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(71) Applicant: **Fullard, Donald Malcolm**
17, Castlecroft Gardens
Wolverhampton West Midlands(GB)

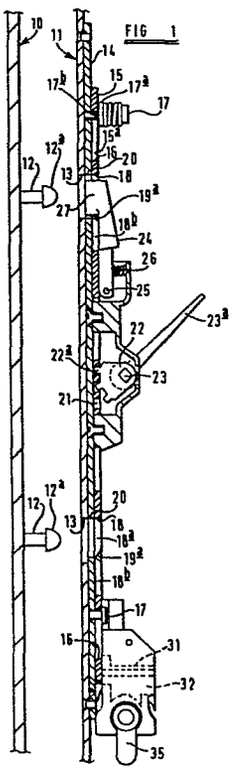
(72) Inventor: **Fullard, Donald Malcolm**
17, Castlecroft Gardens
Wolverhampton West Midlands(GB)

(74) Representative: **Harrison, Gordon Donald et al,**
FORRESTER & BOEHMERT Widenmayerstrasse 4/I
D-8000 München 22(DE)

(54) Locking devices.

(57) A locking device primarily for securing sliding members such as doors and windows in a closed position comprises at least one headed stud (12) provided on one member and a slidable locking plate (15) provided on the other member, said locking plate having a key-hole slot (18) which is releasably engageable with said stud (12), and a striker member (24) is associated with the slot (18) so as to prevent movement of the locking plate (15) from a releasing position to an operative locking position except when the striker member (24) is engaged by the stud (12). The striker member (24) thus prevents the locking plate (15) being moved to its operative locking position when the door or window is open, so as to ensure that the wider end (18*a*) of the key-hole slot is in register with the stud (12) when the door or window is closed.

FIG 1



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Title: "Locking Devices"

This invention relates to locking devices of the kind intended for releasably securing two relatively movable members together. The invention has been developed particularly in relation to a locking device for sliding doors or sliding windows, but may also be applicable to other analogous situations.

In current practice, sliding doors and windows are often secured in a closed position by means of a hook-like latch element provided on one member which is pivotally movable to engage a slotted plate on the other member. This arrangement is not very satisfactory since the latch element may relatively easily be caused to move to its releasing position unless it is very accurately adjusted, and additionally it may be possible for the door or window to be lifted to an extent sufficient to disengage the latch element.

An imporoved form of locking device is disclosed in British Patent Specification No. 1,370,420 using on one member a sliding plate with key-hole slots to engage fixed bolting elements of generally T-shape provided on the other member. This arrangement affords greater security, but the bolting elements and sliding plate are liable to damage if the two members are brought together with the key-hole slots in the sliding plate being properly in register with the bolting elements.

It is an object of the present invention to provide an improved locking device which avoids the aforesaid disadvantage.

According to the present invention, a locking device for releasably securing together two relatively movable members comprises at least one headed bolting element which is provided on one of said members, and a slidable locking plate which is provided on the other of said members, said locking plate having a key-hole slot

so dimensioned and arranged that the head of the bolting element may pass through the wider end of the slot, but not through the narrower end thereof, and said locking plate being movable between a releasing position in which the wider end of the key-hole slot is in register with the bolting element and an operative position in which the narrower end of the key-hole slot is in register with the bolting element, characterised by a striker member associated with said slot which prevents movement of said locking plate from said releasing position to said operative position except when the striker member is engaged by the head of said bolting element.

Thus, the locking plate is held in its releasing position so that the wider end of the key-hole slot is in alignment with the corresponding bolting element so as to allow the two members to be brought together, and only when the bolting element protrudes through the slot so as to displace the striker member, can the locking plate be displaced into its operative position to engage a shank portion of the bolting element in the narrower end of the slot, with the head thereof engaging the locking plate thereby to secure the two members together.

The invention will now be described by way of example, by reference to a specific embodiment of locking device as illustrated in the accompanying drawings, wherein:-

FIGURE 1 shows a longitudinal secitonal view through a locking device as installed on two members which are required to be releasably secured together in face-to-face relation, the two members being shown spaced somewhat apart;

FIGURE 2 shows a corresponding plan view thereof;

FIGURE 3 shows a further view similar to Figure 1 with the two members brought together preparatory to being secured together by means of the locking device; and

FIGURE 4 shows a further similar view with the two members secured together and locked.

As shown in the accompanying drawings, one embodiment of locking device in accordance with the invention is applied to a pair of frame members 10 and 11. In the context of sliding doors or windows, the members 10 and 11 may comprise the webs of extruded frame members not otherwise shown, the member 10 normally being part of a fixed external frame, and the member 11 normally being part of a frame of the slidable door or window. However, it will be appreciated that either of the members 10 and 11 may be fixed, or both may be movable.

The frame member 10 carries two spaced bolting elements comprising studs 12 which project substantially perpendicularly from the face of the member 10 and are provided with domed heads 12a. These studs may be in the form of screws or bolts so as to be adjustable in height relative to the face of the frame member 10.

The other frame member 11 is formed with apertures 13 so arranged as to allow the studs 12 to pass therethrough. The apertures 13 are preferably vertically elongated as shown so as to allow for adjustment of the frame member 11 longitudinally, for example to adjust the vertical position of a door relative to a running track. The device in accordance with the invention includes a base plate 14 secured to the inner face of the frame member 11. The plate 14 is formed with slots 20 in register with the slots 13 in the member 11 and carries a slidable locking plate 15 which is guided for longitudinal movement by means of headed studs 17 engaging in guide slots 16.

The locking plate 15 is formed with respective keyhole slots 18, each having a wider end portion 18a and a narrower end portion 18b.

As will be apparent, the wider ends of the slots 18 are so dimensioned as to allow the heads 12a of the studs 12 to pass through, whereas the narrower ends 18b are

such that the undersides of the heads 12a will engage the shoulders 19 adjacent to the narrower ends 18b of the slots when the locking plate 15 is moved into an operative position as shown in Figure 4. Conveniently, inclined lead-in sections 19a are formed in the sides of the slots 18 at the junction between the wider and narrower end portions thereof, whereby the two frame members 10 and 11 will be pulled together by engagement of the locking plate 15 with the underside of the heads 12a if not already fully together.

The plate 15 is, in the illustrated embodiment, movable by a rack and pinion mechanism afforded by a row of apertures 21 in the plate 15 and a rotatable sector 22 with teeth 22a which engage in the apertures. The sector 22 is mounted on a spindle 23 which is rotatably supported in a housing 21a and carries at its free end an appropriate operating lever 23a.

To prevent inadvertent movement of the locking plate 15 out of its locking position, at least one of the studs 17 carries a spring loaded washer 17a which bears against the face of the plate 15 and is formed with a rib 17b which, when the plate is in the locking position, engages in a transverse groove 15a formed in the plate. The force exerted on the plate 15 by operation of the lever 23a is adequate to displace the washer 17a against the force of the associated spring, but the force of the spring on the washer is sufficient to prevent the plate 15 dropping gravitationally or in response to vibration.

In an alternative arrangement, a detent element could be provided, for example, within the sector housing 21a to engage in one of the apertures 21.

To ensure that the locking plate remains in its releasing position, as shown in Figures 1 and 2, when the frame members 10 and 11 are spaced apart, a striker member is provided in association with at least one of the slots 18. As illustrated, a single striker member 24 is mounted on a pivot pin 25 and engaged by a spring 26 so

that an abutment element 27 formed on the member 24 extends through the wider end 18a of the uppermost key-hole slot and into the corresponding slot 20 of the base plate 14. Thus, the locking plate 15 is effectively locked in its inoperative or releasing position by engagement of the abutment element 27 in the slot 18 as shown in Figure 1.

This ensures that when the two members 10 and 11 are brought together, the wider ends 18a of the key-hole slots 18 are in register with the heads 12a of the studs 12.

As will be appreciated, the striker member 24 is displaced by engagement of the head 12a of the stud 12 with the abutment member 27 as the frame members 10 and 11 are brought together into face-to-face relationship, so that the abutment member is displaced rearwardly clear of the slot 18 as shown in Figure 3. This enables the locking plate 15 to be moved to its operative position (upwardly in the accompanying drawings) in which, as shown in Figure 4, the shanks of the studs 12 are engaged in the narrower end portions 18b of the key-hole slots 18, thereby securing the frame members 10 and 11 together in face-to-face relationship.

In the absence of the striker member 24 it would be possible for the locking plate 15 to be moved into its operative position as shown in Figure 4 even with the frame members 10 and 11 separated, i.e. when the door or window is open, by operation of the lever 23a. Since the position of the locking plate is not readily observable (being encased within a frame member) the door or window could easily be closed inadvertently with the locking plate in this position, leading either to damage to the locking plate and/or the studs, or to failure to secure the door or window in its closed position as desired. This undesirable possibility is eliminated by the provision of the striker member 24.

Whilst the illustrated embodiment shows an arrangement employing two studs 12 with corresponding key-hole slots 18, it will be appreciated that a locking device in accordance with the invention might incorporate only a single stud and corresponding key-hole slot, or a greater number of studs and slots than illustrated.

Whilst the height of the studs 12 is preferably adjustable so that the frame members 10 and 11 are held firmly in face-to-face relationship, even if there is sufficient tolerance to allow a small degree of movement of the frame member 11 away from the frame member 10 when the slide plate is in its operative position, this will in no way impair the security of the locking device, since the locking plate 15 is movable only in a direction perpendicular to the length of the studs, and no component of force can be exerted on the locking plate 15 in the direction required to move it into its releasing position as a result of movement of the frame member 11 away from the frame member 10. Additionally, if the device is installed as illustrated with the locking plate movable upwardly into its locking position and the wider ends of the key-hole slots 18 uppermost, it will be appreciated that if any attempt is made to lift a door of which the frame member 11 forms part, this will only have the effect of ensuring that the studs 12 are more firmly seated within the narrower ends of the slots 18. However, the device can, where more convenient, be installed the other way up.

Any conventional form of lock, such as a deadlock, cylinder lock, or the like may be incorporated in the locking device for additional security, and in the illustrated embodiment, the use of a cylinder lock is shown. A lock housing 30 secured to the base plate 14 defines a guide channel 31 for a bolt 32 which is movable by a rotary striker 33 engaging an abutment 34 in known manner. The striker is associated with a key operable cylinder lock 35 and the arrangement is such that in one

position, as shown in Figure 4, the bolt 32 projects from the housing 31 and engages beneath the lower end of the locking plate 15 to prevent the latter being moved by the lever 23a to its releasing position. A detent element 37 in the housing 30 is pressed by a spring into either of two recesses 38, 39 in the bolt to hold the latter in its locking and releasing positions. A manually operable bolt may alternatively be used in place of the key operable bolt 32.

CLAIMS:

1. A locking device for releasably securing together two relatively movable members (10,11) comprising at least one headed bolting element (12) which is provided on one of said members, and a slidable locking plate (15) which is provided on the other of said members, said locking plate (15) having a key-hole slot so dimensioned and arranged that the head of the bolting element (12) may pass through the wider end of the slot (18), but not through the narrower end thereof, and said locking plate being movable between a releasing position in which the wider end of the key-hole slot is in register with the bolting element and an operative position in which the narrower end of the key-hole slot is in register with the bolting element, characterised by a striker member (24) associated with the slot (18) which prevents movement of said locking plate (15) from said releasing position to said operative position except when the striker member (24) is engaged by the head of said bolting element (12).

2. A locking device according to Claim 1 wherein said striker member comprises a spring loaded lever (24a) adjacent to said key-hole slot (18) and provided with an abutment element (27) which enters the wider end (18a) of the key-hole slot (18) to prevent sliding movement of the locking plate (15) and hold the latter with the wider end of the key-hole slot in register with the bolting element.

3. A locking device according to Claim 1 or Claim 2 wherein the bolting element comprises a stud (12) having a head (12a).

4. A locking device according to any one of the preceding claims wherein the locking plate (15) is slidable by means of teeth (22a) on a rotatable sector (22) engaging in apertures (21) formed in the plate (15).

5. A locking device according to any one of the preceding claims wherein one or more additional bolting elements (12) and corresponding key-hole slots (18) are provided at spaced intervals.

6. A locking device according to any one of the preceding claims wherein a detent (17a) is arranged to engage the locking plate (15) to hold the latter frictionally in its operative position.

7. A locking device according to any one of the preceding claims wherein a bolt (32) is provided to engage the locking plate (15) and hold the latter positively in its operative position.

8. A locking device according to Claim 7 wherein the bolt (32) is movable by means of a key operable lock.

9. A locking device according to Claim 7 or Claim 8 wherein the bolt (32) engages one end of the locking plate (15).

FIG 1

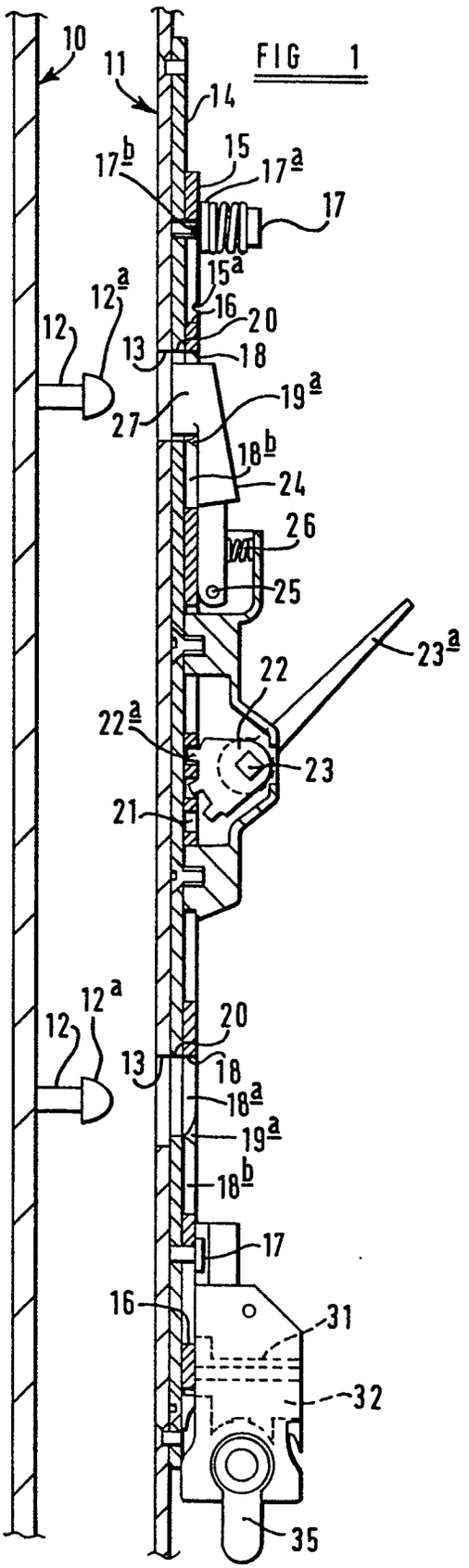
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FIG 2

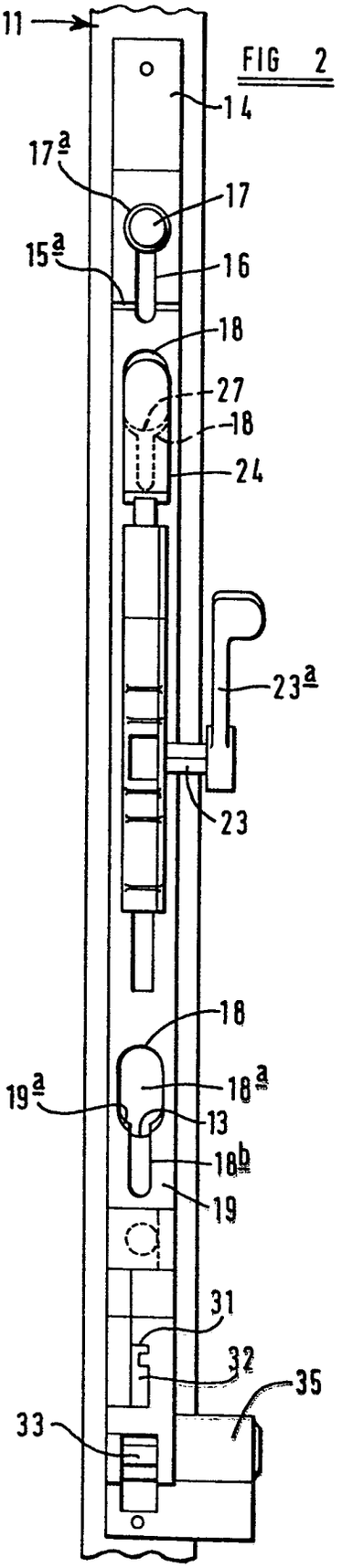
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FIG 3

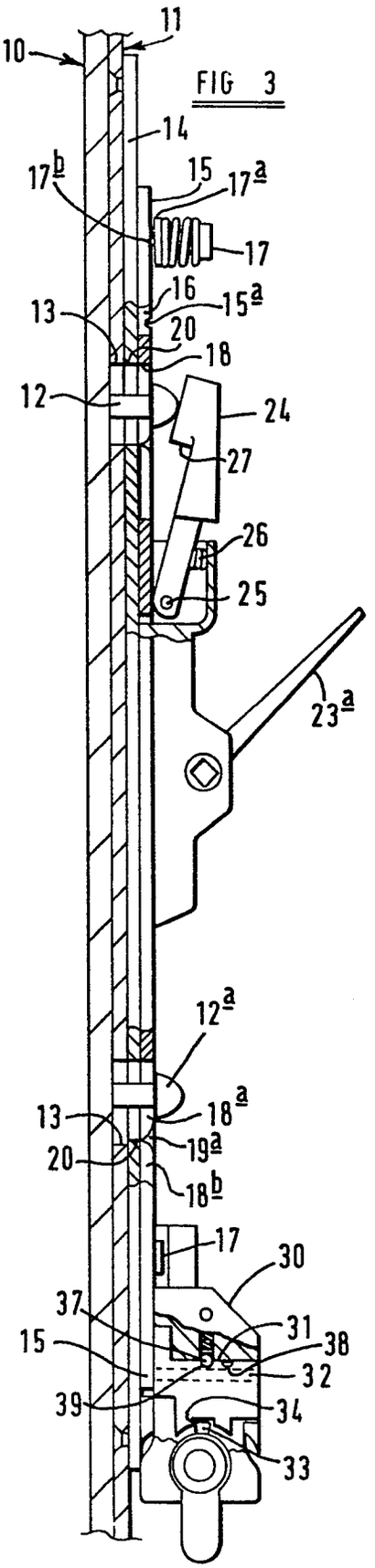
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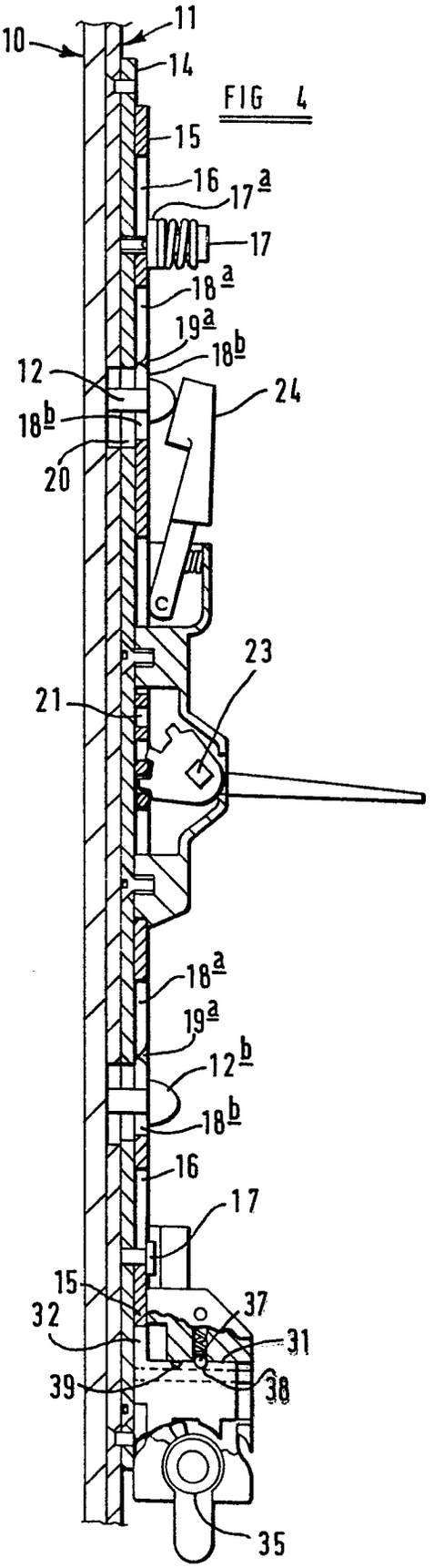
FIG 4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European Patent Office

EUROPEAN SEARCH REPORT

Application number
EP 82 10 0320.9

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
A	US - A - 3 521 920 (D.A. MORAND) * complete document * --	1,3-6
D,A	GB - A - 1 370 420 (GRETSCH-UNITAS GMBH) * page 4, lines 71 to 89; page 5, lines 20 to 33; fig. 7, 9, 10 * ----	1,7,8

CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)

E 05 C 9/02
E 05 B 65/08

TECHNICAL FIELDS SEARCHED (Int.Cl. 3)

E 05 B 65/00
E 05 C 9/00

CATEGORY OF CITED DOCUMENTS

X: particularly relevant if taken alone
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D: document cited in the application
L: document cited for other reasons

&: member of the same patent family, corresponding document

X The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Berlin	28-04-1982	WUNDERLICH