

(19)



Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 0 976 899 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:

10.04.2002 Bulletin 2002/15

(51) Int Cl.7: **E05B 65/10**

(21) Application number: **99304608.5**

(22) Date of filing: **14.06.1999**

(54) **Automatic door lock**

Automatisches Türschloss

Serrure automatique pour portes

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE**

(30) Priority: **02.07.1998 GB 9814262**

(43) Date of publication of application:
02.02.2000 Bulletin 2000/05

(73) Proprietor: **Nemef B.V.**
7345 AN Wenum-Wiesel (NL)

(72) Inventor: **Bosman, Barend**
8161 DE Epe (NL)

(74) Representative: **Harries, Simon George et al**
Black & Decker
Patent Department
210 Bath Road
Slough, Berkshire SL1 3YD (GB)

(56) References cited:
EP-A- 0 688 931 **DE-A- 2 914 372**

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

EP 0 976 899 B1

Description

[0001] The present invention relates to a lock for the inactive door of a pair of doors.

[0002] Doors of the two-leaf type are currently known (for example EP-A-0688931), and are used for reasons of safety in public premises and the like and are described as anti-panic doors. Anti-panic doors of the two-leaf type comprise a primary or active door, which is normally used for entry and exit, and a secondary or inactive door which is usually closed. The inactive door can however be opened, if required, for example to allow the passage of large objects or in an emergency, such as a fire.

[0003] The lock on the active door is designed to operate independently of the inactive door, and normally does so. However, if the lock on the inactive door is operated, this automatically operates the lock on the active door. The secondary or inactive leaf of such doors is generally provided with a locking device which normally attaches it to the frame. In particular, this locking device usually consists of a lock which is provided with a pair of rods which slide vertically, in opposite directions, in the leaf, such that they can engage in ferrules in corresponding seats provided respectively in the door frame and in the floor. In use, when they are in a position retracted inside the leaf, the said rods enable the door to be opened fully, whereas in the extended position they lock the secondary leaf.

[0004] The active door is normally provided with a dead bolt and latch bolt which operate in a conventional manner, when the door is in normal use. It is known to drive the latch bolt and dead bolt from the inactive door, so that the latch bolt and dead bolt can be opened without the use of a key, from the interior only, of the building in which they are located.

[0005] Such locks are known as automatic anti-panic locks, and have the advantage that they make it possible to open both the active and the inactive door from the inactive door alone, suitably by means of a lever or by operation of a panic bar.

[0006] In order to obtain automatic operation it is necessary that, on closing the inactive door, both the upper rod and the lower rod are extended so that they engage in the corresponding seats.

[0007] In order to achieve this, it is necessary when the door is open, for the lower rod to be held in the retracted position, to allow the door to move, and for the upper rod to be held in the extended position, so that on closing, the locking mechanism can be activated and the lower rod moved from the retracted to the extended position.

[0008] It is disadvantage of the known systems that it is necessary to provide a device separate to the main lock, to hold the upper rod in the extended position when the door is open and the operating lever released.

[0009] The need to install a separate device increases the cost of the lock assembly, and the cost of installation,

since this separate device must be precisely located on the door. In addition, locks of this type are typically fitted to heavy steel doors and if there is any distortion in the door, over time, this can lead to problems.

[0010] It is an object of the present invention to provide an automatic anti-panic lock in which the above disadvantages are reduced or substantially obviated.

[0011] The present invention provides an automatic inactive door lock for the inactive door of a pair of doors, the active door of which is fitted with an automatic anti-panic lock comprising a latch bolt and a deadbolt, which inactive door lock comprises

a housing;

a first bolt arranged within the housing to drive the latch bolt of the anti-panic lock;

a second bolt arranged within the housing to drive the deadbolt of the anti-panic lock;

means arranged within the housing attachable to an upper rod to drive the upper rod between a first, normal or locking, position in which the rod extends from the top face of the inactive door and a second, unlocking position in which the rod is within the inactive door;

the upper rod being driveable from the first position to the second position on closing of the inactive door;

means arranged within the housing attachable to a lower rod to drive the lower rod between a first, normal or locking, position in which the rod extends from the lower face of the inactive door and a second, unlocking position in which the rod is within the inactive door;

operating means arranged within the housing operable by an operator to unlock the door by retracting the upper and lower rods;

retaining means arranged to hold the lower rod in the retracted position within the door when the operating means is released by the operator and retaining means arranged to hold the upper rod in the extended position when the inactive door is open and the operating means is released by the operator; characterised in that the retaining means arranged to hold the upper rod in the extended position when the inactive door is open is located within the housing.

[0012] An embodiment of a lock will now be described with reference to the accompanying drawings, in which:

Figure 1 is a view of the lock, assembled on the inactive door of a pair of doors;

Figure 2 is a view of the lock, partly in section, in the normal or closed position and

Figure 3 is a view of the lock, partly in section, in the open position.

[0013] As is shown in Figure 1, a locking system com-

prises an anti-panic lock 2 and an automatic inactive door lock, shown generally at 10.

[0014] The anti-panic lock 2 comprises a latch bolt 4 and a dead bolt 6, operable in conventional manner by a lever handle and a key.

[0015] The automatic inactive door lock 10 comprises a housing 8 in which are located a first long hub plate 12 and a second short hub plate 14 which are arranged in contact with each other. An upper hub 16 is mounted on the upper (free) face of the first hub plate 12 and a lower hub 18 is mounted on the lower (free) face of the second hub plate 14. A rigid four layer structure is thus obtained.

[0016] A through aperture 20 extends through the upper hub 16, first hub plate 12, second hub plate 14 and lower hub 18 and is adapted to receive the shaft of an operating lever (not shown). The through aperture 20 and shaft are preferably square in shape, so that rotation of the lever results in rotation of the hub assembly.

[0017] The first hub plate 12 is in plate form and comprises a contact surface 22, first cam face 24, second cam face 26 and guide slot 30. A pin 31 projects from the surface of the plate 12 in the plane of the upper hub 16.

[0018] The second hub plate 14 is in plate form and is similar in shape to the first hub plate 12, having a contact surface 56 (corresponding to contact surface 22); single cam surface 58 (corresponding to second cam surface 26) and guide slot 62 (corresponding to guide slot 30). A pin 64 which is offset relative to pin 31 of plate 12 projects from the surface of the plate 14 in the plane of the lower hub 18.

[0019] A first (lower) unlocking plate 32 is substantially rectangular in form and comprises a blocking face 33, first and second guide slots 34 and 36, notch 38, first and second upstands 39 and 40, drive pin 42, spring boss 44 and first and second guide pins 46 and 48. A composite first (lower) bolt carrier 50 is mounted on the first unlocking plate 32, and is provided with guide slots 52 and 54 to receive the guide pins 46 and 48.

[0020] A second (upper) unlocking plate 66 is substantially rectangular in form and comprises a drive face 68, first and second guide slots 70 and 72, slot 74, first upstand 76 and second upstand 78.

[0021] A second (upper) bolt carrier 80 is mounted on the unlocking plate 66.

[0022] A turn arm 82 comprises a contact face 84 arranged to contact the second cam face 26 of the hub plate 12 and a finger 86 arranged to contact the drive face 68 of the second unlocking plate 66.

[0023] An upper coupling piece 88 for coupling to the upper rod 90 comprises a face 92 and a pin 94 which locates in the guide slot 70 of the upper unlocking plate 66.

[0024] A lower coupling piece 96 for coupling to the lower rod 98 comprises a pin 100 which locates in the guide slot 34 of the lower unlocking plate 32.

[0025] An unlocking plate 102 comprises an upper

face 104 for contacting the face 92 of the upper coupling piece 88, a lower face 106 and a guide slot 108 adapted to engage a guide pin 110 provided on the back plate 112 of the housing 8 and the guide pin 64 of the second hub plate 14.

[0026] A locking plate 114 comprises a slot 117 to locate the pin 31 of hub plate 12 and a hook projection 118 adapted to engage the blocking face 33 of the lower unlocking plate 32.

[0027] A coupling (or locking/unlocking) plate 120 comprises a face 122 for contacting the lower face 106 of the unlocking plate 102 and a projection 124 for engagement in the notch 38 of the first unlocking plate 32.

[0028] A lower bolt spring 126 locates in the slot 36 and engages the upstand 40 of the lower unlocking plate 32 and biases the lower unlocking plate 32 away from the opening edge of the door 128.

[0029] An upper bolt spring 130 locates the slot 72 and engages the upstand 76 of the upper unlocking plate 66 and biases the upper unlocking plate 66 away from the opening edge of the door 128.

[0030] A coupling plate spring 132 is mounted on a boss 134 located on the back plate 112 of the housing 8, and engages the projection 124 of the coupling plate 120 to bias the coupling plate 120 towards engagement of the projection 124 in the notch 38 of the first unlocking plate 32.

[0031] A lever spring 136 mounted on the boss 44 on the lower unlocking plate 32 biases the lower bolt carrier 50 towards the opening edge of the door 128.

[0032] A leaf spring 138 engages at one end with a boss 140 provided on the back plate 112 of the housing 8, and its other end engages in a slot 142 provided in the locking plate 114.

[0033] The housing 8 further comprises a cover plate (not shown) provided with slots to guide the upper unlocking plate 66 by means of the upstands 76,78 and the lower unlocking plate 32 by means of the upstand 40.

[0034] An upper bolt 144 is mounted on the upper bolt carrier 80 and a lower bolt 146 is mounted on the lower bolt carrier 50.

[0035] The normal or locked arrangement of the automatic inactive door lock 10 is shown in Figure 2.

[0036] In operation, to open the door, the operator rotates an operating lever (not shown) in the clockwise direction. The four layer structure of the first long hub plate 12, the second short hub plate 14, and upper and lower hubs 16,18 is thus rotated.

[0037] Considering first the unlocking operation of the lower part of the lock 10, the first long hub plate 12 is driven in rotation and the first cam face 24 of the plate 12 contacts the drive pin 32 of the first lower unlocking plate 32 and drives the plate 32 against the biasing force of the lower bolt spring 126.

[0038] As the unlocking plate 32 moves in the unlocking direction, the projection 124 of the coupling plate 120 which is biased by the coupling plate spring 132 towards

the unlocking plate 32 engages in the notch 38 of the unlocking plate 32 and restrains it against further movement.

[0039] At the same time, the pin 100 of the lower coupling piece 96 is guided in the first guide slot 34 of the unlocking plate 32 and lifts the lower coupling piece 96 and the lower rod 98.

[0040] When the operating lever is released, the lower coupling piece 96 and the lower rod 98 are held in the raised position.

[0041] When the lock 10 is in the normal or locked position, upwards pressure on lower coupling piece 96 or lower rod 98 does not retract the rod 98, as after a very limited amount of movement, the hook projection 118 on the locking plate 114 contacts the blocking face 33 of the unlocking plate 32 and restrains the unlocking plate 32 against further movement.

[0042] Considering next the unlocking operation of the upper part of the lock 10, as the lever is rotated and the long hub plate 12 rotates, the second cam face 26 of the long hub plate 12 contacts the contact face 84 of the turn arm 82 and the drive face 68 of the second upper unlocking plate 66. The pin 94 of the upper coupling piece 88 is located in the guide slot 70 of the unlocking plate 66, so that as the unlocking plate 66 moves, the upper coupling piece 88 and upper rod 90 are lowered.

[0043] As the lever is released, the upper coupling piece 88 and upper rod 90 return to the normal or locking position, projecting above the door.

[0044] As the door is closed, the upper rod 90 is pushed down by the door frame. The downwardly moving face 92 of the upper coupling piece 88 contacts the upper face 104 of the unlocking plate 102. The unlocking plate 102 moves downwards, with its guide slot 108 engaging the guide pin 110 of the housing 8 and the pin 64 of the short hub plate 14. The lower face 106 of the unlocking plate 102 contacts the face 122 of the coupling plate 120 and drives the coupling plate 120 downwards against the biasing effect of the coupling plate spring 132. The projection 124 of the coupling plate 120 is thus disengaged from the notch 38 of the unlocking plate 32 and the unlocking plate 32 is returned to the normal or locked position by the lower bolt spring 126.

[0045] In conventional manner, the upper bolt 144 which is attached to the upper bolt carrier 80 drives the latch bolt in the active door, and the lower bolt 146 attached to the lower bolt carrier 50 drives the dead bolt in the active door.

Claims

1. An automatic inactive door lock (10) for the inactive door of a pair of doors, the active door of which is fitted with an automatic anti-panic lock (2) comprising a latch bolt and a deadbolt, which inactive door lock (10) comprises

a housing (8);

a first bolt (144) arranged within the housing (8) to drive the latch bolt of the anti-panic lock (2); a second bolt (146) arranged within the housing (8) to drive the deadbolt of the anti-panic lock (2);

means (88) arranged within the housing (8) attachable to an upper rod (90) to drive the upper rod (90) between a first, normal or locking, position in which the rod (90) extends from the top face of the inactive door and a second, unlocking position in which the rod (90) is within the inactive door;

the upper rod (90) being driveable from the first position to the second position on closing of the inactive door;

means (96) arranged within the housing (8) attachable to a lower rod (98) to drive the lower rod (98) between a first, normal or locking, position in which the rod (98) extends from the lower face of the inactive door and a second, unlocking position in which the rod (98) is within the inactive door;

operating means arranged within the housing (8) operable by an operator to unlock the door by retracting the upper and lower rods (90,98) retaining means (124,38) arranged to hold the lower rod (98) in the retracted position within the door when the operating means is released by the operator and

retaining means (114) arranged to hold the upper rod (90) in the extended position when the inactive door is open and the operating means is released by the operator; **characterised in that** the retaining means (114) arranged to hold the upper rod (90) in the extended position when the inactive door is open is located within the housing (8).

2. An automatic inactive door lock (10) as claimed in claim 1, **characterised in that** the lock (10) comprises a coupling plate (120) and a lower unlocking plate (32) and the retaining means (124,38) arranged to hold the lower rod (98) in the retracted position within the door when the operating means is released by the operator comprises a projection (124) located on the coupling plate (120) and biased by a coupling plate spring (132) towards engagement in a notch (38) provided in the lower unlocking plate (32).
3. An automatic inactive door lock (10) as claimed in claim 1 or claim 2 **characterised in that** the operating means is a lever.
4. An automatic inactive door lock (10) as claimed in claim 2 or claim 3 **characterised in that** the lock (10) comprises a locking plate (114) and the lower

rod (98) is secured against retraction by upwards pressure on the rod (98) by the engagement of a hook projection (118) of the locking plate (114) on a blocking face (33) of the lower unlocking plate (32).

5

5. An automatic inactive door lock (10) for the inactive door of a pair of doors, the active door of which is fitted with an automatic anti-panic lock (2) comprising a latch bolt and a deadbolt, substantially as herein described with reference to the accompanying drawings.

10

Patentansprüche

15

1. Automatisches Inaktiv-Türschloss (10) für die inaktive Tür eines Türpaares, von dem die aktive Tür mit einem automatischen Anti-Panik-Schloss (2) versehen ist, umfassend einen Verriegelungsbolzen und einen Absteller, das Inaktiv-Türschloss (10) umfassend

20

ein Gehäuse (8);

25

einen ersten Bolzen (144), der innerhalb des Gehäuses (8) angeordnet ist, um den Verriegelungsbolzen des Anti-Panik-Schlusses (2) zu führen;

30

einen zweiten Bolzen (146), der innerhalb des Gehäuses (8) angeordnet ist, um den Absteller des Anti-Panik-Schlusses (2) zu führen;

35

Mittel (88), die innerhalb des Gehäuses (8) angeordnet sind, die an eine obere Stange (90) befestigt werden können, um die obere Stange (90) zwischen einer ersten, normalen oder Schließposition, in der sich die Stange (90) von der Oberseite der inaktiven Tür aus erstreckt und einer zweiten, Entriegelungsposition zu führen, in der sich die Stange (90) in der inaktiven Tür befindet;

40

wobei die obere Stange (90) von der ersten Position zur zweiten Position geführt werden kann, um die inaktive Tür zu schließen;

45

Mittel (96), die innerhalb des Gehäuses (8) angeordnet sind, die an eine untere Stange (98) befestigt werden können, um die untere Stange (98) zwischen einer ersten, normalen oder Schließposition, in der sich die Stange (98) von der Unterseite der inaktiven Tür aus erstreckt und einer zweiten Entriegelungsposition zu führen, in der die Stange (98) sich innerhalb der inaktiven Tür befindet;

50

55

Betätigungsmittel, die sich innerhalb des Gehäuses (8) befinden, die durch eine Bedienperson betätigt werden können, um die Tür zu entriegeln, indem die obere und untere Stange (90, 98) zurückgezogen wird;

Halterungsmittel (124, 38), die angeordnet sind, um die untere Stange (98) in der zurückgezogenen Position innerhalb der Tür zu halten, wenn das Betätigungsmittel von der Bedienperson losgelassen wird und

Halterungsmittel (114), die angeordnet sind, um die obere Stange (90) in der erstreckten Position zu halten, wenn die inaktive Tür geöffnet ist und das Betätigungsmittel von der Bedienperson losgelassen wird;

dadurch gekennzeichnet, dass das Haltezugsmittel (114), das angeordnet ist, um die obere Stange (90) in der erstreckten Position zu halten, sich innerhalb des Gehäuses (8) befindet, wenn die inaktive Tür geöffnet ist.

2. Automatisches Inaktiv-Türschloss (10) nach Anspruch 1, **dadurch gekennzeichnet, dass** das Schloss (10) eine Kopplungsplatte (120) und eine untere Entriegelungsplatte (32) umfasst und wobei das Halterungsmittel (124, 38), das so angeordnet ist, dass es die untere Stange (98) in der zurückgezogenen Position innerhalb der Tür hält, wenn das Betätigungsmittel von der Bedienperson losgelassen wird, einen Vorsprung (124) umfasst, der sich auf der Kopplungsplatte (120) befindet und durch eine Kopplungsplattenfeder (123) zur Aufnahme in eine Kerbe (38) vorgespannt wird, die in der unteren Entriegelungsplatte (32) vorgesehen ist.

3. Automatisches Inaktiv-Türschloss (10) nach Anspruch 1 oder Anspruch 2, **dadurch gekennzeichnet, dass** das Betätigungsmittel ein Hebel ist.

4. Automatisches Inaktiv-Türschloss (10) nach Anspruch 2 oder 3, **dadurch gekennzeichnet, dass** das Schloss eine Verriegelungsplatte (114) umfasst und die untere Stange (98) gegen Rückziehen durch Abwärtsdruck auf die Stange (98) durch den Eingriff eines Hakenvorsprungs (118) der Verriegelungsplatte (114) auf eine Blockierseite (33) der unteren Entriegelungsplatte (32) gesichert ist.

5. Automatisches Inaktiv-Türschloss (10) für die inaktive Tür eines Türpaares, von dem die aktive Tür mit einem automatischen Anti-Panik-Schloss (2) versehen ist, das einen Verriegelungsbolzen und einen Absteller wie im wesentlichen mit Bezug auf die beigefügten Zeichnungen beschrieben, umfasst.

Revendications

1. Serrure automatique (10) pour porte inactive destinée à la porte inactive d'une paire de portes, dont la porte active est dotée d'une serrure automatique antipanique (2) comprenant un pêne demi-tour et un pêne dormant, laquelle serrure (10) pour porte inactive comprend :

un boîtier (8) ;
 un premier verrou (144) agencé à l'intérieur du boîtier (8) pour commander le pêne demi-tour de la serrure antipanique (2) ;
 un second verrou (146) agencé à l'intérieur du boîtier (8) pour commander le pêne dormant de la serrure antipanique (2) ;
 un moyen (88) agencé à l'intérieur du boîtier (8) qui peut être fixé à une barre supérieure (90) pour commander la barre supérieure (90) entre une première position de verrouillage ou normale dans laquelle la barre (90) s'étend depuis la face supérieure de la porte inactive et une seconde position de déverrouillage dans laquelle la barre (90) est à l'intérieur de la porte inactive ;
 la barre supérieure (90) pouvant être entraînée de la première position à la seconde position lors de la fermeture de la porte inactive ;
 un moyen (96) agencé à l'intérieur du boîtier (8) pouvant être fixé à une barre inférieure (98) pour commander la barre inférieure (98) entre une première position de verrouillage ou normale dans laquelle la barre (98) s'étend depuis la face inférieure de la porte inactive et une seconde position de déverrouillage dans laquelle la barre (98) est à l'intérieur de la porte inactive ;
 un moyen d'actionnement agencé à l'intérieur du boîtier (8) actionnable par un opérateur pour déverrouiller la porte en rétractant les barres supérieure et inférieure (90, 98) ;
 un moyen de retenue (124, 38) agencé pour maintenir la barre inférieure (98) dans la position rétractée à l'intérieur de la porte lorsque le moyen d'actionnement est libéré par l'opérateur ; et
 un moyen de retenue (114) agencé pour maintenir la barre supérieure (90) dans la position étendue lorsque la porte inactive est ouverte et que le moyen d'actionnement est libéré par l'opérateur ;

caractérisée en ce que le moyen de retenue (114) agencé pour maintenir la barre supérieure (90) dans la position étendue lorsque la porte inactive est ouverte est placé à l'intérieur du boîtier (8).

2. Serrure automatique (10) pour porte inactive selon

la revendication 1, **caractérisée en ce que** la serrure (10) comprend une plaque de couplage (120) et une plaque de déverrouillage inférieure (32) et le moyen de retenue (124, 38) agencé pour maintenir la barre inférieure (98) dans la position rétractée à l'intérieur de la porte lorsque le moyen d'actionnement est libéré par l'opérateur comprend une saillie (124) placée sur la plaque de couplage (120) et poussée par un ressort de plaque de couplage (132) en vue de l'engagement dans une encoche (38) ménagée dans la plaque de déverrouillage inférieure (32).

3. Serrure automatique (10) pour porte inactive selon la revendication 1 ou la revendication 2, **caractérisée en ce que** le moyen d'actionnement est un levier.

4. Serrure automatique (10) pour porte inactive selon la revendication 2 ou la revendication 3, **caractérisée en ce que** la serrure (10) comprend une plaque de verrouillage (114), et **en ce que** la barre inférieure (98) est assurée contre la rétraction par une pression vers le haut exercée sur la barre (98) par l'engagement d'une saillie formant crochet (118) de la plaque de verrouillage (114) sur une face de blocage (33) de la plaque de déverrouillage inférieure (32).

5. Serrure automatique (10) pour la porte inactive d'une paire de portes, dont la porte active est dotée d'une serrure automatique antipanique (2) comprenant un pêne demi-tour et un pêne dormant, sensiblement comme décrit ici en se référant aux dessins.

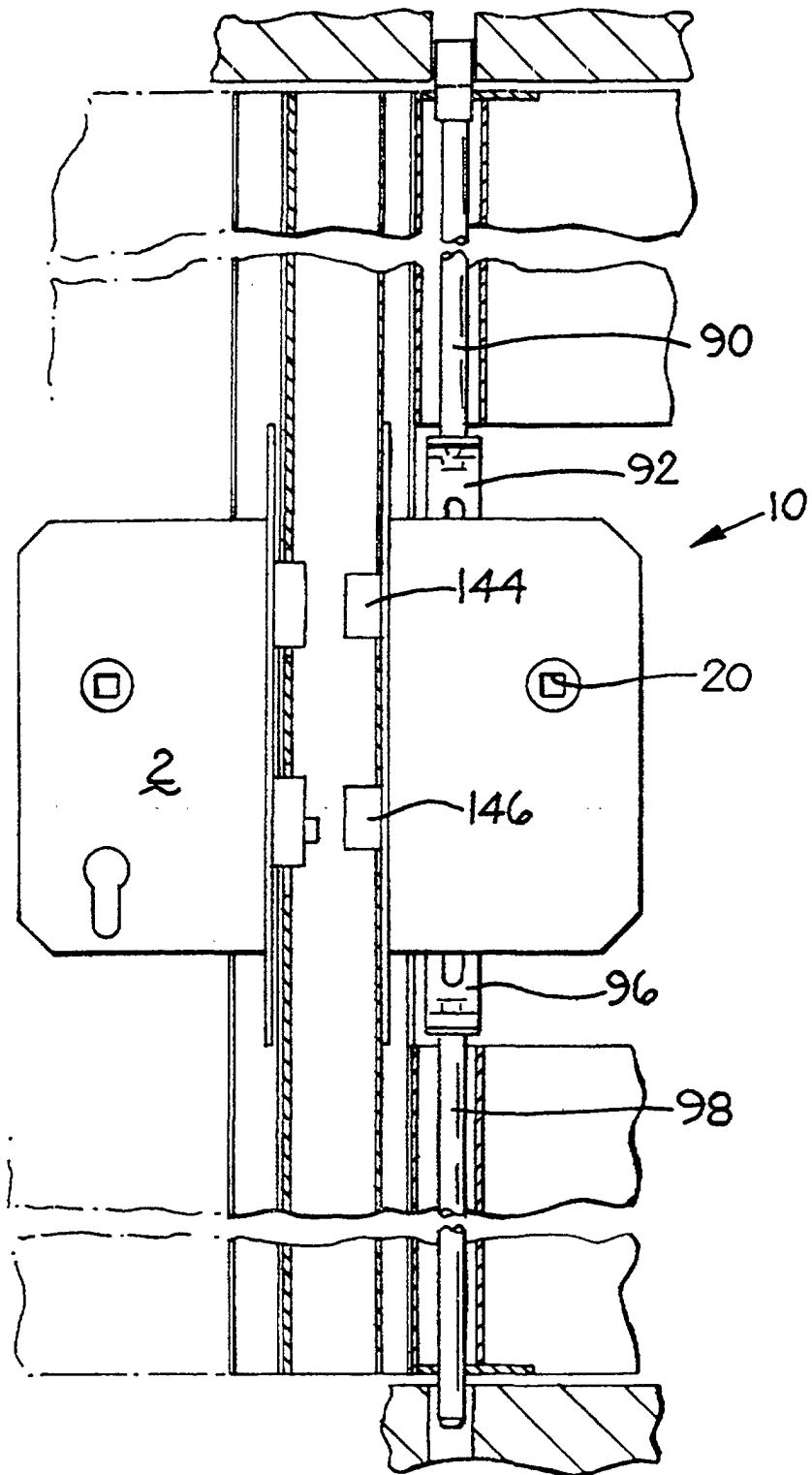
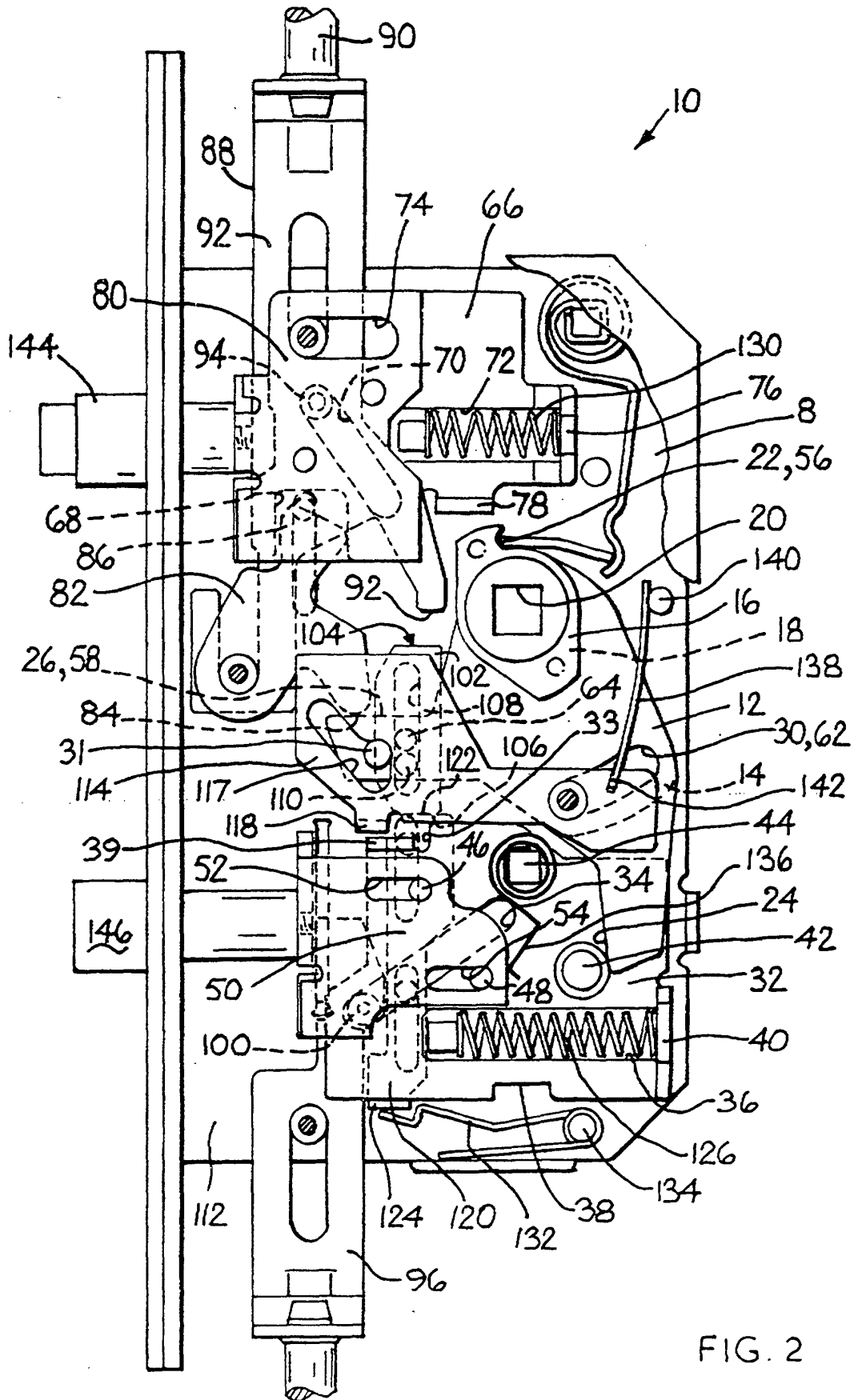


FIG. 1



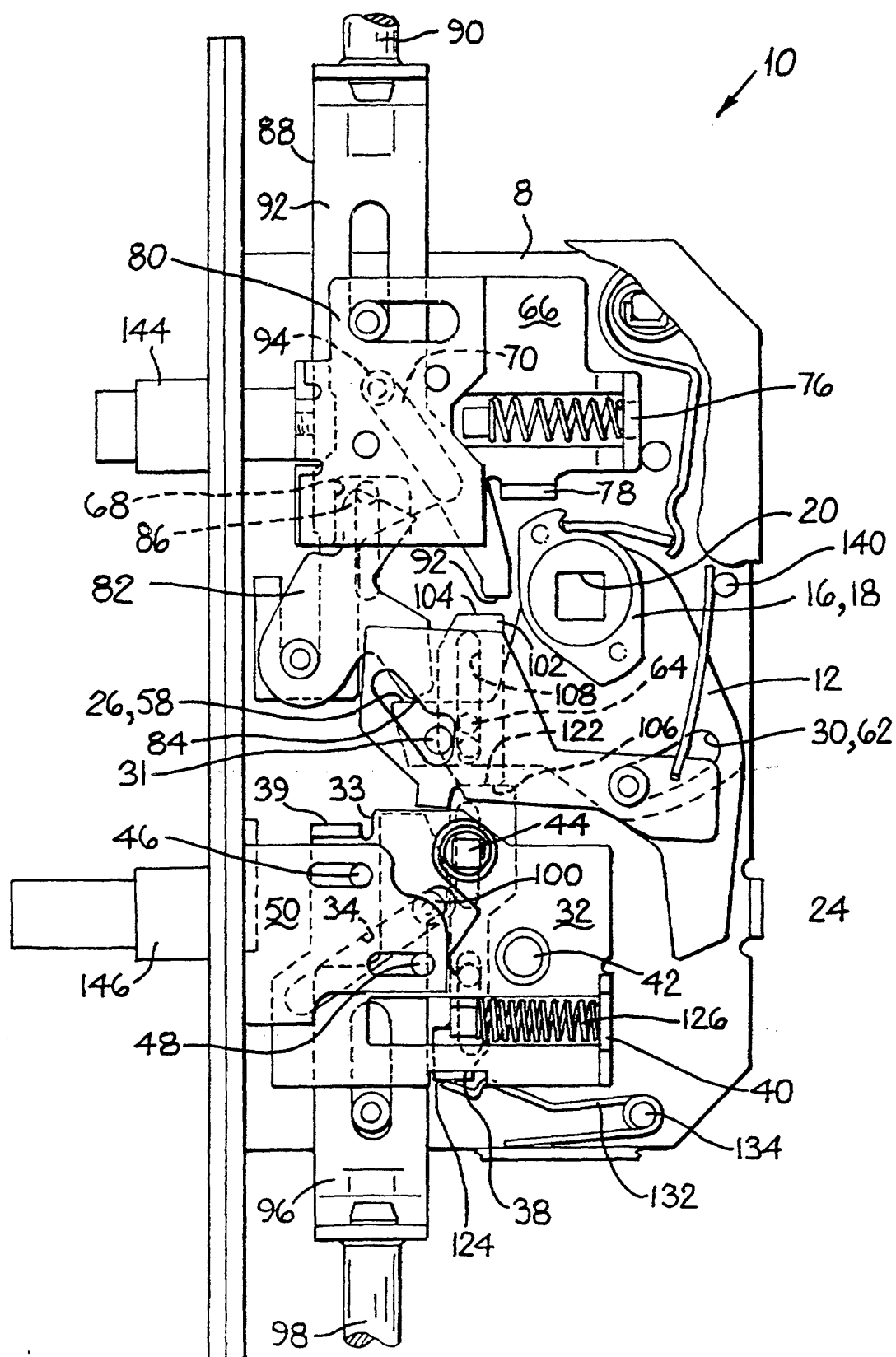


FIG. 3