avec une première ouverture traversante (12a) dans ledit palâtre (12).
- 30
6. Système formant serrure selon l'une quelconque des revendications 2 à 4, dans lequel l'élément d'entraînement (16) dudit au moins un pêne de verrouillage (13) est monté de manière pivotante sur un élément de pivot creux qui coïncide avec une seconde ouverture traversante (12b) dans le palâtre (12).
- 35
- 40
7. Système formant serrure selon la revendication 5 ou 6, dans lequel l'une desdites première et seconde ouvertures traversantes (12a, 12b) est conçue pour recevoir un dispositif de montage de logement de serrure (23a, 23b).
- 45
8. Système formant serrure selon l'une quelconque des revendications 2 à 7, dans lequel ledit mécanisme de verrouillage (40) communique avec ledit au moins un pêne (13) au moyen d'une tige de pression distincte (42) dont la longueur a été adaptée à la profondeur d'insertion de clef appropriée.
- 50
9. Système formant serrure selon l'une quelconque des revendications 2 à 8, comprenant deux pènes (13, 13') avec des moyens d'entraînement et de commande verticalement symétriques.
- 55

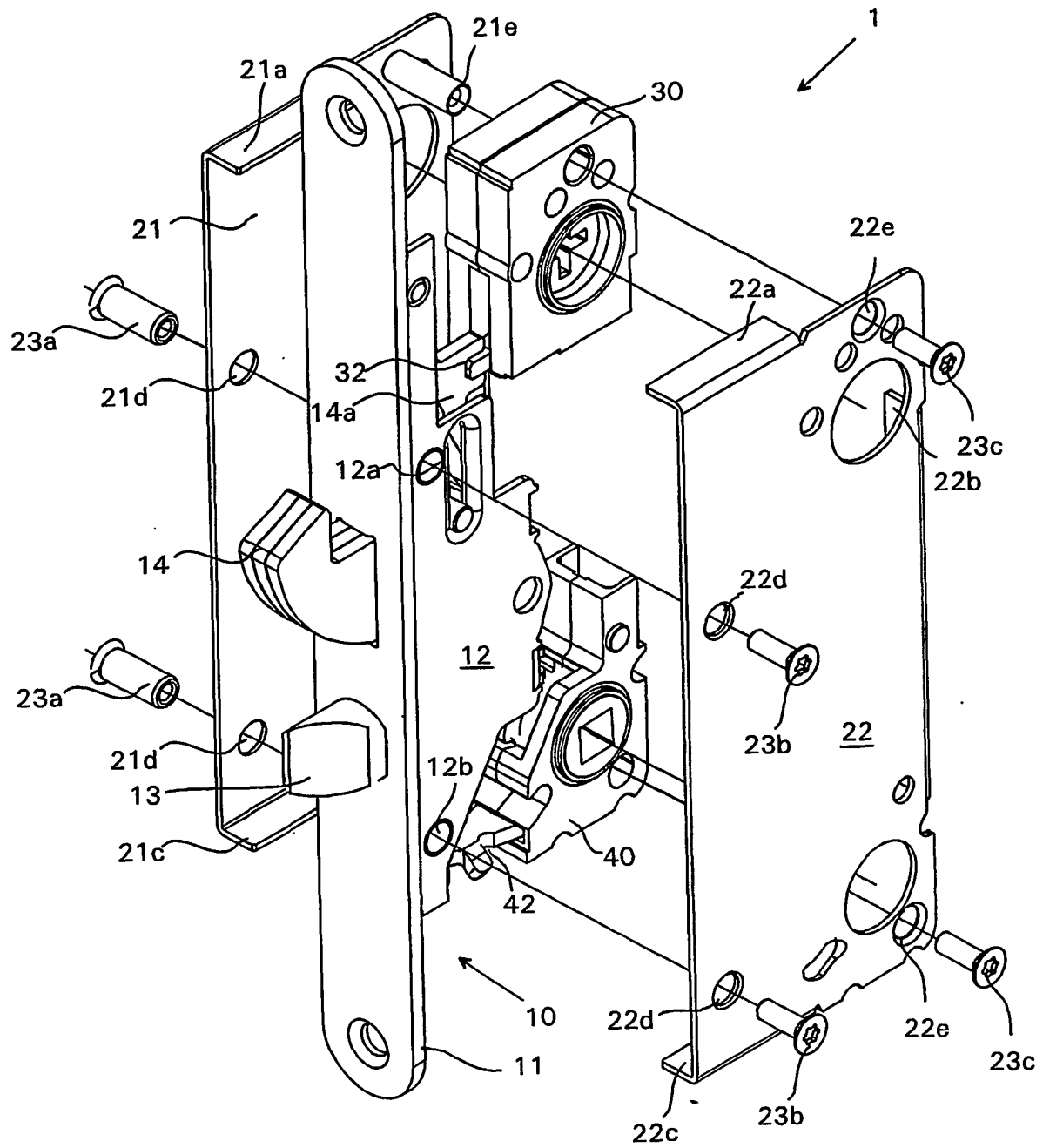


Fig. 1

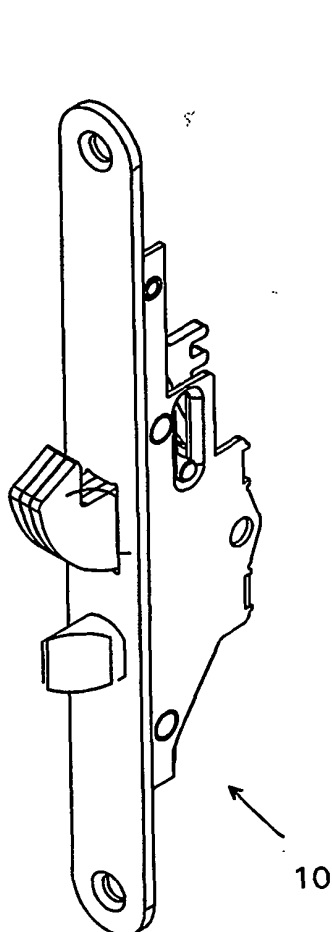


Fig. 2a

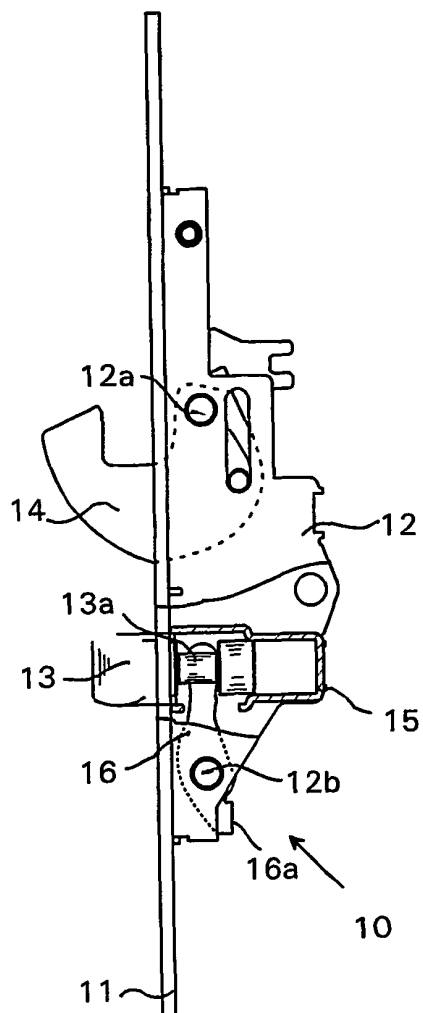


Fig. 2b

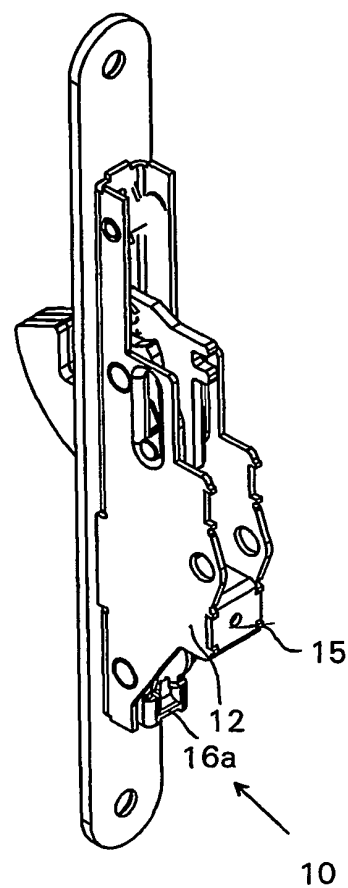
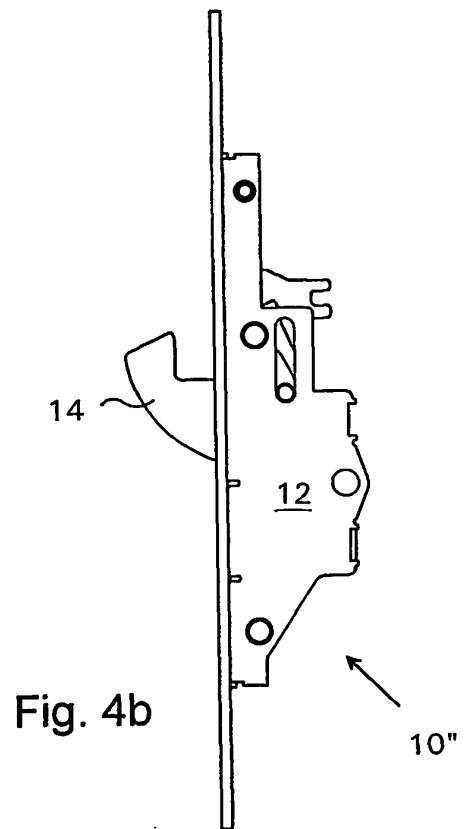
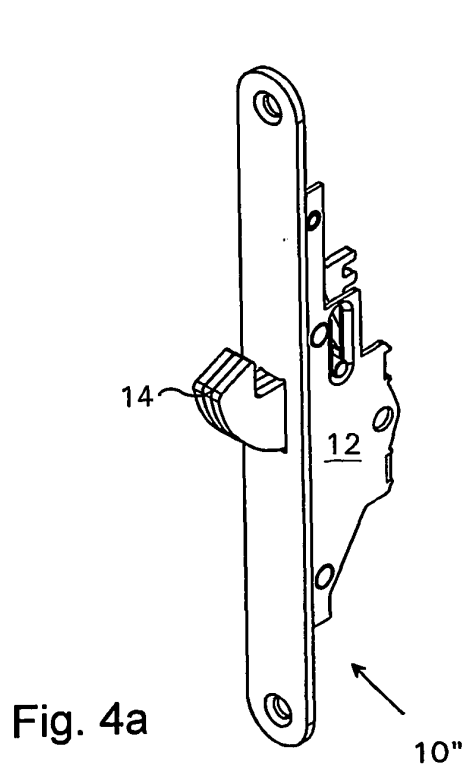
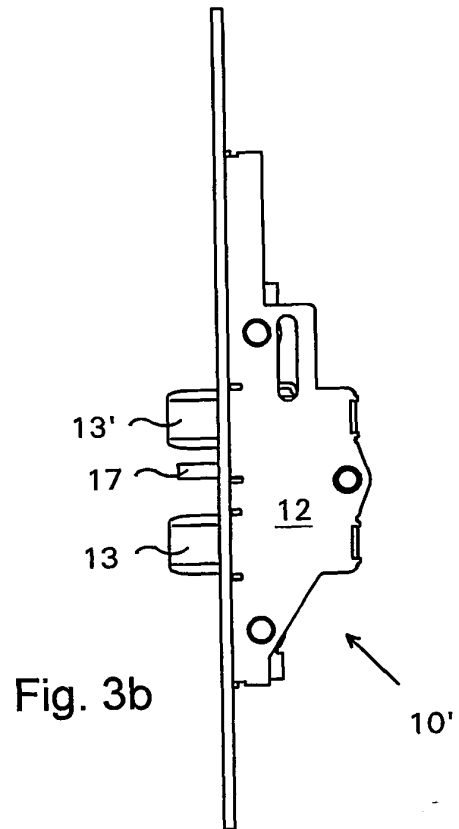
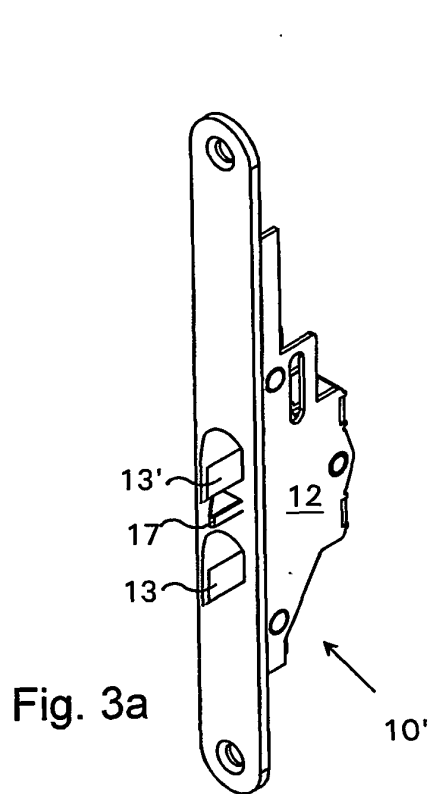


Fig. 2c





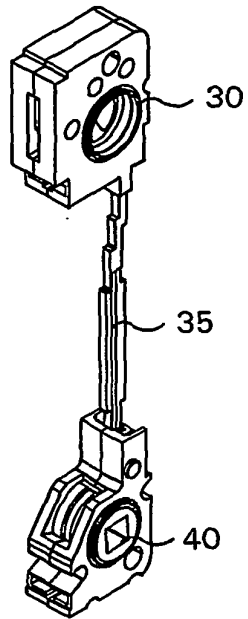


Fig. 5a

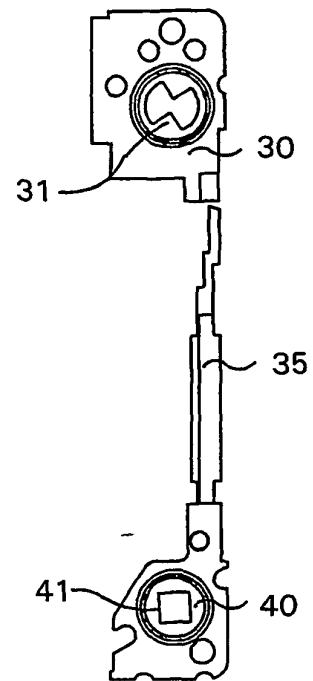


Fig. 5b

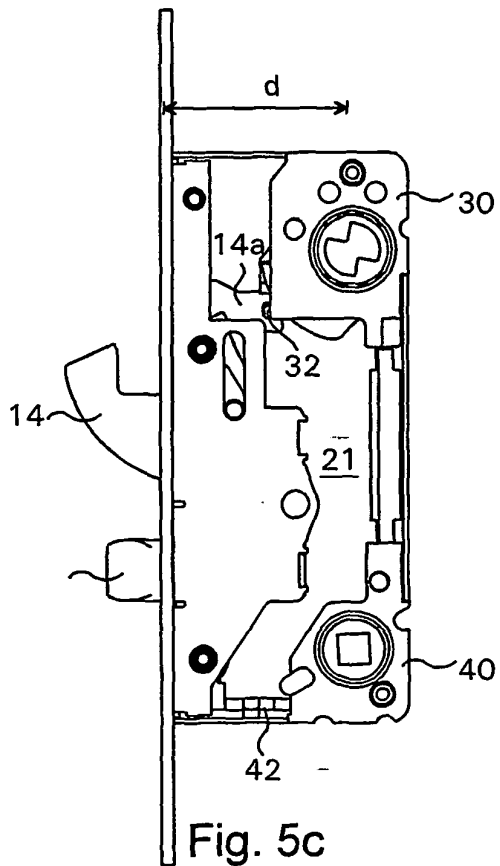


Fig. 5c

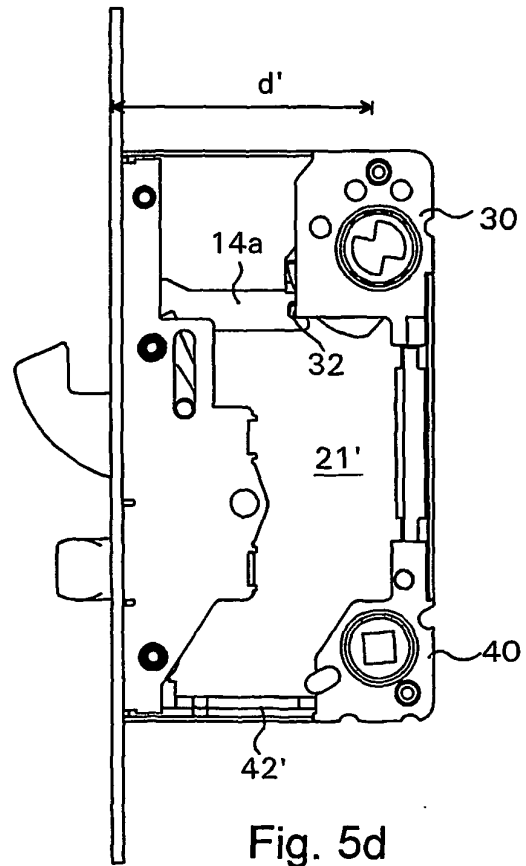


Fig. 5d

**REFERENCES CITED IN THE DESCRIPTION**

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**Patent documents cited in the description**

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