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(54) **Security lock hook-shape latch reinforcement pins**

Hakenriegelverstärkungsstifte für Sicherheitsschloss

Tiges de renfort pour pêne à crochet de serrure de sécurité

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Description

Technical Field of the Invention

[0001] The present invention relates to a locking assembly, more precisely to a door locking assembly with hook-shaped latches showing improved security characteristics.

Background of the Invention

[0002] Locks offering high security characteristics, that is to say, locks with hook-shaped dual latches engaging in suitable slots within the door frame are well-known in the circles of security lock manufacturers. Those are especially advantageous in that when fully locked, they simply provide multiple axes locking so as to withstand both vertical and horizontal forces produced in association with and during burglary attempts.

[0003] Multiple patent literature references may be provided herein, all with hook-shaped latches rotated by a set of actuator mechanism driven axles. Among others, one of the patents/patent applications available to the public is the Italian patent ITT020000226, which is issued in the name of Tesio S.r.l. The same discloses hook-shaped latches in the form of curvilinear projections interlocking with latch slots laid on the lock panel. Said curvilinear latches are rotated by way of axles connected thereto. Rotation of the axles by an actuation mechanism is realized by a movable element commanding an arm incorporating suitable pivots rotating said axles and therefore said curvilinear latches.

[0004] GB2309996A discloses a lock assembly comprising a bolt pivotally mounted upon a support, and a drive member slidable with respect to the support, the bolt being provided with a projection engageable with the drive member to move the bolt between an open position and a closed position on sliding movement of the drive member, and wherein when the bolt is in its closed position, further movement of the drive member to a locked position restricts pivotal movement of the bolt with respect to the support.

[0005] US3695068A discloses a combination locking and latching assembly for mounting between the side faces of a narrow tubular stile frame member of a door to provide both locking and latching operations, respectively, by means of a locking bolt and a latch member, and wherein the latch member is spring urged to a latched position and is independently operable by a latch handle to an unlatched position, while the locking bolt is arranged to be actuated in a normal manner being further operable, in an unlocked position of the locking bolt, to move the latch member to a retracted or unlatched position.

[0006] The disclosure herein differs from the available prior art in that it features a special arrangement designed to prevent burglary attempts specifically aiming at rendering hook-shaped latches non-functional by damaging their rotation mechanisms. Although locks with those types of latches are substantially advantageous over a regular linear latch lock, they still incorporate certain vulnerabilities.

[0007] It is a well-known fact that various techniques are used for releasing a door lock in burglary attempts. One of those techniques is to employ a perpetual screw or endless screw, like that of a jack, a screw that is fixed so that it cannot move longitudinally as it rotates. Accordingly, once fixed at two sides of the door frame at a position parallel to the door surface, it remains stationary and forces the door frame to bend toward hollow spaces outside the door. This can eventually bend the frame to the extent that hook-shaped latches reach their limit strength and therefore either their hook ends break through a line defining the outer part hook head or the pivoting pins on which said curvilinear latches are rotatably mounted -and therewith also fixed to the side sheet of the lock case- and the latch actuation pins guided on the latches tend to advance in the frame direction by tearing said lock case side sheet throughout the distance up to the panel on the lock side. In the latter case, it is probable that said pivot axles and guided actuation pins get broken off.

[0008] In both cases, on the other hand, all security aspects of the door will practically become nonfunctional since respectively either the latches will no more be engaging in the slots on the frame side lock panel without the hooking portions or they will no more be secured neither by pivot axles nor by guided actuation pins.

[0009] The lock case side walls and several individual components of lock hardware are typically secured to each other within the case in several points. The pins on the rotation axes of the hook latches are also secured to the sheet material side wall. This becomes a serious drawback especially in the event of a burglary attempt as exemplified earlier. The linear tension produced by the perpetual screw along the transversal axis of the door in the direction of the door frame especially requires the hook latches to resist against the outward force induced on the hook ends.

[0010] When burglary takes place, the hook ends are in a position interlocked with the slots on the frame side lock panel. This latter is made of a strong material and will not break off in most cases. As the perpetual screw rotates, however, it will tend to bend outward and the slots on the panel along with the hook ends interlocked therewith will be deformed to the extent that a gap will occur in between the lock side and the frame side panels.

[0011] Break of the hook-shaped latches can be prevented and remedied by way of appropriate material selection. On the other hand, with the assumption that the outer hook portions of the hook latches can resist against breaking off due to appropriate material selection, the break away force will then exert on the axles and on the guided hook latch actuation pins. Upon breaking off of the pivoting pins, whose primary function is not retaining the integrity of the system and resisting against outside forces but to constitute the rotation center thereof, the

hook latches will first loose contact with the case side sheet and by a certain damage on the guided actuation pins, the latches will practically be free and not anymore secured to the lock case.

[0012] As will be apparent in the proceeding parts, the present invention solves the specific problem identified above by making use of the lock panel, which is already made of a strong material and which is suitable for resisting against forces that are to cause movement of the latches outside their predetermined outermost limit positions.

Objects of the Invention

[0013] Primary object of the present invention is to provide a high security door locking assembly with hook-shaped latches the outward movement of which is kept within a predetermined range and can not be removed from the lock case, as is defined by the features of claim 1.

Summary of the Invention

[0014] The present invention proposes a security lock comprising a regular sliding bolt along with a set of separate hook-shaped latches in the form of curvilinear projections operating jointly in the manner to interlock with suitable latch slots on the door frame. According to the present invention, said curvilinear latches are additionally provided with a plurality of pins vertically projecting from the lateral surface thereof in the manner to face either of the case side sheets. In case of an unauthorized attempt to release the lock by bending the lock panel on the door frame outwardly so as to cause the latches to move in the direction of the frame, the vertically projecting pins within the inside of the case will abut against the lock panel on the lock side and prevent movement of said latches.

Brief Description of the Figures

[0015] Accompanying drawings are given solely for the purpose of exemplifying a locking assembly whose advantages over prior art were outlined above and will be explained in detail hereinafter:

Fig. 1a demonstrates a transversal perspective side view of the lock case according to the present invention.

Fig. 1b demonstrates the door frame side lock panel according to the present invention.

Fig. 2 demonstrates a longitudinal perspective side view of the lock case according to the present invention.

Fig. 3 demonstrates another transversal perspective side view of the lock case according to the present invention.

Fig. 4 demonstrates the hook-shaped latches according to the present invention.

Fig. 5 demonstrates the lock case side sheet according to the present invention.

Detailed Description of the Invention

[0016] Referring now to the figures outlined above, the lock assembly in Fig. 1a, generally referred to as 11, comprises a plurality of latches (12, 13 and 14) movable relative to said assembly (11) in the manner to engage in suitable slots (15, 16) on the lock panel (18), an actuator mechanism for switching said plurality of latches between a locking and an unlocking positions and last but not least a transmission mechanism transferring motion to said plurality of latches (13, 14).

[0017] According to the present invention, beside a regular sliding latch (12), a set of separate hook-shaped latches (13, 14) in the form of curvilinear projections operating reciprocally in an integral manner are employed so as to interlock with a suitable latch slot (19) laid on the frame side lock panel (20). Said curvilinear latches (13, 14) are designed to be operated jointly and to be rotating by way of axles (21) connected thereto. The hook-shaped latches (13, 14) are conventionally designed to have a curvilinear side on the outer portion of the head part, the latter extending inward in the form of a right-angled corner and forming therein a space between two blocks. One of those blocks is actually the head portion, which engages into the slot (19) on the frame side lock panel (20).

[0018] The linearly sliding latch (12) according to the present invention is conventionally controlled by a handle hub in the form of a spring loaded structure actuated by the handle rotating a mechanism transferring motion to the spring loaded structure. The actuator mechanism of the sliding latch (12) and the transmission mechanism thereof, are widely practiced in the art and need not be further mentioned herein. The behavior of the sliding latch (12) with regard to the handle hub is apparent to the person skilled in the art.

[0019] As for the curvilinear latches (13, 14), rotation of the axles (21) so as to effect movement of the same is realized by an actuation mechanism started by insertion of a key into the keyhole (22) in the manner to advance a rotatable element (not shown), the latter commanding an arm suitable for engaging in a groove (22) to advance said actuation mechanism for curvilinear latches (13, 14). The function of a lock cylinder is apparent to the person in the art. The actuator means for the latches (13, 14) is typically comprised of a linearly guided unidirectionally sliding plate (25) with two gripping arms (29) extending to the latches' (13, 14) rotation center (21).

[0020] According to the present invention, the curvilinear lock bolts (13, 14) are designed to provide a single-

turn 90-degree displacement ensuring engagement position into the panel slot (19) in one turn. Turning of an appropriate key in the keyhole (22) causes the axles (21) and a couple of redirection pins (23) that are guided within the latches (13, 14), to rotate said latches (13, 14) accordingly. Each of said pins (23) is driven back and forth between two edges of a guiding channel (24, Fig. 2), depending on the engaging and disengaging positions of said latches (13, 14). Synchronous movement of said redirection pin (23) together with said axle (21) leads to a full step 90-degree slip of the curvilinear latches (13, 14) in a reciprocal manner.

[0021] Synchronous movement of said axles (21) together with said redirection pins (23) can be explained by referring to the structure of each gripping arm (29) extending from said linearly guided unidirectionally sliding plate (25). To this end, each gripping arm (29) extending to each latch (13, 14) comprises an open end recess in order for laterally receiving said axles (21), whose bottom surfaces are secured to a suitable slot on at least one of the lock case sidewalls (28). When fully locked, the axles (21) are fully encircled with the exception of the recess's open end, which is preferable to limit movement thereof.

[0022] Beside said recesses on each arm, a slot for vertically accommodating said redirection pin (23), which is only allowed a limited linear movement within said guiding channel (24), is located. Movement of this latter to move the latch (13, 14) is directly effected by said gripping arm (29) since it is placed into both the gripping arm (29) slot and the latch channel (24) coaxially. In the very beginning of the locking sequence, each gripping arm (29) reciprocally advances to slip said redirection pins (23) to the channel (24) limits and further advancing of the gripping arms (29) causes the redirection pins (23) to carry said latches (13.14) around each rotation centers (21) to the full-locked position. Single turn 90-degree movement of the latches (13, 14) is not possible without the redirection pins (23) properly advance to the outermost limit position in the guiding channels (24). In other words, rotation is effected by the redirection pins' (23) inclined movement within the channels (24) inclined with regard to the lock panel (18) direction. The fact that the location of the rotation center (21) is on the direction of the inclined channels (24), provides an effective single-turn 90-degree slip. An effective single step full rotation would not be possible in an alternative design in which the rotation centers (21) are not directly located on the channels' (24) longitudinal direction.

[0023] To avoid a burglary attempt of the type defined earlier, in which an endless screw is used to bend the frame side lock panel (20) in the direction of the door frame in the manner to load stress on the most critical security components of the lock such as the redirection pins (23) and the axles (21), the present invention features a set of special arrangements to keep the redirection pins (23) and the axles (21) away from the induced force components. Accordingly, said curvilinear latches (13, 14) are additionally provided with a plurality of pins (26) vertically projecting from the lateral surfaces of their body portions that remain within the lock case in locked position. In case of an unauthorized attempt to release the lock by bending the frame side lock panel (20) on the door frame outwardly so as to cause the latches (13, 14) to move in the direction of the frame, the vertically projecting pins within the inside of the case will abut against the lock panel (18) and stops displacement of said latches (13, 14).

[0024] The reinforcement pins (26) are the first barriers to contact the lock panel (18) in any attempt to slip said latches outwardly, that is, in the direction of the door frame. Since they are longitudinally embedded in the latch (13, 14) body in a secure manner with the head portions slightly running over the latch (13, 14) surfaces in a manner to form a sufficient contact surface with the lock panel (18) portion outside the latching slot (19), letting the latter stop the entire latch (13, 14) body moving and resisting against outward forces otherwise exerted on the redirection pins (23) and the axles (21).

[0025] The reinforcement pins (26) are located substantially close to the lock panel (18) considering the locked position layout of the latches (13, 14). In other words, the distance of the reinforcement pins (26) to the lock panel (18) is smaller than the radius of the reinforcement pin (26) itself. More precisely, the smallest distance between a point of the reinforcement pins (26) and the lock panel (18) is smaller than the radius of the reinforcement pin (26) itself.

[0026] According to the present invention, reinforcement pins may also be installed on the far end of the latch (13, 14) to the lock panel (18). Such a pin (27) is shown in Fig. 4. Such pins (27) projecting symmetrically from both surfaces of a curvilinear latch (13, 14) will further delay removal of latch (13, 14). In the country of the applicant, it is known that the risk for a burglar to fully release a high security lock sharply decreases as the duration consumed in front of a single lock increases.

[0027] In a nutshell, the present invention proposes a locking assembly (11) comprising a plurality of regular and curvilinear latches (12, 13 and 14) movable relative to said assembly (11) in the manner to engage in suitable slots (15, 16) on the lock panel (18), actuator mechanisms for actuating said regular and curvilinear latches (12, 13 and 14) and transmission mechanisms transferring motion to said plurality of latches (13, 14), said curvilinear latches (13, 14) being provided with at least one reinforcement pin (26) projecting from the lateral surfaces of the latch (13, 14) body portions that remain within the lock case in locked position.

Claims

1. A locking assembly (11) comprising a a sliding latch (12) and curvilinear rotating latches (13 and 14) movable relative to said assembly (11) in a manner to

engage in suitable slots (15, 16) on a lock panel (18), actuator mechanisms for actuating said sliding latch (12) and curvilinear rotating latches (13 and 14) and transmission mechanisms transferring motion to said plurality of latches (12, 13, and14) **characterized in that;**
said curvilinear latches (13, 14) are provided with at least one reinforcement pin (26) projecting from the lateral surfaces of the curvilinear latch (13, 14) body portions,
said reinforcement pins (26) projecting laterally from the side faces of said curvilinear latches (13, 14) form a lateral contact surface with the lock panel (18) portions immediately above and below said latching slot (15) in any attempt to slip said latches (13, 14) outwardly,
said reinforcement pins (26) are located substantially close to the lock panel (18) with regard to the locked position layout of the latches (13, 14).

2. A locking assembly (11) according to Claim 1 wherein the smallest distance between any point of the reinforcement pins (26) and the lock panel (18) is smaller than the radius of the reinforcement pin (26) itself when the curvilinear rotating latches (13,14) are in locked position.

Patentansprüche

1. Verriegelungsbaugruppe (11), umfassend einen Schieberiegel (12) und gekrümmte rotierende Riegel (13 und 14) die relativ zu der Baugruppe (11) in einer Weise beweglich sind, um in geeignete Aussparungen (15, 16) auf einer Schlossplatte (18) einzugreifen, Betätigungsmechanismen zum Betätigen des Schieberiegels (12) und der gekrümmten rotierenden Riegel (13 und 14) und Übermittelungsmechanismen, die an die Vielzahl von Riegeln (12, 13 und 14) Bewegung übertragen, **dadurch gekennzeichnet, dass**
die gekrümmten Riegel (13, 14) mit mindestens einem von den seitlichen Oberflächen der Rumpfteile des gekrümmten Riegels (13, 14) vorstehenden Verstärkungsstift (26) versehen sind,
wobei die seitlich von den Seitenflächen der gekrümmten Riegel (13, 14) vorstehenden Verstärkungsstifte (26) bei jedem Versuch, die Riegel (13, 14) nach außen gleiten zu lassen, eine seitliche Kontaktoberfläche mit den Teilen der Schlossplatte (18) unmittelbar über und unter der Verriegelungsaussparung (15) bilden,
wobei sich die Verstärkungsstifte (26) bezüglich der Anordnung der Riegel (13, 14) in geschlossener Position im Wesentlichen nahe zu der Schlossplatte (18) befinden.

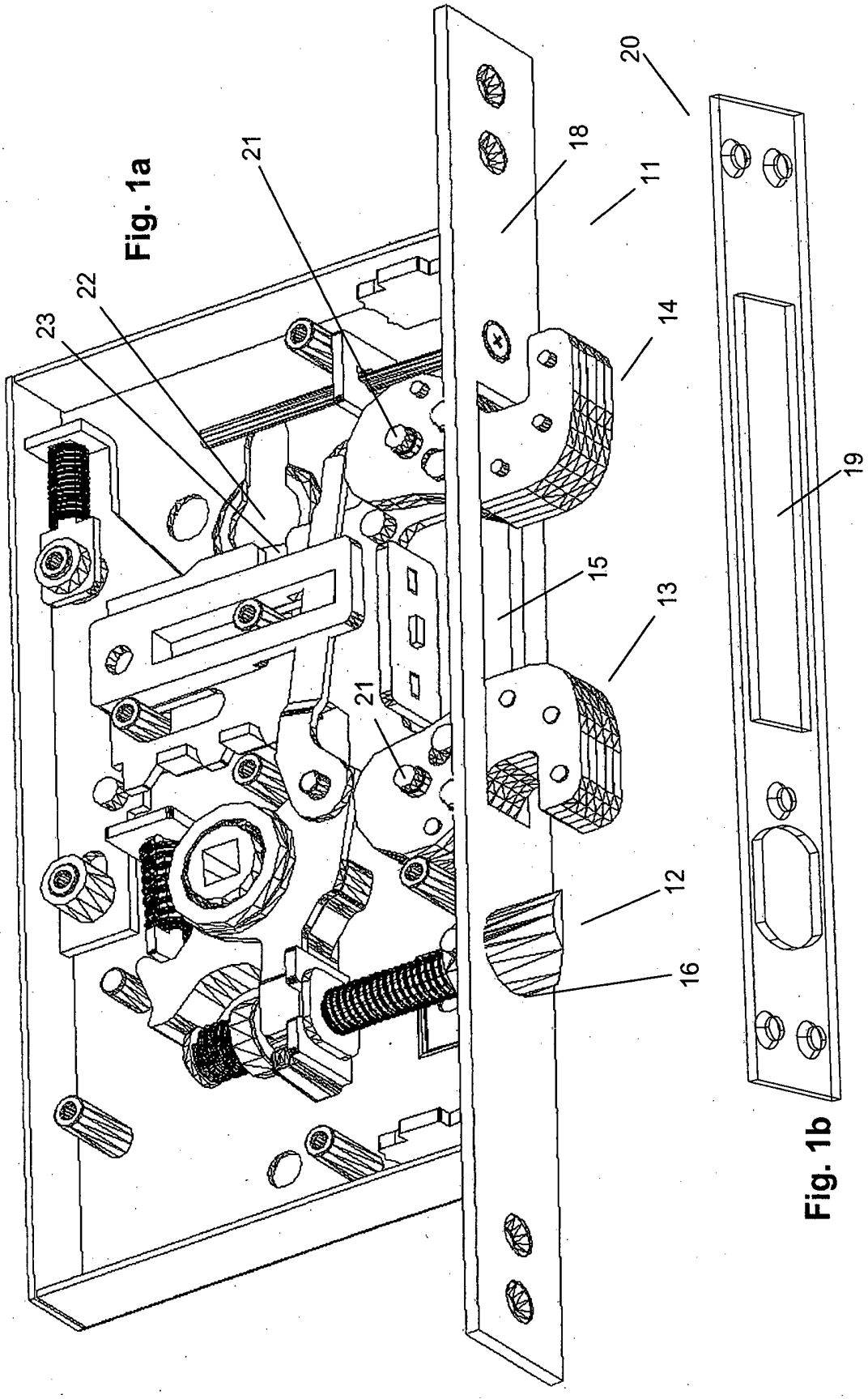
2. Verriegelungsbaugruppe (11) gemäß Anspruch 1, wobei die kleinste Entfernung zwischen jedem Punkt der Verstärkungsstifte (26) und der Schlossplatte (18) kleiner ist als der Radius des Verstärkungsstiftes (26) selbst, wenn die gekrümmten rotierenden Riegel (13, 14) sich in der geschlossenen Position befinden.

Revendications

1. Ensemble de verrouillage (11) comprenant un loquet coulissant (12) et des loquets rotatifs curvilinéaires (13 et 14) déplaçables par rapport audit ensemble (11) de façon à prendre dans des fentes correspondantes (14, 16) dans une contreplaque (18), des mécanismes d'actionnement servant à actionner ledit loquet coulissant (12) et lesdits loquets rotatifs curvilinéaires (13 et 14) et des mécanismes de transmission transférant le mouvement à ladite pluralité de loquets (12, 13 et 14), **caractérisé en ce que** :

lesdits loquets curvilinéaires (13, 14) sont pourvus d'au moins une broche de renforcement (26) faisant saillie depuis les surfaces latérales des portions du corps du loquet curvilinéaire (13, 14),
lesdites broches de renforcement (26) faisant saillie latéralement depuis les faces latérales desdits loquets curvilinéaires (13, 14) forment une surface de contact latérale avec les portions de la contreplaque (18) immédiatement au-dessus et au-dessous de ladite fente de verrouillage (15) lors de toute tentative de faire glisser lesdits loquets (13, 14) vers l'extérieur,
lesdites broches de renforcement (26) sont situées essentiellement près de la contreplaque (18) compte tenu de la disposition des loquets (13, 14) en position verrouillée.

2. Ensemble de verrouillage (11) suivant la revendication 1, dans lequel l'écart le plus petit entre n'importe quel point des broches de renforcement (26) et la contreplaque (18) est plus petit que le rayon de la broche de renforcement (26) elle-même, lorsque les loquets rotatifs curvilinéaires (13, 14) sont en position verrouillée.


Fig. 1a
21
22
23
18
11
14
15
13
21
12
16
20
19
Fig. 1b

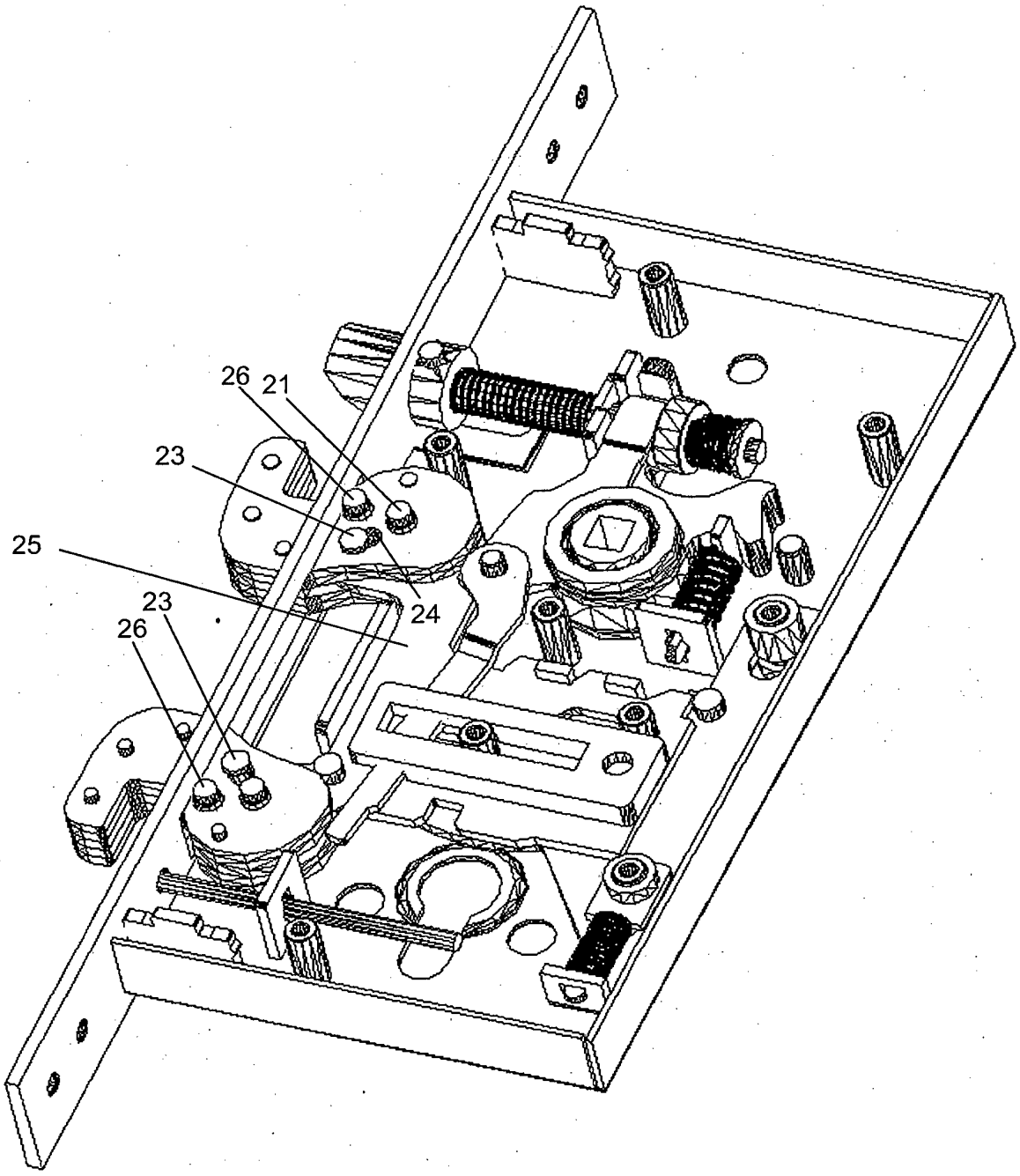


Fig. 2

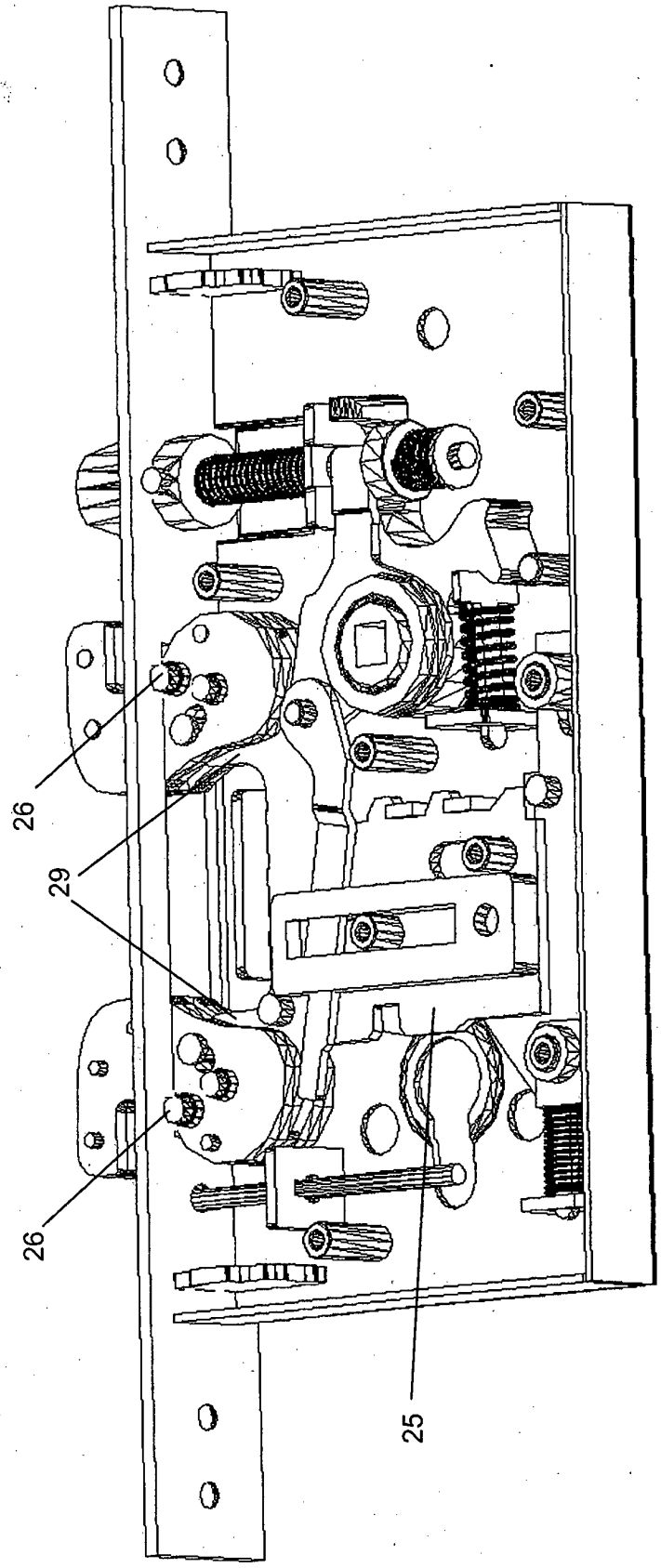


Fig. 3

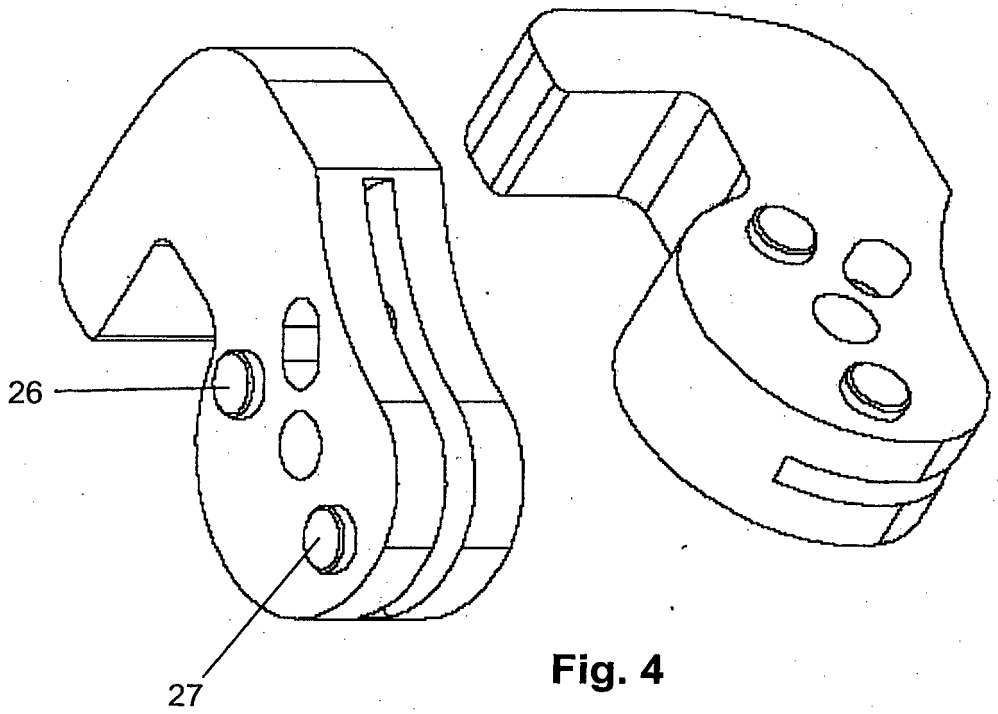


Fig. 4

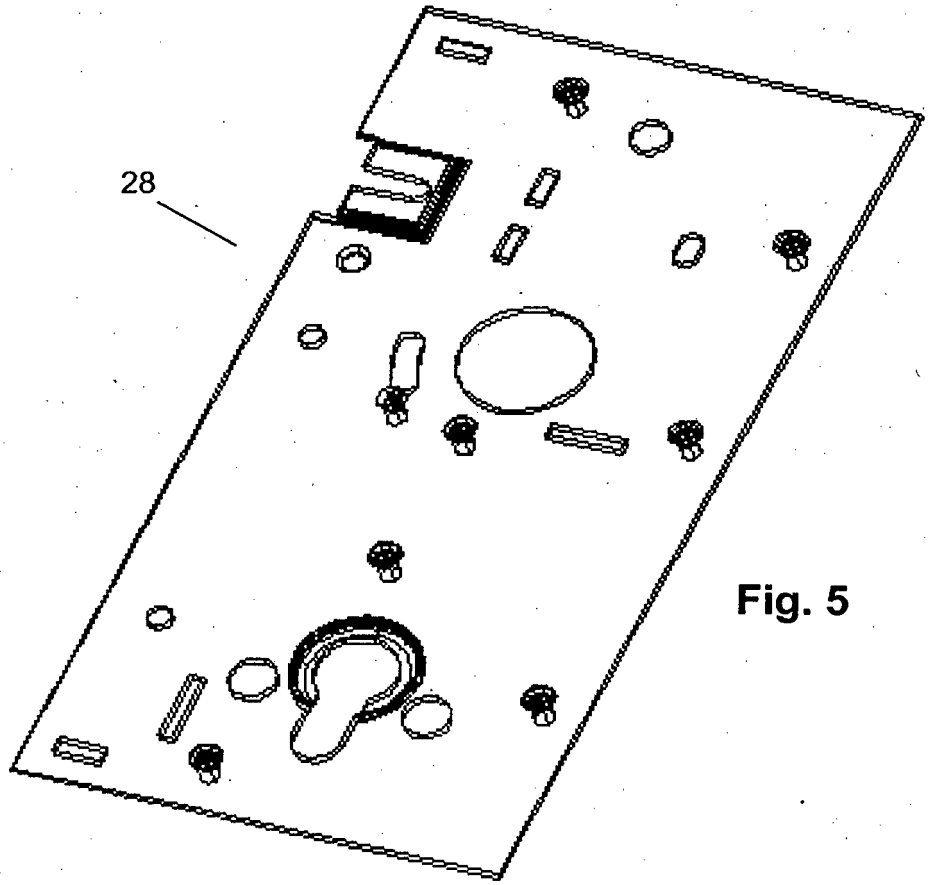


Fig. 5

REFERENCES CITED IN THE DESCRIPTION

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