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(54) **Securing system for a hinged panel.**

(57) A securing system for a hinged panel such as a hollow stile window or door comprises a rotable handle (17) which drives a rotable pinion (19) acting on a slidable rack (20). The projecting operating member (24) of the rack (20) acts between a pair of abutments (25) fixed to a slidable espagnolette part (12), to move the slidable part (12) relative to a fixed espagnolette part (11) secured to an edge of the window stile. Rollers (15), which may be tapered or flanged, can be engaged or disengaged with keepers (16) in a fully locked position (30) or a locked ventilation position (31). Optional variations of the system incorporate a two or three point locking bar system driven by the rack and pinion and a multi point espagnolette system acting on three or four sides of the hinged window panel. Different widths of stile including slimline stiles can be accommodated using slotted fixing members (22) in one plane and by the configuration of the drive element (24) in a perpendicular plane.

EP 0 167 386 A2

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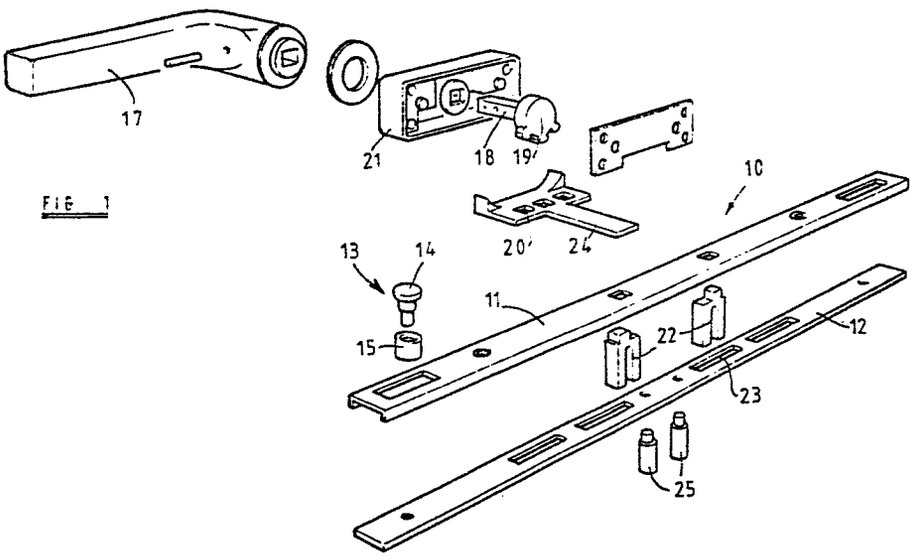

Fig 1

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TITLE: Securing System for a Hinged Panel

This invention relates to a securing or locking system for hinged or pivoted panels such as windows.

In the following description, the expression "window" should be read as including other hinged or pivoted panels for example doors, where the context permits.

Traditionally, metal or timber solid windows have been secured by a single face-mounted catch with a pivoted striker engaging behind, or within, a fixed, frame-mounted keeper. Such a single-point system tends to be insecure because it is possible to force or burst open the single fixing, even without breaking the window.

A multiple-point engagement is desirable for a window fixing partly for security reasons and partly because each engagement point can be used to draw the window stile into closer engagement with the window frame and hence reduce draughts.

The difficulties of providing a satisfactory securing or locking system have been increased by the modern trend towards the use of hollow section stiles for windows, for example of aluminium, aluminium alloy or plastics such as UPVC. Face fixing to the stile is not generally speaking acceptable. Where the mechanism is to be concealed within the stile, particularly acute problems occur with the more recent narrow stile frames, where a slimline securing system is required.

It is an object of the present invention to provide a new or improved securing system for hinged panels and primarily for hollow stile windows which is capable of providing a greater degree of security than a traditional single-point locking system. Other objects of the invention will appear from the following description.

According to the invention there is provided a securing system comprising a manually rotatable operating member adapted to be secured externally of a window stile and mechanism adapted to be mounted internally of the window stile and comprising a pinion keyed for rotation with said rotatable operating member, a rack constrained for rectilinear sliding movement in response to rotation of said pinion, a drive element moving in unison with the rack and extending perpendicular to the direction of movement of the rack, the drive element acting directly or indirectly on at least two remotely disposed locking elements.

In a first embodiment, the locking elements are provided on a two part espagnolette, comprising a fixed part adapted to be secured to an edge of the window stile and a slidable part associated with the fixed part and carrying said locking elements, the slidable part being driven for rectilinear sliding movement by said drive element.

The slidable part may have a pair of abutments, between which the drive element projects to transmit movement to the slidable part from the drive element.

The locking elements may comprise two or more rollers mounted to the slidable part and projecting through working slots in the fixed part of the espagnolette for engagement with keepers on a window frame.

Alternatively, the locking elements may comprise two

or more keepers mounted to the slidable part, for engagement with rollers mounted on a window frame.

Each keeper may have a pair of limbs, the roller lodging behind a first limb in a fully locked condition and behind the second limb in a ventilated locked condition of the window.

One, or preferably each limb may have a reversed taper to provide an over dead centre retained position for the roller.

The keeper may have two pairs of limbs, provided at opposite ends, so as to be capable of use with either direction of locking movement.

The keeper and roller may have cooperating shapes to prevent disengagement in a direction parallel to the roller axis. For example the roller and keeper may have cooperating tapers or a flange on the roller may engage in undercut slots of the keeper.

Where the keepers are provided on a fixed window frame, they may be resiliently mounted.

The fixed part of the espagnolette may be provided with a pair of slotted mounting members, and the mounting of the manually rotatable operating member to the stile may be via fasteners engaging respectively in the slots of said mounting members.

In an extended securing system, further espagnolettes are provided on the remaining edges of the window, all the sliding parts of the espagnolettes being connected together in a series by flexible connectors to operate simultaneously.

The connectors may each comprise a length of flexib-

le material constrained within a corner member and provided at each end with securing means for securing the connector to an adjacent sliding espagnolette part.

The connectors may be moulded toothed sockets adapted to receive corresponding toothed extensions of the sliding parts.

It will be appreciated that movement of the manually rotatable member is transmitted to the espagnolettes either clockwise or anti-clockwise around the periphery of the window since they are all connected together in series.

In an alternative embodiment, the drive element is keyed to a further rack to transmit rectilinear sliding movement thereto.

The further rack may be one of a pair of racks drivingly connected in opposite senses to a pinion.

The further rack or racks may form or be operatively connected to one or more locking elements which may comprise pins engageable with respective window frame elements perpendicular to the stile to which the system is attached.

The pinion may be associated with a pivoted catch engageable with a window frame element adjacent and parallel to the stile to which the system is attached.

The further rack or racks may be connected by flexible connections to one or more respective further espagnolette sliding parts disposed on frame members adjacent to the stile to which the system is attached.

Various embodiments of the securing or locking system according to the invention will now be described in

more detail by way of example only, with reference to the accompanying drawings, in which:-

FIGURE 1 is an exploded perspective view of a handle-operated single-side espagnolette securing system;

FIGURE 2 is an enlarged front elevation of a rack and pinion mechanism of Figure 1;

FIGURE 3 is a section on the line 3-3 of Figure 2;

FIGURE 4 is a front elevation of a keeper for use with the espagnolette;

FIGURE 5 is a side elevation of the keeper;

FIGURE 5a is a part sectional view of a modified roller and keeper assembly taken at a position indicated by the line 5-5 of Figure 4.

FIGURE 5b is a similar view to Figure 5a of a further modified keeper and roller assembly.

FIGURE 6 is a small-scale view of a four-sided espagnolette system;

FIGURE 7 is a scrap view of a connector for use in the system shown in Figure 6, with a section of one part;

FIGURE 8 is a detail of a corner of the system shown in Figure 6;

FIGURE 9 is and internal view of a further rack and pinion mechanism used in a modified securing system;

FIGURE 10 is a side elevational view of the rack and pinion mechanism of Figure 9;

FIGURE 11 is a front elevational view of the mechanism of Figures 9 and 10.

Referring firstly to Figure 1 of the drawings, a securing or locking system of the espagnolette type is generally indicated at 10. It comprises a two-part espagnolette having an outer fixed channel shaped part 11 and an inner slidable part 12 guided for rectilinear sliding movement within the channel shaped fixed part 11. The two parts are mounted to an external edge of the stile of a window.

The sliding part 12 carries, in generally known manner, a pair (or for large sizes, three or more) rollers 13, having central studs 14 peined to the slidable part 12, trapping tubular sleeves 15 which are free to rotate. The rollers are engageable with keepers 16 on a window frame, these keepers being described with reference to Figures 4, 5, 5a and 5b.

The espagnolette 10 is operated by a manually rotatable handle 17, fixed for rotation to a square-section stem 18, which carries a pinion 19. These are shown in more detail in Figures 2 and 3.

The pinion 19 engages a rack 20, constrained for rectilinear sliding movement within a housing 21. The housing is secured to the window stile (not shown) by fasteners such as screws, which pass into slotted mounting members 22, fixed to the fixed part 11 of the espagnolette and passing through slots 23 in the slidable part 12. The fasteners can be secured at any point along the slots of the the slotted mounting members, which permits the system to be used for a range of window stile widths, including very narrow widths.

Rotation of the handle 17 rotates the pinion 19 and slides the rack 20 in the housing 21. An extension of

the rack 20 forms a drive element 24 which projects into the espagnolette mechanism, being located between a pair of abutments 25 peined to the slidable part 12. As the handle is rotated, the slidable part 12 slides relative to the fixed part 11 and moves the rollers 13 into and out of engagement with the keepers on the window frame.

The extension can be formed integrally with the rack 20 or fixed for movement in unison with the rack.

There is no fixed engagement position between the drive element 24 and the abutments 25, so the espagnolette can be positioned relatively close to or far from the face of the window stile to which the handle 17 is fixed. This means that the assembly can be used with thick window stiles, for example where noise-reducing wide-space double glazing is used; or with thin stiles. If necessary, the end of the drive element 24 can be cropped off before fitment in very thin stiles, making a very slimline mechanism.

It will be seen that the system can therefore accomodate a range of thicknesses and widths of window stile, because of the way in which the handle and espagnolette are assembled to the frame using the slotted mounting members 22 and because of the connection of the drive element 24 and abutments 25 just described.

Figures 4 and 5 show a keeper 16. This is secured to a window frame (not shown) by screws or other fasteners in countersunk, slightly elongate holes 26 in a base 27. The ends of the keeper 16 provide U-shaped walls 28, 29, defining fully closed and partly closed locked positions of the window. The keeper can be resiliently mounted on the window frame if desired, to reduce the risk of damage if the window is slammed shut.

The wall 28 further from the entrance 29 of the keeper provides a location behind which the roller shown

in dotted lines at 30 is in a fully closed, locked condition. A reversed taper 9 is provided to retain the roller by an over dead centre movement during which the window is pulled tightly against the frame and then, when the roller slips past the high point of the reversed taper, the pressure on the window is slackened off slightly. The roller cannot then be released without deliberate effort.

To secure the window in a slightly open ventilated condition, the roller 15 is positioned in the location 31, behind the wall 32 closer to the entrance 29. A ramp is provided in the base 27 at the entrance 29. Similarly the walls all have tapered edges, to provide a smooth lead-in for the roller 15 as it engages the keeper 16. Although only one end of the keeper is used for any particular roller, because of the direction of travel of the espagnolette, identical wall arrangements are provided at each end, so that different left- and right-handed versions of keeper need not be provided, and to encourage correct fitting of keepers.

In a modification, not shown in the drawings, the keepers, or some keepers, can be disposed on the espagnolette with corresponding rollers secured to the window frame. This feature may be used in particular with centre pivot windows so as to allow the window to pivot freely through the frame. In this case, where the keeper is provided on the movable part of the espagnolette, only a single ended keeper would be used, consisting essentially of one half of the keeper shown in Figures 4 and 5 of the drawings.

Figures 5a and 5b of the drawings show modified roller and keeper arrangements which are designed to prevent the roller being forced axially out of the keeper in an attempt to force open the window.

In Figure 5a, the keeper 16a has inwardly tapered walls which cooperate with a tapered roller 15a, having a taper of about 5°. Since the roller 15a enters the keeper 16a at the entrance 29 and moves along betweeen the side walls, it can engage just as before but it cannot be disengaged by forcing it in a direction parallel to the axis of the roller.

In Figure 5b, the walls of the keeper 16b are undercut to receive a projected flange of the roller 15b, which acts in a similar manner.

A window fitted with the above-described espagnolette can be secured at two or more points (depending on the number of rollers 13), spaced along one side of the window frame. Greater security is obtainable if the system is extended to all four sides of the window frame, as shown in Figures 6 to 8.

Three further two-part espagnolettes 33, 34 and 35 are provided on the remaining window stiles. These are identical in construction to the espagnolette 10, except that they are remotely operated by connection to the single handle mechanism 17. Each of the slidable parts 12 of the espagnolettes is connected by a flexible connector to the next adjacent slidable part in a complete loop around the window. Movement of the slidable part 12 of the espagnolette 10 is transmitted to the remaining sliding parts in a push-and-pull mode.

To achieve this, the slidable parts 12 of each espagnolette are modified at each end by being provided with toothed edges as shown at 36 in Figure 7. These toothed edges mate with corresponding internal teeth 37 in female connectors 38, formed integrally at each end of a flexible plastics strip 39 shown in Figure 8. A cover flap prevents disengagement. The strip 39 extends around the corner of the window and operatively connects the

adjacent espagnolettes. The strip is constrained within a channel-section corner cover 40 and is protected from excessive wear and tear at the corner itself by a roller 41 or other means.

The flexible connectors are provided in a standard length, but variations in window and espagnolette size can be accomodated by varying the position of the male and female connection 36, 37.

It will be appreciated that the push-and-pull force transmission used results in the sliding parts of the espagnolettes moving either clockwise or anti-clockwise with respect to the window on movement of the handle 17.

A push and pull mode of force transmission cannot be used to lock espagnolettes on only three of four sides of a window, without some means of transmitting force around the fourth side. For three-sided locking, a different drive-transmitting arrangement, shown in Figures 9 to 11, is used.

The drive element 24 is received in a slot 42 in a drive-splitting rack and pinion arrangement comprising a pair of racks 43, 44 and a central pinion 45. The two racks 43, 44, move in opposite directions in response to rotation of the pinion 45. When one rack is moved by the drive element 24, the pinion 45 transmits drive in the reverse sense to the other rack.

Each rack has an extension rod 46, screwed into its end. In a simple two-point locking arrangement, the extensions terminate in bolts which engage in suitable holes or sockets in the upper and lower window frame members. The mechanism can provide three-point locking if a pivoted catch 47 is mounted for rotation with the pinion.

Alternatively, the extension rods 46 can be provided with end attachments to attach to flexible connectors of the general type previously described with reference to Figures 6 to 8, to operate a pair of adjacent espagnolettes.

The flexible connectors can exert a pushing force, provided that they are suitably constrained within corner members 40.

It will be appreciated that the system described is versatile in that it can give various degrees of security with the use of standard components of the system in different combinations. In addition, it can be fitted to window stiles of differing width because neither the securing fasteners for the espagnolette and handle, nor the drive engagement between the drive element 24 and the abutments 25 involves fixed engagement positions. In each case, the parts can meet at a continuum of positions within a range determined by the sizes of the components as previously described.

The mechanism itself is very compact and is particularly useful in slimline hollow stile windows.

CLAIMS

1. A securing system for a hinged panel comprising a manually rotatable operating member adapted to be secured externally of a window stile and mechanism adapted to be mounted internally of the window stile characterised in that the mechanism comprises a pinion (19) keyed for rotation with said rotable operating member (17), a rack (20) constrained for rectilinear sliding movement in response to rotation of said pinion (19), and a drive element (24) moving in unison with the rack (20) and extending perpendicular to the direction of movement of the rack (20), the drive element (24) acting directly or indirectly on at least two remotely disposed locking elements (15).

2. A securing system according to Claim 1 further characterised in that the locking elements (15) are provided on a two part espagnolette, comprising a fixed part (11) adapted to be secured to an edge of the window stile and a slidable part (12) associated with the fixed part (11) and carrying said locking elements (15), the slidable part (12) being driven for rectilinear sliding movement by said drive element.

3. A securing system according to Claim 2 further characterised in that the slidable part (12) has a pair of abutments (25) between which the drive element (24) projects to transmit movement to the slidable part (12) from the drive element (24).

4. A securing system according to Claim 2 or Claim 3 further characterised in that the locking elements comprise two or more rollers (15) mounted to the slidable part (12) and projecting through working slots in the fixed part (11) of the espagnolette for engagement with keepers (16) on a window frame.

5. A securing system according to Claim 2 or Claim 3 further characterised in that the locking elements comprise two or more keepers (16) mounted to the slidable part (12) for engagement with rollers (15) mounted on a fixed window frame.

6. A securing system according to Claim 4 further characterised in that each keeper has a pair of limbs (28), (32), the roller (15) being adapted to lodge behind a first limb (28) in a fully locked condition and behind a second limb (32) in a ventilated locked condition of the window.

7. A securing system according to any one of Claims 4 to 6 further characterised in that the keeper (16) and roller (15) have cooperating shapes to prevent disengagement in a direction parallel to the roller axis.

8. A securing system according to any one of Claims 2 to 7 further characterised in that the fixed part (11) of the espagnolette is provided with a pair of slotted mounting members (22), and the mounting of the manually rotatable operating member (17) to the stile is by way of fasteners engaging respectively in the slots of said mounting members (22).

9. A securing system according to any one of Claims 2 to 8 further characterised in that further espagnolettes are provided on the remaining edges of the window, all the sliding parts (12) being connected together by a series of flexible connectors (39) to operate simultaneously and in that the connectors (39) each comprise a length of flexible material constrained within a corner member (40) and provided at each end with securing means (38) for securing the connector (39) to an adjacent sliding espagnolette part (12).

10. A securing system according to any one of Claims 1

to 9 further characterised in that the drive element is keyed to a pair of further racks (43), (44) drivingly connected in opposite senses of movement to a pinion (45) the further racks (43), (44) being operatively connected to one or more locking elements (46) comprising pins engageable with respective window frame elements perpendicular to the stile to which the securing system is attached.

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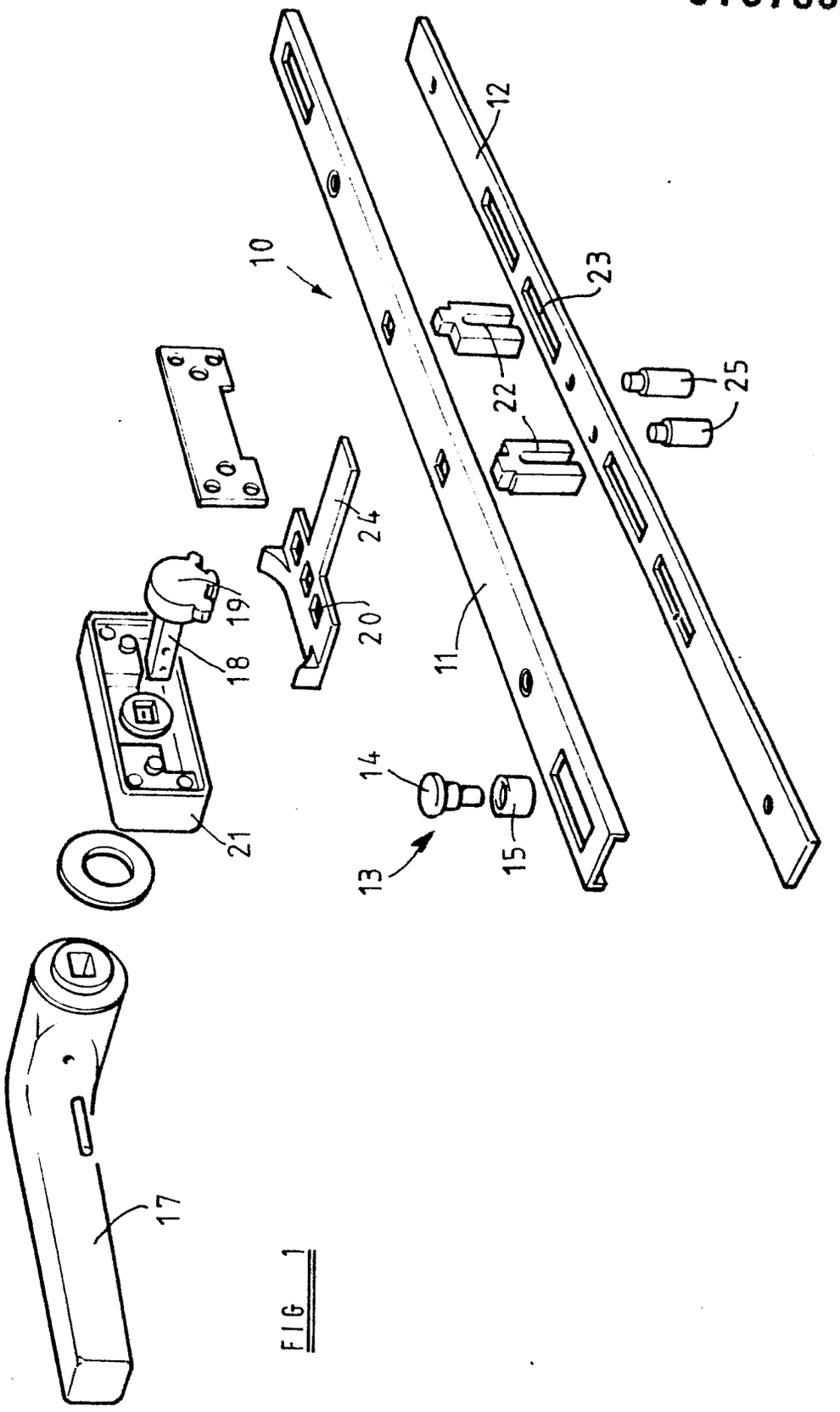

FIG 1

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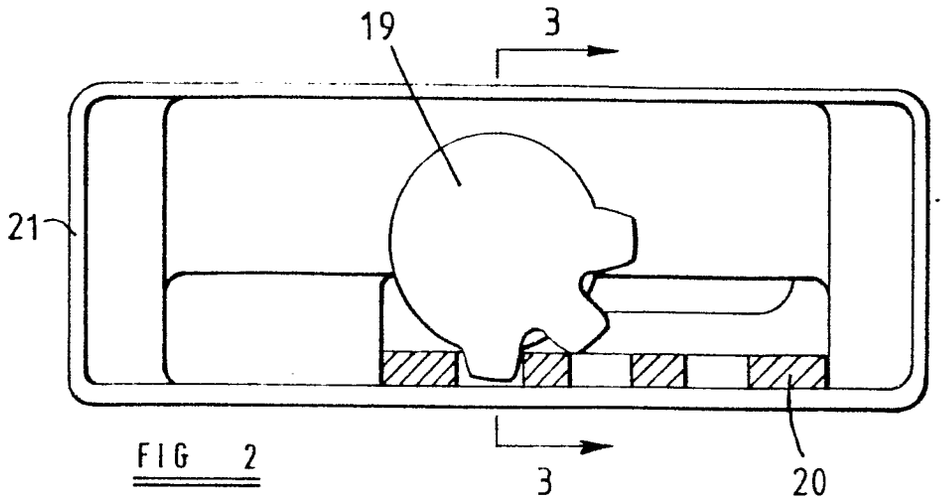

FIG 2

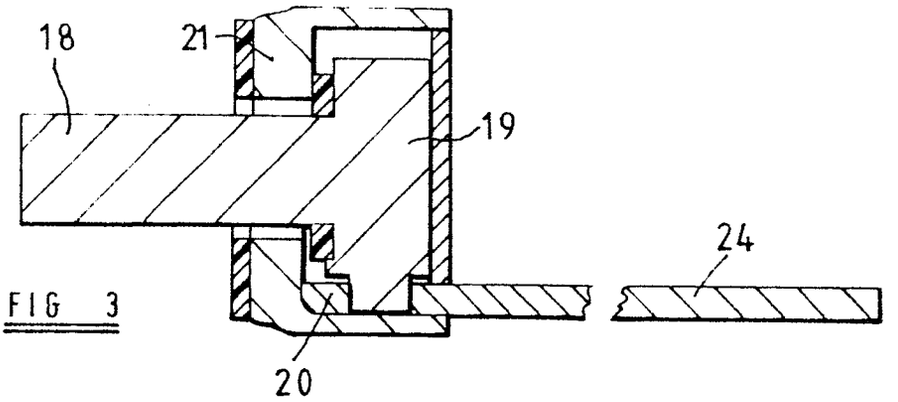

FIG 3

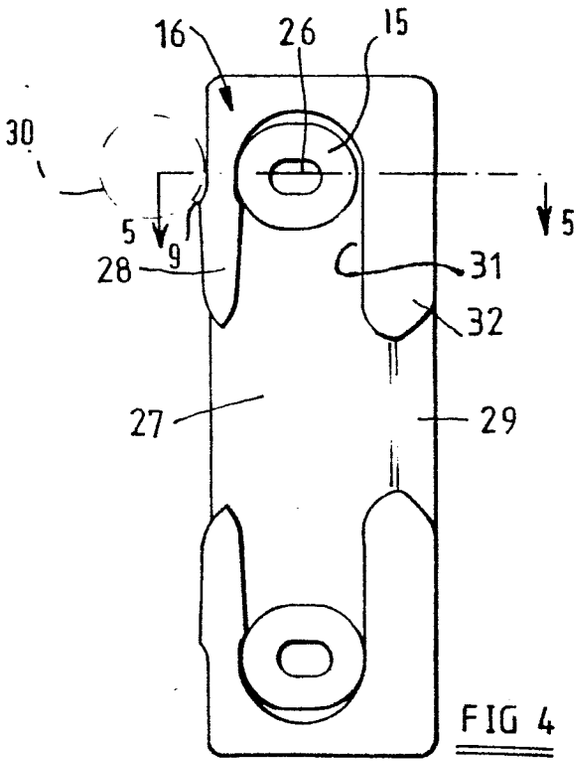

FIG 4

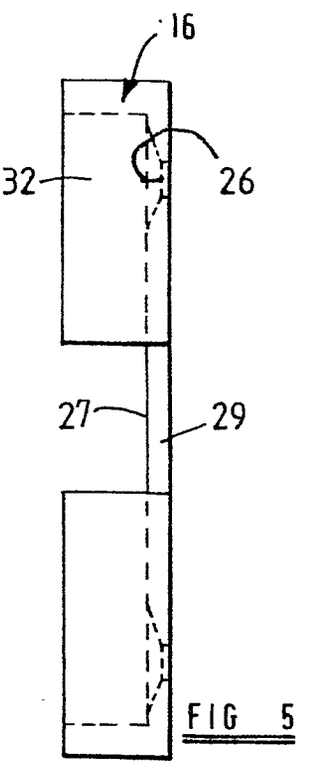

FIG 5

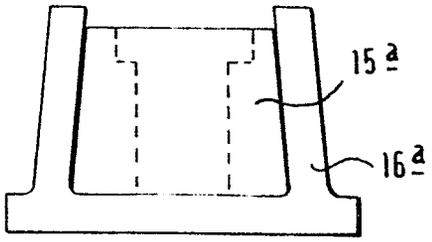

FIG 5a

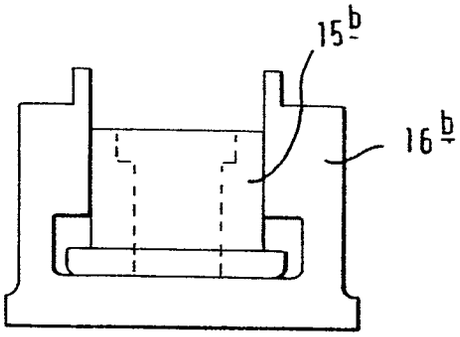

FIG 5b

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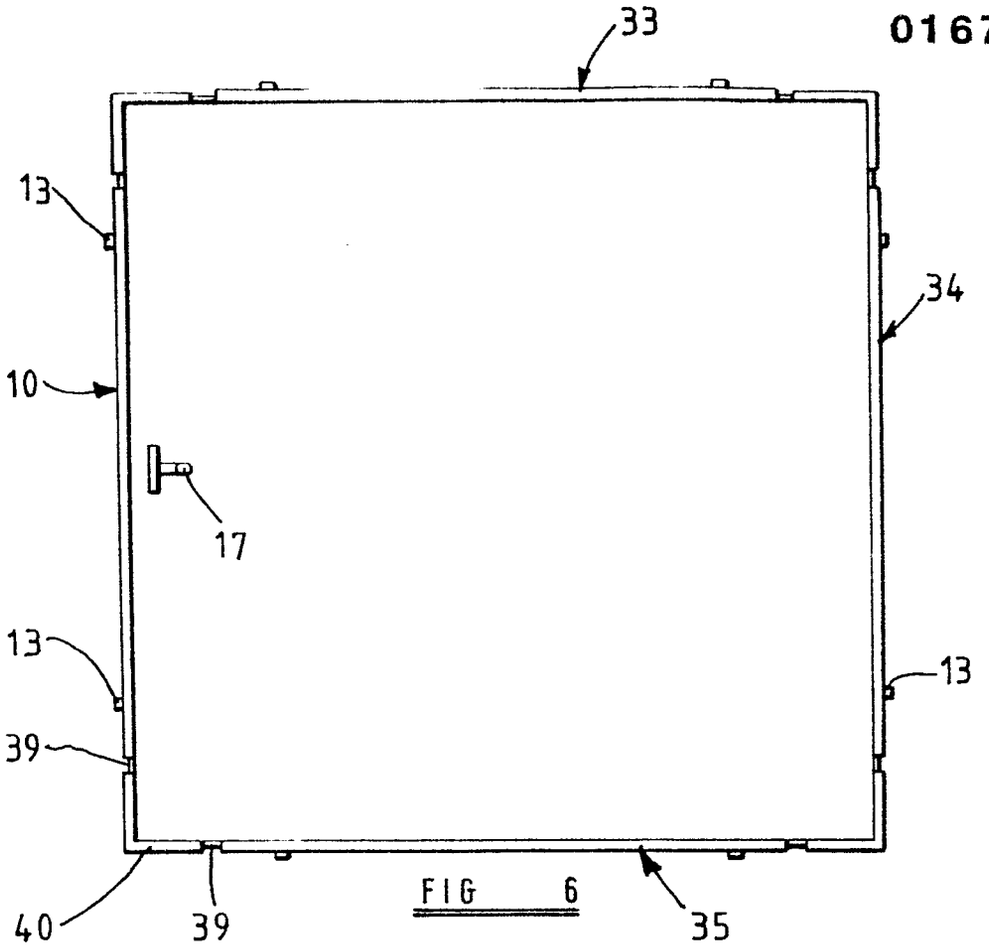

FIG 6

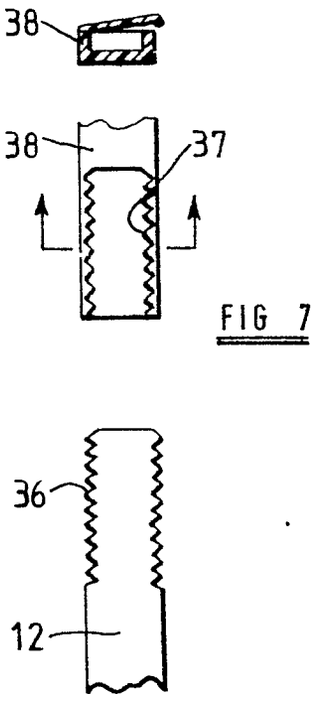

FIG 7

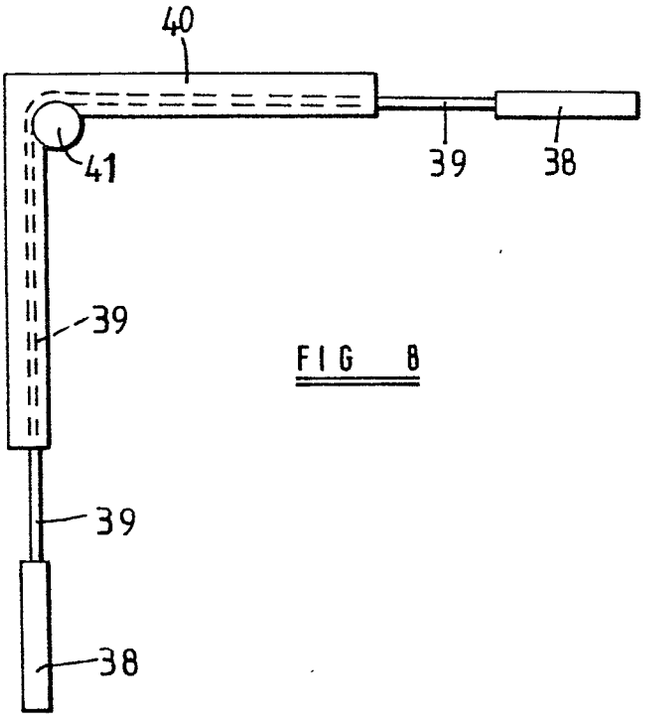

FIG 8

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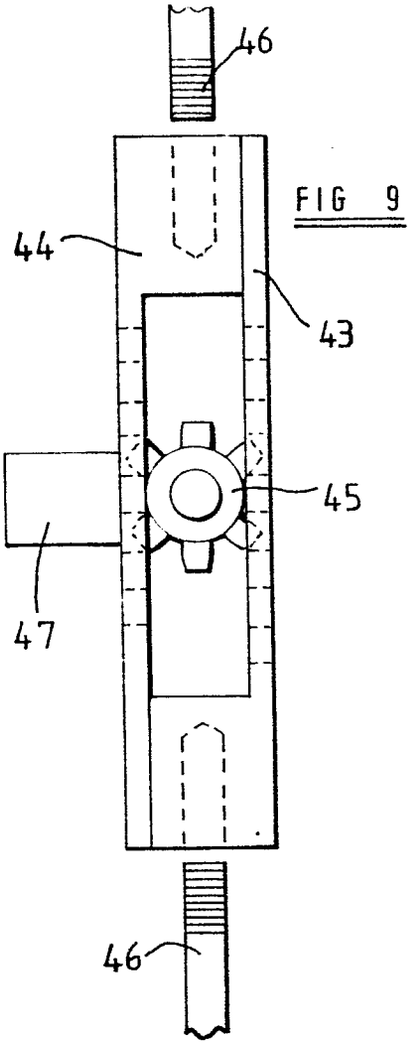

FIG 9

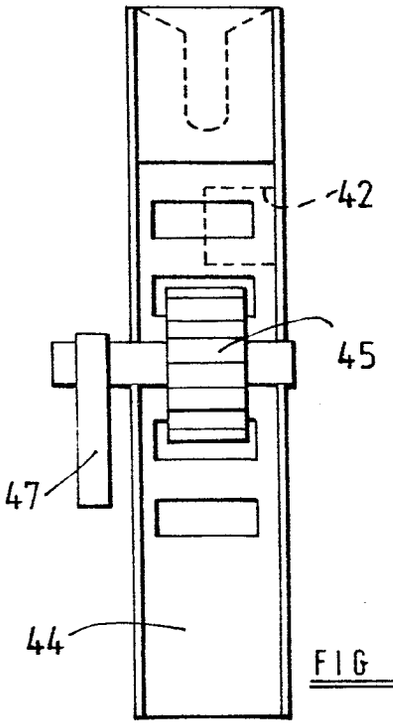

FIG 10

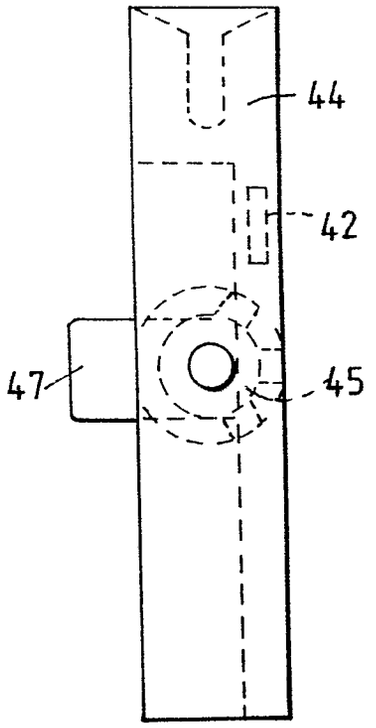

FIG 11