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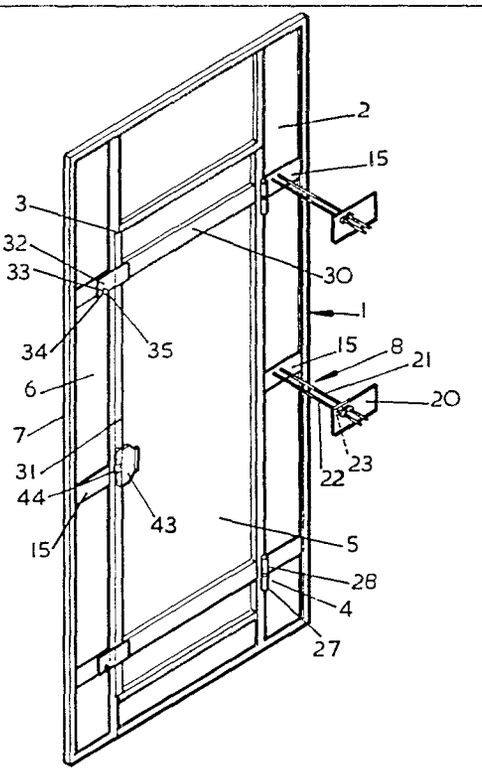
(54) Security door system.

(57) The present invention provides a security door system (1), comprising a door surround structure (2) defining a door opening (3) in which is hingedly mounted a door panel. The door panel (5) is vertically movable through at least a limited distance and has a height relative to the door opening (3) such as to permit vertical movement through a limited distance in its closed position. The door panel (5) and door surround structure (3) are provided with an interengaging security lock means (43) for substantially securing said door at least against vertical movement and interengaging retaining means (32-35) for retaining the door panel (5) against pivotal movement from its closed position in a first position of the door (5), whilst permitting pivotal movement of the door in a second position of the door (5) vertically displaced from said first position.



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SECURITY DOOR SYSTEM

This invention relates to a door system suitable for use in protecting doorways and entrances in temporarily unoccupied premises.

Property which is temporarily vacant for one reason or another for example during building renovation or between tenants, is being increasingly subject to damage due to theft and extensive vandalism. Since conventional doors offer relatively little protection against a determined attack it is necessary to protect them on the outside with an additional door system which is highly resistant to attack and is simple and economic in construction and installation whilst at the same time affording access to authorised persons.

The present invention provides a security door system, which door system comprises a door surround panel structure formed and arranged to define a door opening and a door panel hingedly mounted in said door opening so as to be pivotally movable between a closed position and an open position and vertically movable through at least a limited distance and having a height relative to the door opening such as to permit vertical movement through a limited distance in its closed position, said door panel and door surround structure being provided with an interengaging security lock means for substantially securing said door at least against vertical movement and interengaging retaining means formed and arranged for retaining the door panel against pivotal movement from its closed position in a first position of the door, and for permitting pivotal movement of the door in a second position of the door vertically displaced from said first position.

Preferably the door is hingedly mounted so that in its closed pivotal position and its first vertical position its lower edge in the plane of the door surround structure is supported immediately above, for example not more than about 6 mm, preferably not more than about 3 mm, the inner bottom edge of the door opening.

Desirably the door surround is provided at the upper edge of said door opening on its outer face with a shield means extending downwardly therefrom by a distance greater than the separation between the upper edge of the door in the plane of the door surround structure and the inner top edge of the door opening in the closed pivotal position and first, vertical, position of the door so as to cover the gap therebetween.

In a preferred form of the invention for use in protecting an opening having a predetermined size and defined by a lintel, jambs and a threshold the door opening and door panel are dimensioned so that their respective edges are disposed in overlapping relation in a closed position of the door with said door on the rear face of the door surround structure, said door surround structure being provided on its rear face with securing means for securing of said door surround structure, in use of the system, to at least the jambs of said opening in said building, with the outer edges of said door surround structure disposed in overlapping relation with said lintel, jambs and threshold on the outside faces thereof in use of the door system.

In use of the door system of the invention, the door panel is held securely in its closed position against pivotal opening movement by the retaining means and must first be lifted vertically to disengage the retaining means. This however will only be possible when the security lock means are unlocked. Since the security lock means are required to function only to prevent lifting of the door panel they can be of relatively lightweight and simple construction as the main resistance to an opening force will be borne by the retaining means. Since the respective parts of these can be fixedly secured and need not be movable in any respect they can readily be made to be of a strong construction which can contribute to the strength of the door structure itself, in

a relatively simple and economic manner.

In general the door system of the present invention is of relatively economic construction and can be easily secured in an opening in a building by securing the door surround structure to the existing jambs with a high degree of security and resistance to attack due inter alia to the overlapping between the door and door surround and between the door surround and jambs, lintel and threshold, while at the same time screening the securing means used to fix the door surround in place. In practice the precise extent of overlap between the door surround and jambs, lintel and threshold is not critical so that by varying the extent of overlap it is possible to use a single size of door system with a range of different opening sizes. Furthermore by using a securing means in the form of an adjustable clamping means it is possible to readily accommodate different jamb thicknesses.

Further preferred features and advantages of the invention will appear from the following description given by way of example of a preferred embodiment illustrated with reference to the accompanying drawing in which:

Fig. 1 is a rear perspective view of a security door system with some of the surround securing means;

Fig. 2 is a front elevation of a door system for an apartment doorway; and

Figs. 3 and 4 are respectively horizontal and vertical sections through the door systems of Figs. 1 and 2.

Fig. 5 is a perspective view of a door opening tool for use with the door of Figs. 1 to 4;

Fig. 6 is a perspective view of an optional door support suitable for use with the door of Figs. 1 to 4, and

Fig. 7 is a perspective view of a modified form of bolt system for use in the door of Figs. 1 to 4.

Fig. 1 shows a door system 1 comprising door surround structure 2 defining a door opening 3 at which is hingedly mounted 4 a door panel 5. The door surround structure 2 is of a generally rectangular C-shaped section with the main upright 6 of the C-shape forming the front outside face 7 of the door surround structure 2.

As may be seen in Figs. 2 to 4 the door surround structure 2 is provided with a plurality of securing means 8 for securing of the structure 2 to the jambs 9, threshold 10 and lintel 11 at an opening 12 in a building 13 normally closed by an existing door 14.

In general the securing means 8 comprise a clamping plate 20: a clamping bolt 21 for clamping the clamping plates 20 towards anchor plates 15 secured to the door surround 2 at the inside and outside faces of the jambs 9 etc.; and a spacer bolt 22 fixed to the clamping plate 20 with a spacer nut 23 spaced from the anchor plate at distance such that a substantially even clamping force is exerted across the anchor plate and clamping plate and the respective opposed faces of the jambs etc. It will be appreciated that with the abovedescribed form of securing means it is readily possible to accommodate various different thickness of jamb, threshold and lintel whilst providing a substantially secure and strong fixing of the door surround structure 2 around the opening 12.

The door panel 15 is of generally Z-shaped section at its outer edges 24 with an outwardly extending circumferential flange 25 set back from the principal plane of the door panel 5 at the rear of a shoulder 26. In the closed position of the door panel 5 the flange 25 abuts the radially inward hooked end 17 part of the door frame structure section 2 to overlap the latter on its rear face whilst the principal plane of the door panel is substantially flush with the front outside face 7 of the door surround structure 2, the door panel 5 in effect nesting radially inwardly

inside the door surround structure 2 so as to be substantially supported against horizontal lateral displacement in the plane of the door system.

The door panel is hung in the door surround structure on hinge means 4 comprising respective hinge parts 27, 28 secured to respective ones of the door surround structure and the door panel, so as to permit at least a limited degree of vertical movement of the door on said hinges.

The structural strength and rigidity of the door panel 5 and surround 2 are reinforced at their rear with the aid of horizontal reinforcing or bracing members 30 which have at the free side 31 of the door panel 5, retaining plates 32 which project laterally behind the door surround 2. At their lower edges the retaining plates 32 have notches 33 which engage retaining pins 34 behind their heads 35 to prevent pivotal movement of the door on its hinges in an opening direction, said retaining pin and plate constituting a strong and secure retaining means for the door.

As may be seen in Fig. 4 the door panel 5 has a height in the plane of the door slightly less (e.g. about 20 mm less) than that of the opening 3 in the surround 2 so that it can be vertically displaced on its hinges in its pulled-to closed pivotal position. More specifically the structure is formed and arranged so that in a first position of the door wherein the retaining means inter-engage there is only a narrow clearance 36 of some 3 mm or so between the bottom edge 37 of the door 5 and the inner bottom edge 38 of the door opening 3. Between the upper edge 39 of the door 5 and the inner top edge 40 of the door opening 3 there is a larger gap 41 of up to 20 mm. This gap 41 is however concealed from view and protected against insertion of tools by a shield means in the form of a cover plate 42.

In order to prevent any vertical displacement of the door panel 5 from its first position a security lock means 43 which may be of any conventional form e.g. key operated, combination-type or card-operated, is provided on the door panel 5 for engagement with a suitable keeper means 44 on the door surround 2 in its locked condition. When the security lock means 43 is unlocked the door panel 5 may be lifted vertically with the aid of a suitable tool through a small distance (e.g. 12 mm) sufficient to disengage the retaining means 32, 34 whereupon, and only then, the door panel can be swung open.

It will be appreciated that due to the very small clearance (which incidentally need not extend across the full width of the door but could merely be a small elongate recess in either or both of the door bottom edge and door surround) between the bottom of the door panel 5 in the plane of the surround and the surround, only a relatively thin bladed tool can be inserted. When the security lock is in its locked condition rotation of such a thin blade would tend to result merely in its deformation. On the other hand in the unlocked condition the tool will be of sufficient strength to lift the door on its hinges, the clearance having been made to be sufficient to accommodate a blade with a strength adequate but not substantially more than that required to lift the door.

A suitable form of tool which can as shown be very simple is shown in Fig. 5 and comprises a thin blade 45 extending at right angles from a lever arm 46 towards one end 47 remote from a hand grip portion 48 thereof. In use the blade is inserted into the clearance and then pressure applied on the lever to tend to rotate the lever parallel to the plane of the door thereby raising one side 49 of the blade up as the other side 50 bears down on the surround 2 at the bottom of the opening 3.

With the abovedescribed form of construction it will be

appreciated that in its locked condition the door system provides strong and secure protection to an opening with the fixings used to install the system well protected against outside interference. Whilst at the same time permitting installation and removal of the system in a quick and simple manner. Naturally the door hinge mounting can be arranged to permit sufficient vertical displacement to lift the door panel entirely off the hinge in the open position of the door to permit easier handling of the door panel and surround separately from each other.

Fig. 6 is a detail view of the bottom corner 51 on the hinged side of the door opening 3. As may be seen in the drawing the corner 51 is provided with a generally lazy-'Z' shaped section elongate door support member 52 having a lower web 53 connected along its outer edge 54 to the door opening bottom edge 38, and an upper web portion 55 extending rearwardly behind the door surround structure 2 above the door opening bottom edge 38. The height of the upper web portion 55 above the door opening bottom edge 38 is selected to be such that when the door is lifted to its second, raised, vertical position from its fully closed position and then swung open, it will swing out over and onto the door support member 52 and be supported at or above the level of its second position. With this arrangement it will be appreciated that the door, when open, may be closed by simply swinging it to without the need for first lifting it into a raised position in order to allow the respective parts of the retaining means 32-35 to clear each other prior to engagement when the door drops down on its hinges as it clears the support member upper web portion 55.

Fig. 7 shows a modified form of retaining means 56 comprising a substantial plate-form nose 57 projecting outwardly of the free side edge 58 of the door panel 5 to which it is secured, and a keeper 59 secured to the

opposed edge 60 of the door surround structure 2. In more detail the keeper 59 comprises a horizontal rearwardly extending plate 61 and a vertical plate 62 extending rearwardly alongside it. The vertical plate 62 is notched 63 at its upper corner 64 immediately adjacent the door surround structure 2 to provide a recess in which the nose 57 is received and captively held against horizontal movement corresponding to pivoting open of the door (without first raising it).

CLAIMS

1. A security door system (1), which door system comprises a door surround structure (2) formed and arranged to define a door opening (3) and a door panel (5) hingedly mounted (4) in said door opening (3) so as to be pivotally movable between a closed position and an open position said door panel(5) and door surround structure (3) being provided with an interengaging security lock means (43) for substantially securing said door at least against vertical movement and interengaging retaining means (32-35) formed and arranged for retaining the door panel (5) against pivotal movement from its closed position in a first position of the door (5) characterized in that said door (5) is hingedly mounted so as to be vertically movable through at least a limited distance and has a height relative to the door opening (3) such as to permit vertical movement through a limited distance in its closed position, and in that said retaining means (32-35) is formed and arranged for retaining the door panel (5) against pivotal movement from its closed position in a first position of the door (5), and for permitting pivotal movement of the door (5) in a second position of the door (5) vertically displaced from said first position.

2. A door system according to claim 1 wherein said door(s) is hingedly mounted (4) so that in its closed pivotal position and its first vertical position its lower edge (37) in the plane of the door surround structure (2) is supported not more than 6 mm above the inner bottom edge (38) of the door opening (3).

3. A door system according to claim 1 or claim 2 wherein the door surround structure (2) is provided at the upper edge (40) of said door opening on its outer face with a shield means (42) extending downwardly therefrom by a distance greater than the separation between the upper edge (39) of the door in the plane of the door surround

(2) and the inner top edge (40) of the door opening (3) in the closed pivotal position and first, vertical position of the door (5) so as to cover the gap (41) therebetween.

4. A door system according to any one of claims 1 to 3 for use in protecting an opening (12) having a predetermined size and defined by a lintel (11), jambs (9) and a threshold (10) wherein the door opening (2) and the door panel (5) are dimensioned so that their respective edges (17,24) are disposed in overlapping relation in a closed position of the door (5) with said door (5) on the rear face of the door surround structure (2), said door surround structure(2) being provided on its rear face with securing means (8) for securing of said door surround structure (2), in use of the system, to at least the jambs (9) of said opening (12) in said building, with the outer edges of said door surround structure (2) disposed in overlapping relation with said lintel (11), jambs (9) and threshold (10) on the outside faces thereof in use of the door system (1).

5. A door system according to any one of claims 1 to 4 wherein said door surround structure (2) is provided behind the inner bottom edge (38) of the door opening (3) with a door support member having a support surface at a height above said door opening bottom edge (38) not lower than the lower edge (37) of the door (5) in the plane of the door surround structure (2) when said door (5) is in its second position, so as to support said door (5) in said second vertical position when said door (5) is open.

6. A door system according to any one of claims 1 to 5 wherein at least one of said door panel(5) and door surround structure is provided with reinforcing rib or strap means (30).

7. A door opening device suitable for use with a security door according to any one of claims 1 to 6 which device comprises an elongate lever (46) having a substantially planar first side and a tongue portion (45) projecting from said first side at or in proximity to a first end portion and extending obliquely across said lever, said lever having a handle means (48) projecting outwardly of its opposite side at or in proximity to its other end.

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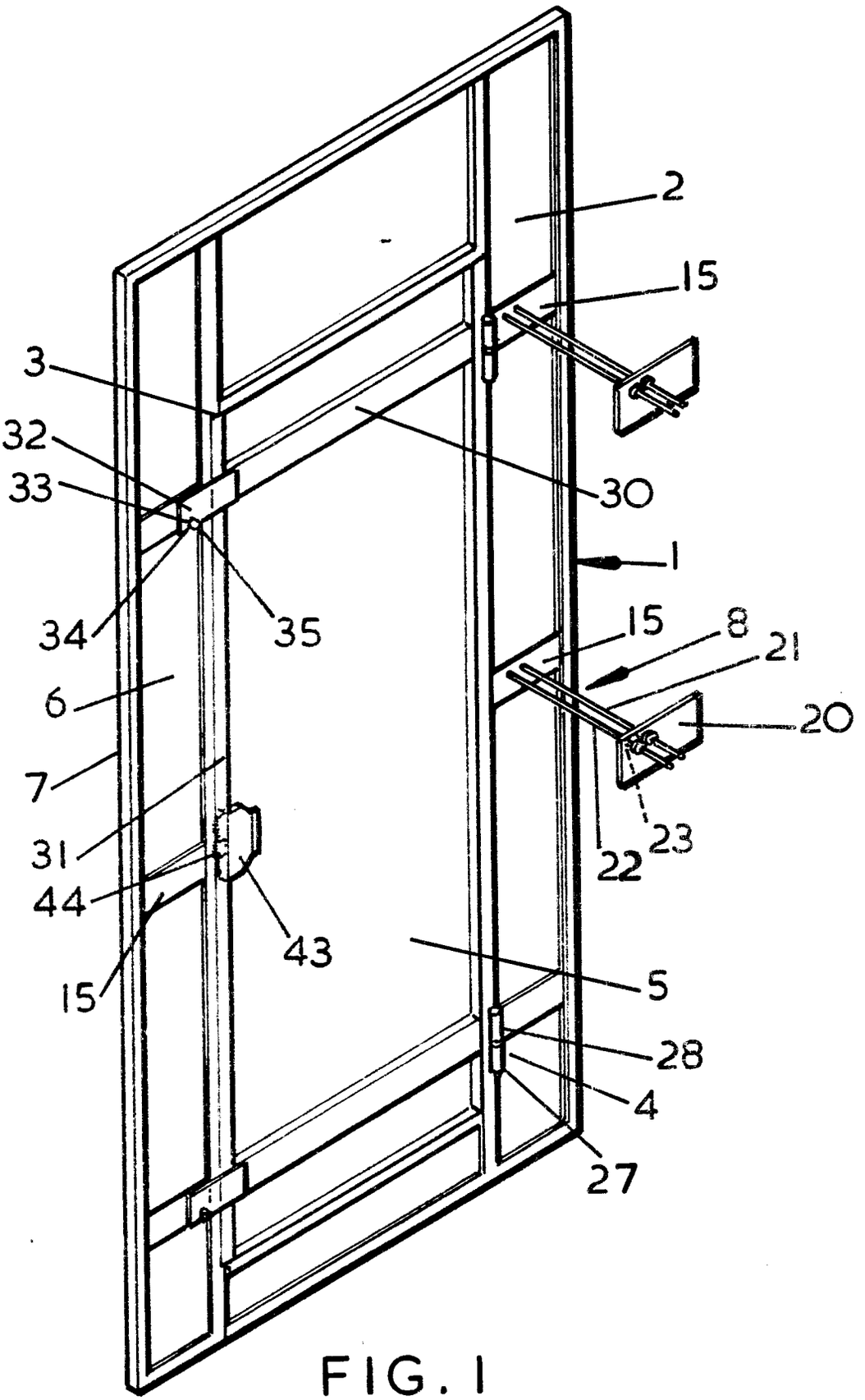

FIG. 1

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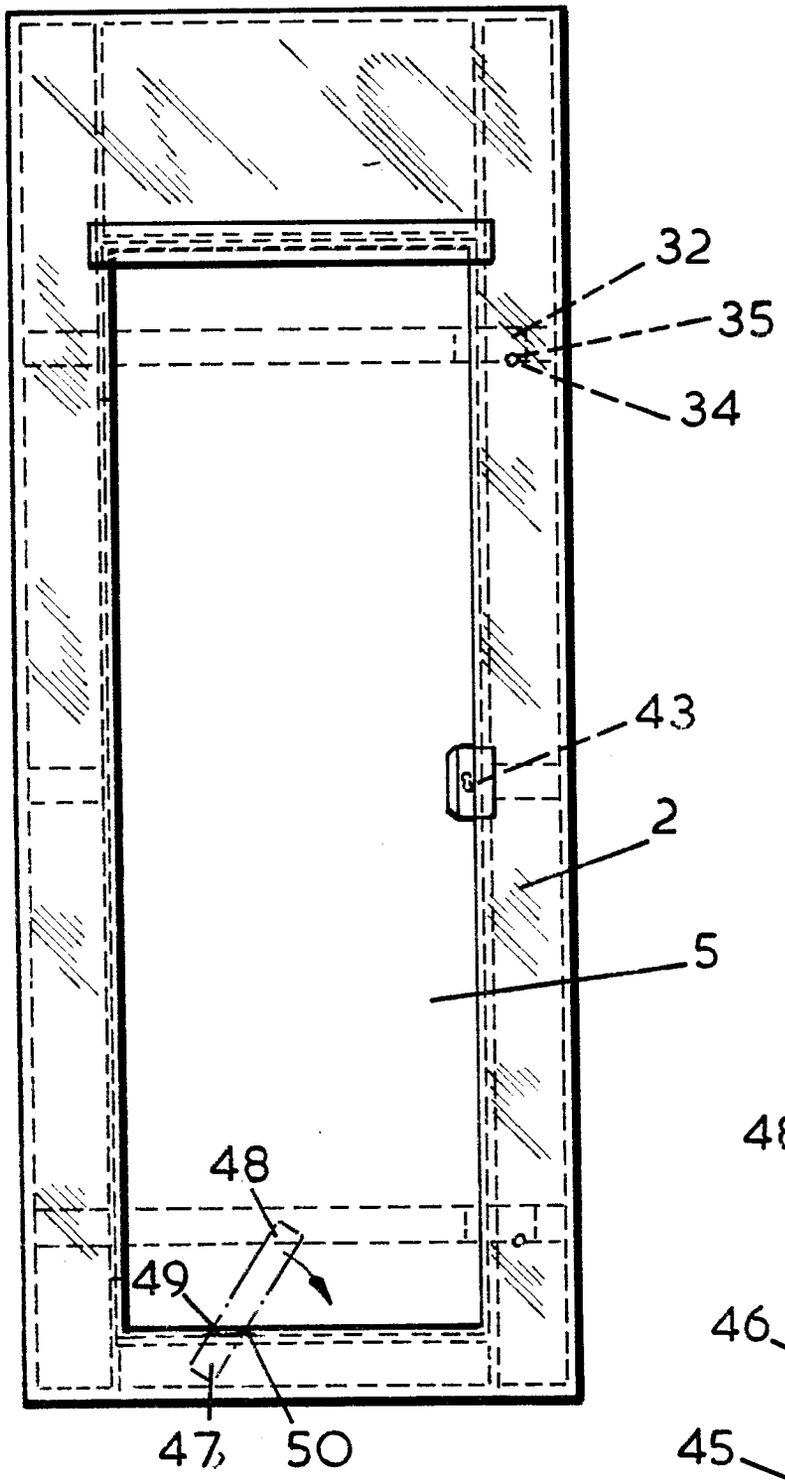

FIG. 2

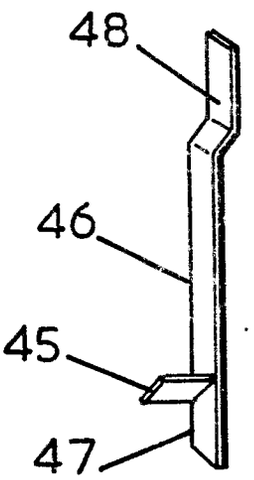

FIG. 5

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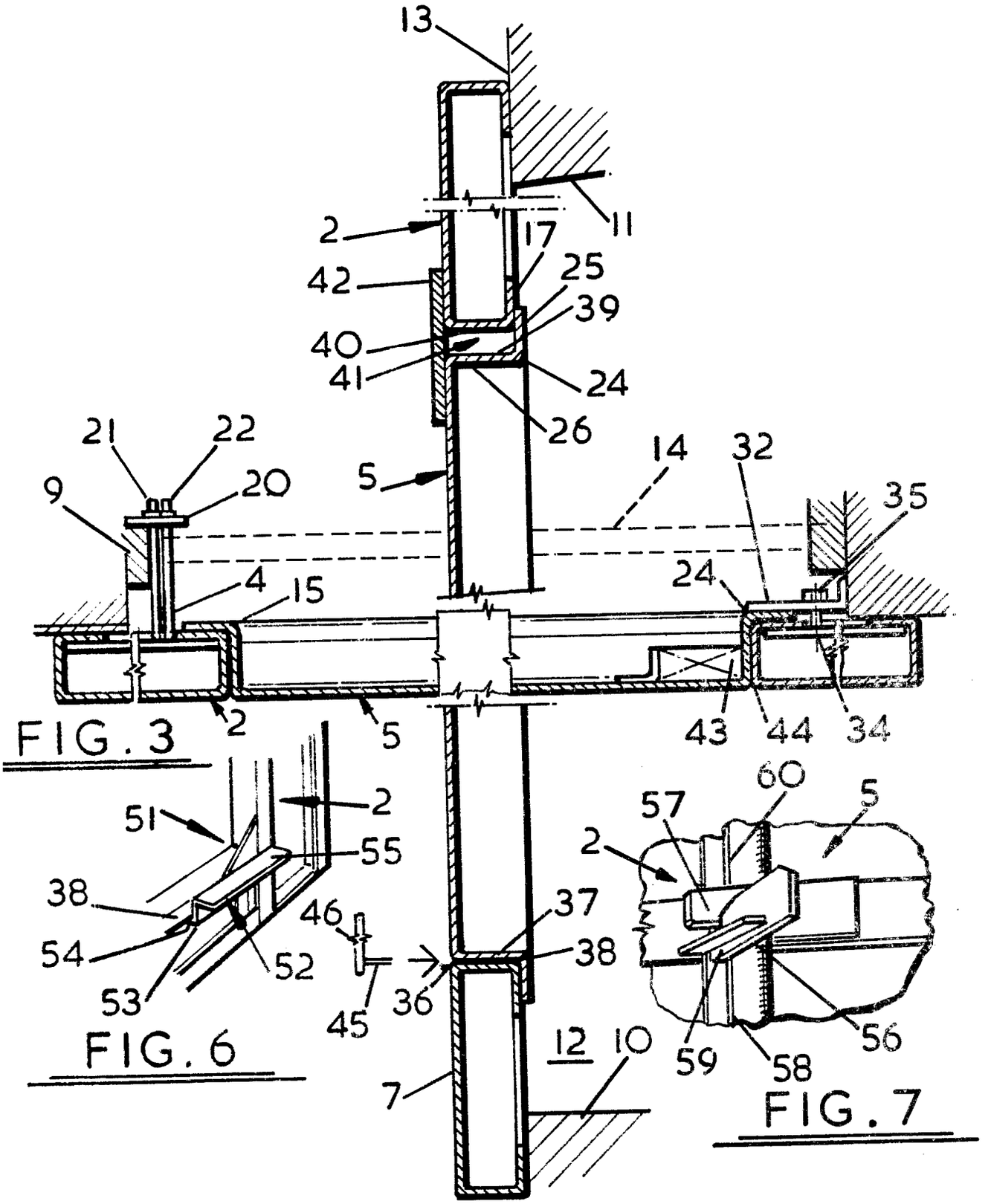

FIG. 3

FIG. 6

FIG. 7

FIG. 4