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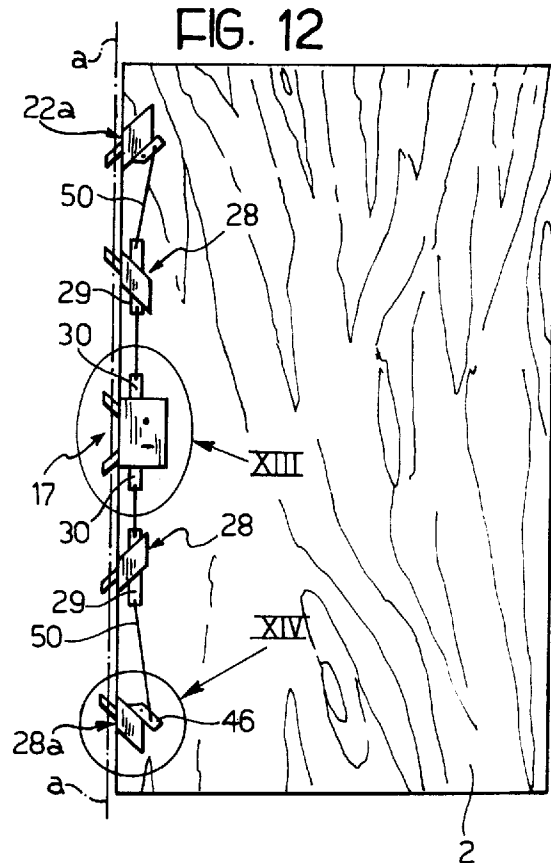
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54 Safety antiburglar lock device for building fixtures.

57 A burglar-resistant security locking system for door and window structures which include a pair of closure elements one of which is movable relative to the other and which, when the door or window is closed, have two edge regions which mate and define a closure plane between them, and in which the locking system includes a casing (34, 18) which can be fixed to one of the elements and in which at least one bolt (32, 20) is slidable, the bolt being insertable through the closure plane into an aperture in the other element to effect locking, and in which the or each bolt (32, 20) is movable in a direction inclined obliquely to the closure plane.



The present invention relates to a burglar-resistant security locking system for door and window structures which include a pair of elements, at least one of which is movable relative to the other and which, when the door or window is closed, have two edge regions which mate and define a closure plane between them, and in which the locking system includes a casing which can be fixed to one of the elements and in which at least one bolt is slidable for insertion through the closure plane into an aperture in the other element so as to lock the door or window.

The security locking systems to which the invention relates may be constituted by a lock or by a so-called deviator mechanism provided with a bolt the movement of which is controlled by a rod which transmits drive from a lock, or by a system comprising a lock and one or more deviators, the bolts of which are controlled by the lock.

In prior art locking systems of the type described above, the bolt or bolts are movable in a direction perpendicular to the closure plane defined above. A disadvantage of prior art systems is that, if a break-in is attempted with the use, for example, of a burglar's jemmy, the bolt may be moved out of its striking plate aperture by the deformation of the movable element of the door or window structure with which the lock is associated, this being possible even if the bolt still projects to its maximum extent from the element to which it is fixed. The burglar resistance of prior art locking systems is in fact based mainly on the length, dimensions and above all the number of the bolts. The greater the number of bolts, the more points on the movable element that have to be deformed or forced; in order to overcome this disadvantage, at least in part, it is necessary to ensure that this element is suitably rigid and of a particularly robust structure to enable it to resist the deformation which would compromise security.

The object of the present invention is to provide a locking system which ensures greater burglar resistance but also reduces the need to resort to especially strong, armoured window or door structures while at the same time ensuring a greater burglar resistance.

To this end, the subject of the present invention is a locking system of the type described above characterised in that the bolt, or each bolt, is movable obliquely relative to the closure plane.

In a preferred embodiment, the bolt, or each bolt, is movable in a plane substantially parallel to the plane of the movable element of the door or window structure with which it is associated and its direction of movement is inclined to the direction of longitudinal extent of the mating regions of the closure elements constituting the door or window structure.

Further characteristics and advantages of the present invention will become apparent from the detailed description which follows, given with reference to the appended drawings provided purely by way of

non-limitative example, in which:

Figure 1 is a schematic view of a door fitted with a prior art closure system of a conventional type
Figure 2 is an enlarged detail of Figure 1;

Figure 3 is a partly sectioned schematic view of a lock according to the invention;

Figure 4 is a lateral view of the lock of Figure 1;

Figure 5 is a schematic view of another embodiment of a lock of the invention;

Figures 6a-6f are schematic views illustrating various embodiments of locks according to the invention;

Figures 7a and 7b are schematic views which illustrate a door fitted with a locking system of the invention;

Figure 8 is a partly sectioned, enlarged detail of Figure 7a;

Figure 9 is a schematic view of a deviator mechanism according to the invention;

Figure 10 is a lateral view of the deviator mechanism of Figure 9;

Figure 11 is a view from above of the deviator of Figure 9;

Figure 12 is a schematic view of a door fitted with a locking system according to the invention;

Figure 13 shows an alternative embodiment of the detail indicated by the arrow XIII of Figure 12; and

Figure 14 is an enlarged detail of the part indicated by the arrow XIV of Figure 12.

With reference to the drawings, Figures 1 and 2 illustrate the prior art in which a movable door 2 hinged to a fixed frame at points 10 is fitted with a closure system including a lock 4 with bolts 6 movable in a plane parallel to the general plane of the door 2 in a direction perpendicular to the line a-a which is the trace of the closure plane. The lock also controls transmission rods 8 which, through respective deviator mechanisms 12, operate bolts 14, also movable in directions perpendicular to the closure plane, so as to cause the bolts to be inserted in respective apertures in striking plates 16 carried by the door frame.

As shown in the enlarged detail of Figure 2, if a burglar attempts to break in with the aid of a jemmy G, the bolts may be moved out of their seats by a force exerted in the direction F which deforms the door itself.

As shown in Figures 3-5, a lock according to the invention, generally indicated 17, includes a casing 18 intended to be fixed to one of two elements of a door or window structure and includes a mechanism for transmitting drive to bolts 20 which are movable in directions inclined obliquely to the closure plane, the trace of which is indicated a-a in Figures 3 and 5, and which is defined between the mating edge surfaces of the said two elements.

The bolts 20 are preferably movable in a plane parallel to the plane of the door or window to which the

lock is fitted; the direction in which each bolt moves, the trace of which is indicated y-y in Figures 3 and 5, is preferably at an angle α to a line x-x which is perpendicular to the closure plane, this angle preferably being between 25° and 65°, with an angle of around 45° being preferred.

The bolts are guided by a register plate 22 with holes with inclined axes and are intended to engage complementary apertures in a striking plate 24 mounted on the other of the two elements of the door or window structure, which may be the door or window frame or a second movable door.

As shown in Figures 6a-6f, the lock according to the invention may have a plurality of bolts which move in divergent directions out of the lock or it may have a plurality of bolts movable in inclined directions substantially parallel to each other (Figure 6f).

If necessary, the lock may also have a conventional spring latch 26 movable perpendicular to the closure plane defined above. The mechanisms for transmitting drive to the or each bolt from an actuating member such as a key may be manufactured according to techniques familiar to an expert in the art. In order to advance the bolts obliquely, it is possible, for example, to use a drive transmission mechanism constituted by a pin projecting laterally from the bolt and engaged with a slide having a slot.

It should be understood that the innovative concept of the invention could be applied to any type of lock, whether operated by a key, or electromagnetically or by a pump or by any other commonly used actuator.

As illustrated in Figures 7a, 7b and 8-11, the innovative principle of the invention may also be applied to a deviator mechanism, generally indicated 28, in which a drive transmission rod 30 controlled by a lock 4, either of a conventional type or having inclined bolts according to the invention as described above, causes a bolt 32 to move obliquely to the closure plane as defined above.

The deviator mechanism includes a fixed casing 34 which can be fixed to a door and in which a plate-shaped slide 29 rigidly fixed to or pivotally connected to a rod 30, is slidable. The casing has lateral bushes 42 for guiding the bolt and a positive guide 36 extending parallel to the direction of movement of the bolt; the plate-shaped slide 29 also has a positive guide 38 transverse its direction of longitudinal extent and the bolt 32 has a laterally-projecting pin 40 which engages both of the guides 38 and 36 so that translational movement of the rod, driven by the lock, causes the bolt to move along its longitudinal axis until it engages a striking plate in the other element of the door structure.

As illustrated in Figures 7a, 7b, the locking system may include a plurality of deviator mechanisms controlled by respective rods through known drive transmissions and mounted near the ends of the clo-

sure element or door to which the locking system is fitted. When the locking system includes at least one pair of deviator mechanisms mounted in the same edge region of the door or window element on opposite sides of the lock, the bolts of each deviator mechanism are preferably movable along lines which converge towards each other (Figure 7a) or away from each other (Figure 7b) towards the closure plane of the element to which they are fitted. In this way, the bolts form a sort of "zig-zag" seam between the movable door to which they are fixed and the door frame or between one door and the other in the case of double doors.

The detail of Figure 14 illustrates a further embodiment of a deviator mechanism according to the invention, generally indicated 28a and including a fixed casing 34 in which is slidable a bolt 32 with a laterally-projecting pin 40 which engages a guide slot 60 in the casing 34 which extends parallel to the direction of movement of the bolt.

The movement of the bolt, shown in its fully projecting position in Figure 14, is driven by a rod 50 through a rocker lever 46 pivotable on a fixed pin 48 and having an arm 52 articulated at 44 to the rod 50 and an arm 54 with a slotted end 53 slidably engaged with the pin 40.

Figure 12 shows a combined locking system which includes a lock 17, or possibly a conventional lock 4, which drives first and second rods 30 in opposite directions, each rod cooperating with a respective deviator mechanism 28, for example of the type illustrated in Figure 9, with an inclined bolt 32.

The movement of each rod 30 driven by the lock is transmitted to a respective rod 50 which cooperates with a deviator mechanism, for example of the type 28a of Figure 14, the bolt of which is movable in a direction which converges with the movement of the bolt of the deviator mechanism 28 in a direction outwardly of the door 2.

It is understood that deviator mechanisms may also include several parallel bolts housed in the same casing. The bolts may have any cross-section, for example circular, square, rectangular or oval, which mates with the aperture in the striking plate.

The materials used in the manufacture of the bolts and the locking systems in general are not different from conventional materials commonly used in the art. Steel is preferred for the bolts, sheet metal for the casings 34 of the deviator mechanisms and synthetic materials for the sliding bushes 42 of the deviator mechanisms.

Although the locking system has been illustrated with reference to specific embodiments, it should be understood that the innovative principle may be applied to other types of locks, deviators or combined systems of locks and deviators; in all cases, an attempt to force the lock with, for example, a jemmy will cause the bolt to engage in its striking plate, prevent-

ing it from being withdrawn.

Claims

1. A burglar-resistant security locking system for window or door structures which include a pair of closure elements one of which is movable relative to the other and which, when the door or window is closed, have two edge regions which mate and define a closure plane between them, and in which the locking system includes a casing (34, 18) which can be fixed to one of the elements and in which at least one bolt (32, 20) is slidable for insertion through the closure plane into an aperture in the other element to effect locking, characterised in that the or each bolt (32, 20) is movable in a direction inclined obliquely to the closure plane.

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2. A locking system according to Claim 1, characterised in that the said direction is inclined to the direction of longitudinal extent of the edge regions.

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3. A locking system according to Claim 1 or Claim 2, characterised in that the casing (34, 18) contains a mechanism for transmitting drive to the or each bolt (32, 20) from an actuator member outside the casing.

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4. A system according to Claim 3, characterised in that the mechanism is a locking mechanism and the actuator member is a key.

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5. A system according to Claim 3, characterised in that the actuator member is a rod (30, 50) for transmitting drive from a lock (4, 17).

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6. A system according to Claim 5, characterised in that the or each bolt (32) has a laterally-projecting pin (40), the rod (30) controls a plate (29) having a positive guide (38) transverse its longitudinal extent and the casing (34) has a positive guide (36) parallel to the direction of movement of the bolt (32, 20) and in that the pin is engaged in both guides in such a way that the translational movement of the rod causes the bolt (32, 20) to move along its longitudinal axis.

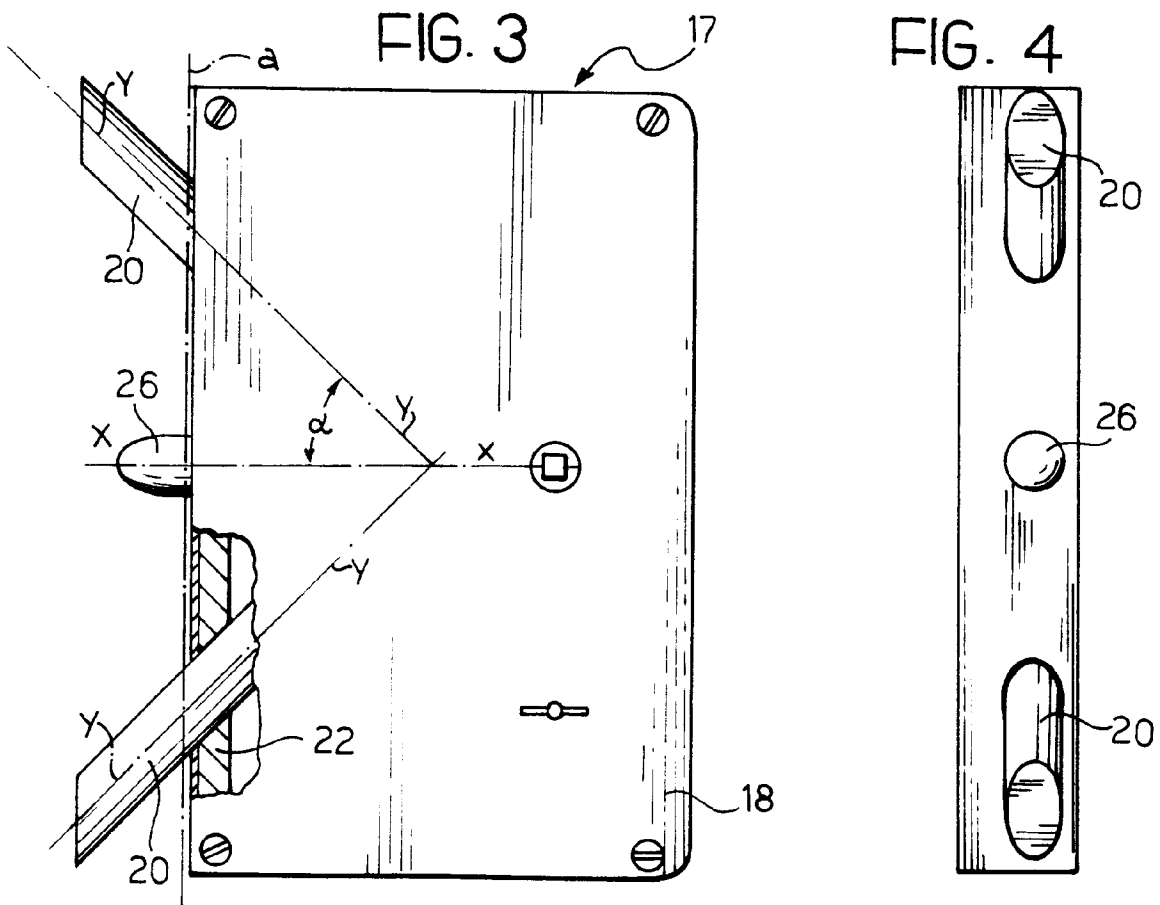
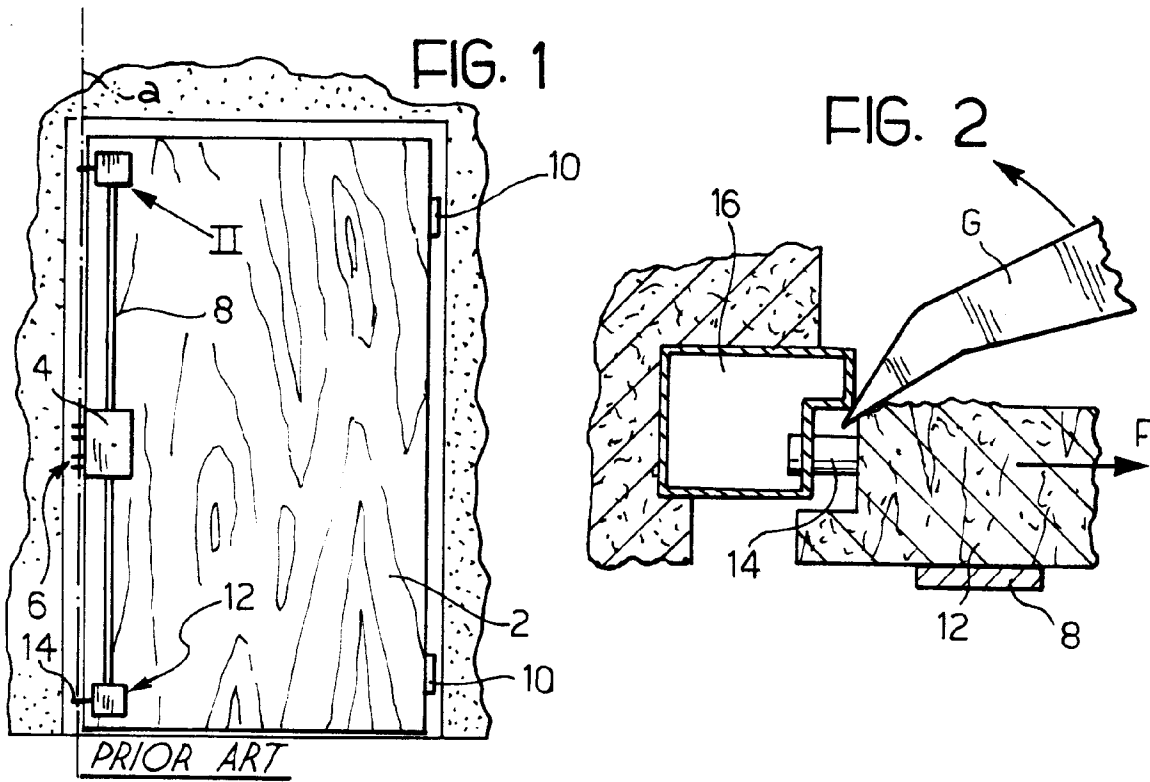
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7. A system according to Claim 5, characterised in that the bolt (32) has a laterally-projecting pin (40), the casing (34) has a positive guide (60) extending parallel to the direction of movement of the bolt and engaged by the laterally-projecting pin and the drive-transmission rod (50) is pivoted on an arm (52) of a rocker lever (46) pivoted on a fixed pivot (48) and having a second arm (54) slidably engaged with the pin (40).

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8. A system according to Claims 1 and 5, characterised in that it includes a lock (4), at least one pair of movable rods (30) actuated by the lock and extending longitudinally on opposite sides of the lock (4) and a pair of deviator mechanisms (28) each of which cooperates with a respective rod (30) and has at least one respective bolt (32) movable in a direction inclined obliquely to the direction of longitudinal extent of the respective rod (30).

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9. A system according to Claim 8, in which the bolts (32, 20) of each pair of deviator mechanisms (28) are movable in convergent directions in opposing positions.

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10. A system according to Claim 8 or Claim 9, further including a second pair of deviators (28a) each having a respective inclined bolt (32) the movement of which is controlled by a drive-transmission rod (50) which cooperates with a respective first deviator mechanism (28).

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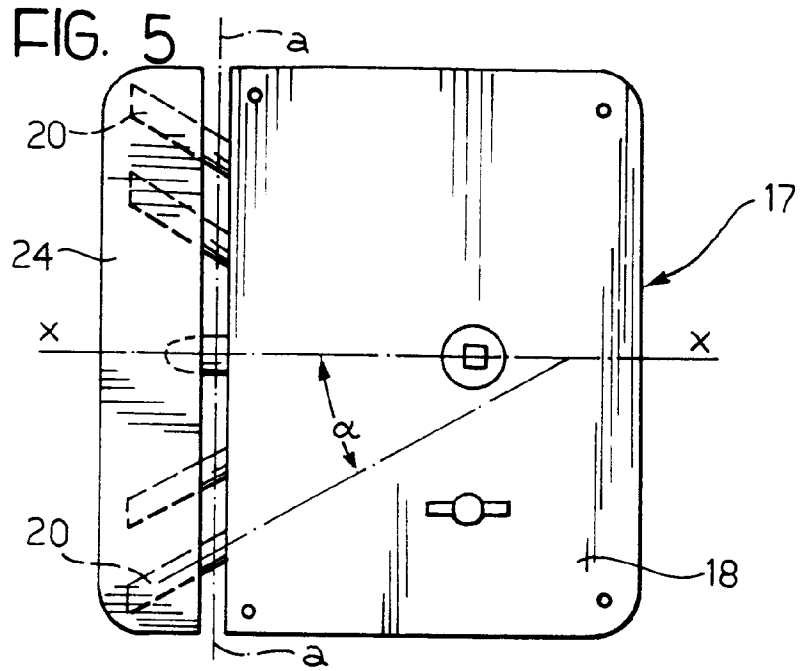


FIG 6a-6f

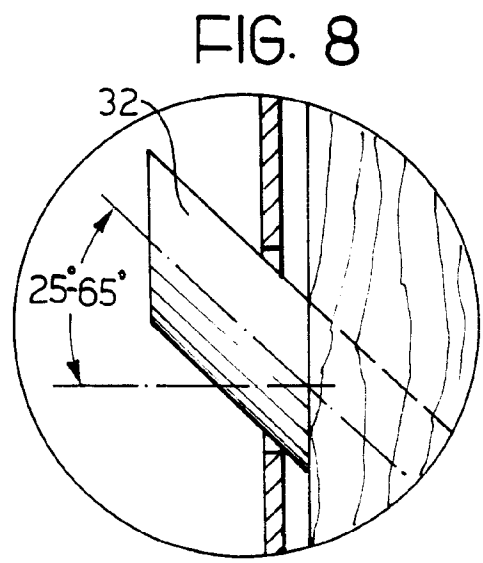
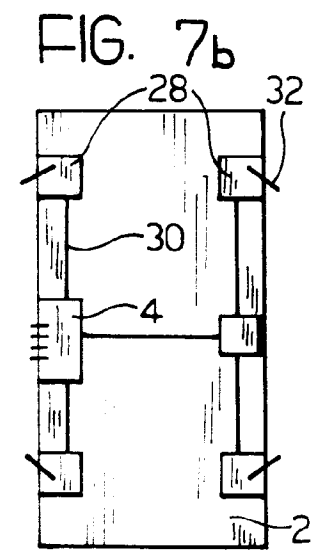
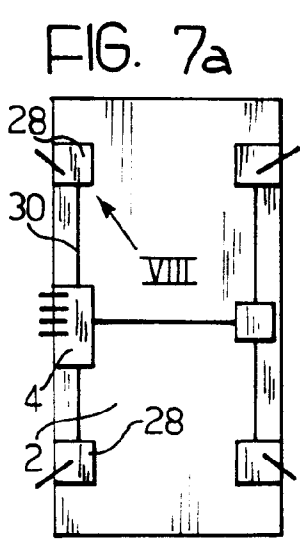
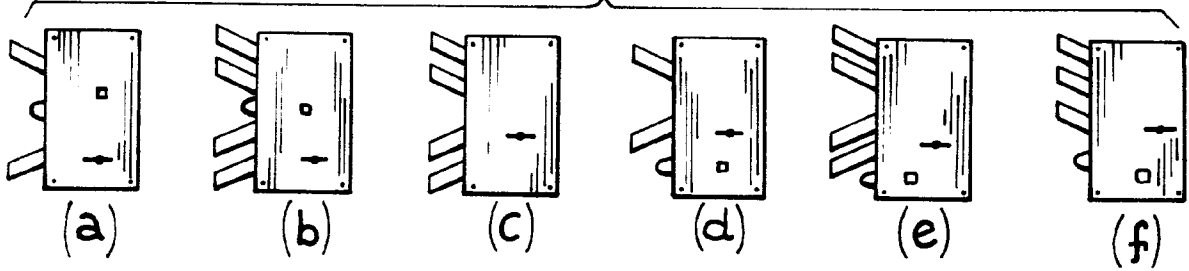


FIG. 9

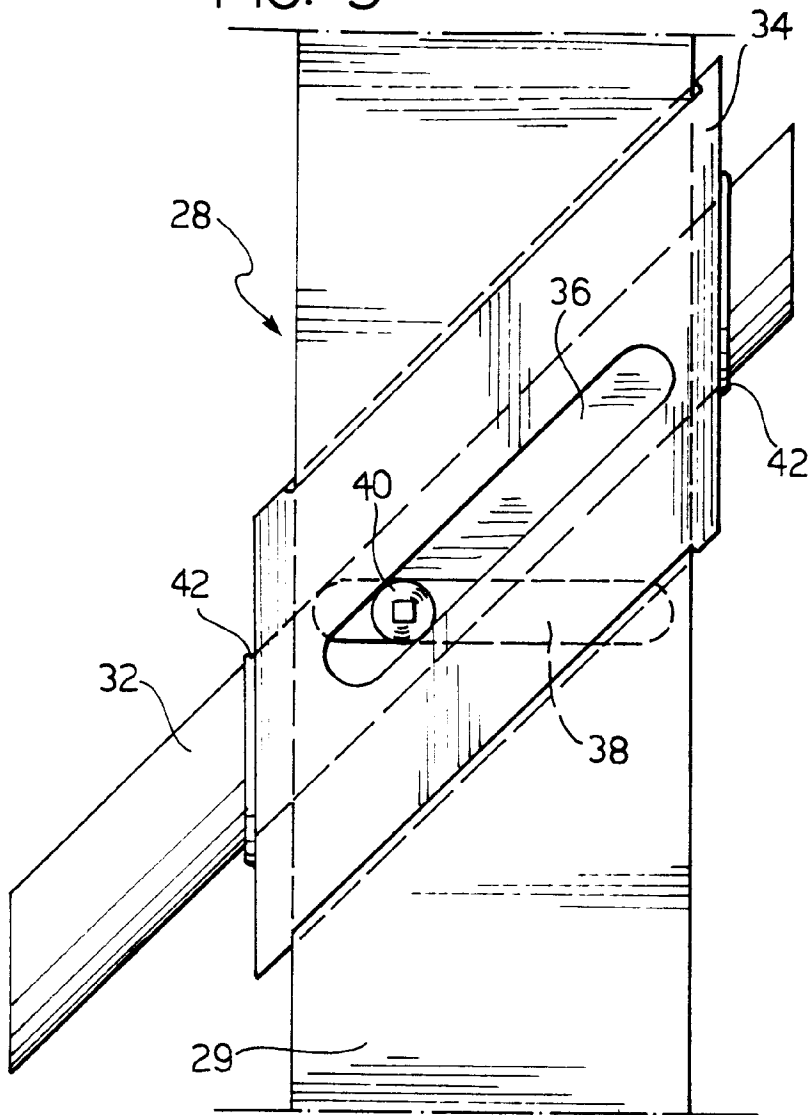


FIG. 10

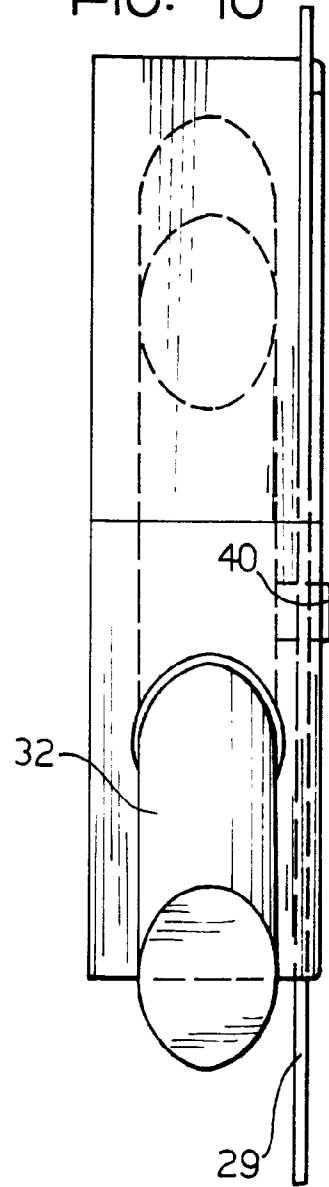


FIG. 11

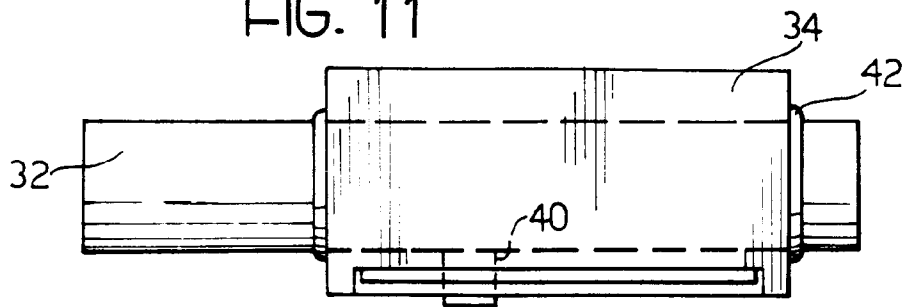


FIG. 12

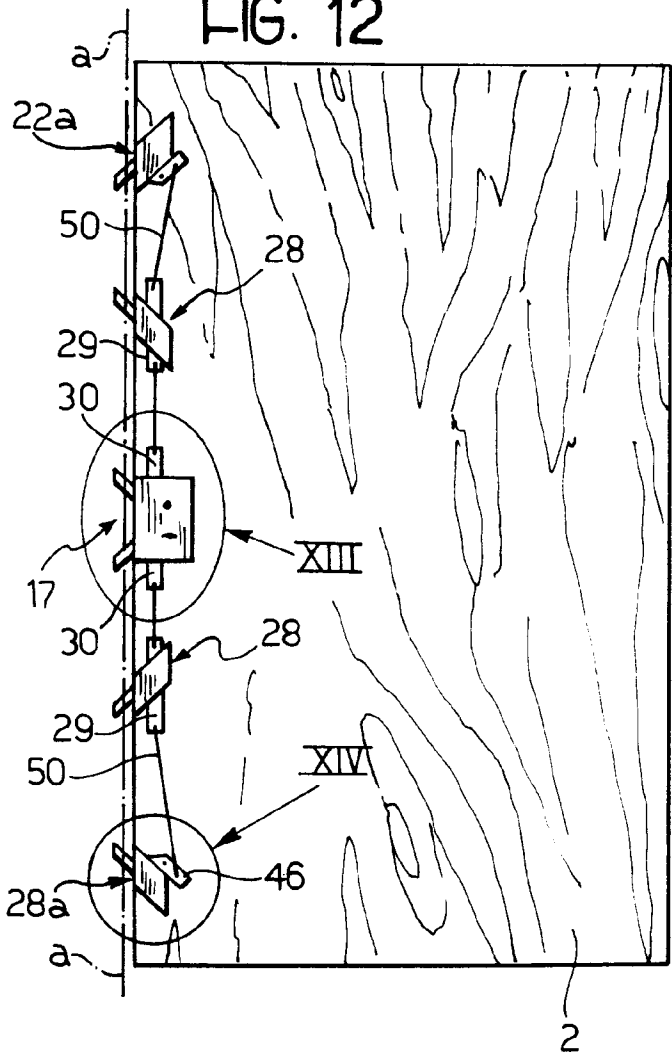


FIG. 13

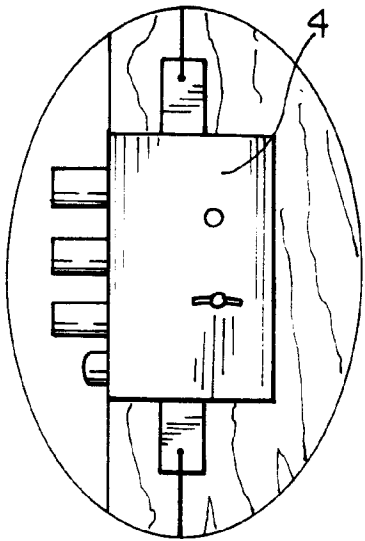
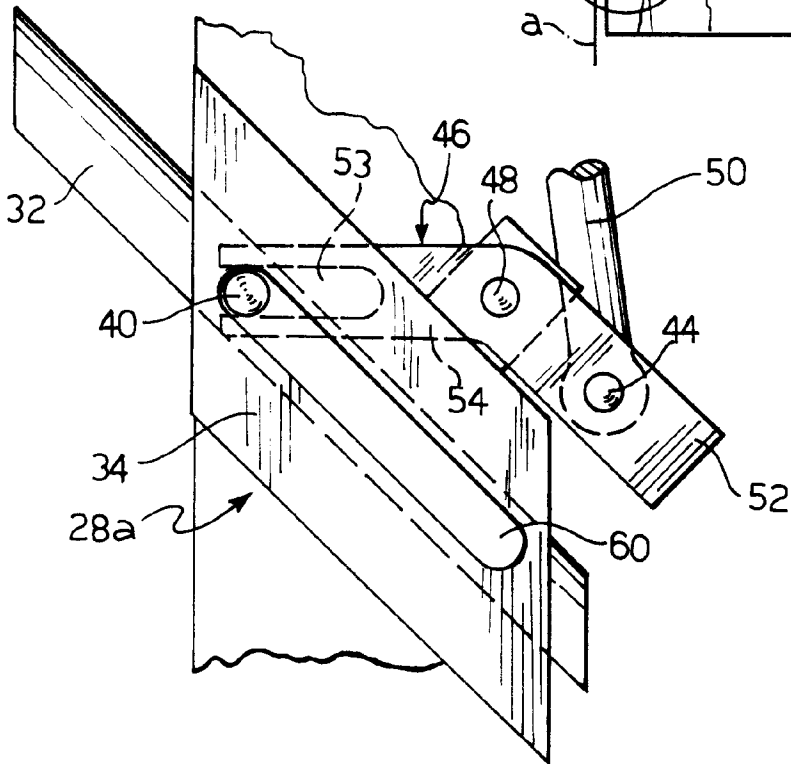


FIG. 14





European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 95 10 1546

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	EP-A-0 515 834 (MARTIN LEHMANN GMBH & CO. KG) * the whole document * ---	1-4	E05B63/14 E05C9/18 E05B15/10
X	EP-A-0 373 068 (VALENTE) * the whole document * ---	1-5	
X	GB-A-171 336 (ROBINSON AND MARKS) * the whole document * ---	1-5	
X	US-A-1 332 958 (SEGAL) * the whole document * ---	1-4	
X	FR-A-2 598 456 (VANAGO) * the whole document * ---	1-4	
X	GB-A-2 217 770 (TSENG TSAI YU) * the whole document * ---	1-4	
X	GB-A-668 675 (KAW) * the whole document * ---	1-3,5	TECHNICAL FIELDS SEARCHED (Int.Cl.6)
X	US-A-1 810 760 (FRIEDMAN) * the whole document * ---	1-4	E05B E05C
A	FR-A-1 031 331 (SERILLET) * the whole document * ---	1-3,5-7	
A	DE-U-90 07 232 (AUG.WINKHAUS GMBH & CO KG) * figures 5,6 * ---	1-8	
A	US-A-4 683 733 (MARIN) * the whole document * -----	1-4	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 11 May 1995	Examiner Vestin, K
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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