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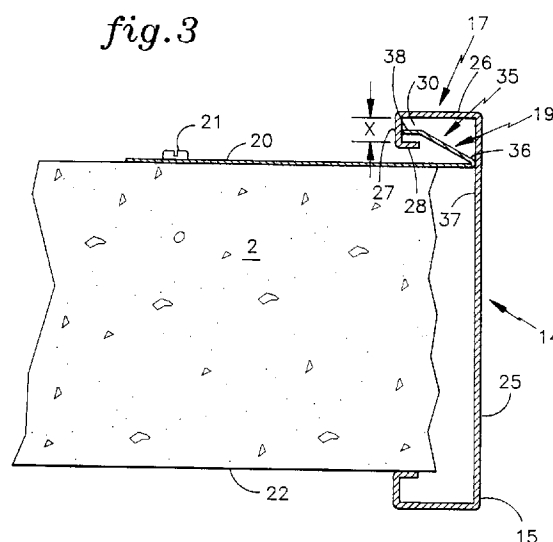
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(54) **Universal door frame.**

(57) An adjustable elevator door frame is provided for use in a doorway formed in a wall (2). The frame includes a pair of spaced apart side frame members (14) and a top frame member connecting the side frame members. Each side frame member (14) has a longitudinally extending reentrant edge flange (17). The edge flange (17) is adapted for releasable engagement with a connecting element (20) adapted for attachment to the wall (2) adjacent the doorway. The edge flange (17) is adapted to accommodate a degree of relative transverse displacement of the frame member with respect to the corresponding connecting element (20), thereby permitting the frame to adjust and accommodate structural misalignment between corresponding walls (2) of different floors and walls (2) of different thickness.

fig.3



The present invention relates to door frame members, door frame assemblies and methods of construction thereof.

The invention has been developed primarily to accommodate elevator doors in multi-story buildings, and will be described hereinafter with reference to this application. However, it will be appreciated that the invention is not limited to this particular field of use.

A major problem with the construction of conventional elevator door frames is that elevator doorways vary significantly in dimension from building to building as well as within buildings. A number of factors cause these deviations including variations in construction techniques, expected deviations from nominal values within allowable tolerances, and the like. The dimensions most often affected, wall thickness and vertical alignment between corresponding lift-well walls of different floors, must be held within tight standards. As a result, several methods have been promulgated in the past to overcome variations within the building.

Oversized elevator door frames, for example, have been used to accommodate relatively large variations in wall thickness and structural misalignment. These ill-fitting frames are permanently "grouted" in position with concrete or other suitable cementitious material. However, this technique is labor intensive, involves the use of additional "wet trades" personnel, requires substantial additional materials, and, consequently, is time consuming and relatively expensive. Moreover, if oversized frames are positioned and grouted inaccurately, or if the frame is damaged, repositioning or replacing the frame is time consuming and expensive because of the need to cut and reform the grouting material.

It is therefore an object of the present invention to provide an adjustable elevator door frame and/or a method of constructing a door frame which overcomes or minimizes the deficiencies of the prior art.

According to the present invention there is provided an adjustable elevator door frame comprising a side frame member, having a reentrant edge flange; and a connecting element for connecting the frame member to a wall of an elevator shaft, wherein said connecting element is received by said reentrant edge flange, thereby enabling said edge flange and said connecting element to adjustably accommodate different wall geometries and misalignment.

In a preferred embodiment an adjustable elevator door frame is provided for use in a doorway formed in a wall. The frame includes a pair of spaced apart side frame members and a top frame member connecting the side frame members. Each side frame member has a longitudinally extending reentrant edge flange. The edge flange is adapted for releasable engagement with a connecting element adapted for attachment to the wall adjacent the doorway. The edge

flange is adapted to accommodate a degree of relative transverse displacement of the frame member with respect to the corresponding connecting element, thereby permitting the frame to adjust and accommodate structural misalignment between corresponding walls of different floors and walls of different thickness.

The present invention may also include a top frame member having a reentrant edge flanges. The edge-flange of the top frame is also adapted for releasable engagement with a connecting element adapted for attachment to the wall adjacent to the doorway.

According further to another aspect of the present invention, a method is provided for forming an adjustable elevator door frame for an elevator doorway in a wall. The method includes the steps of: (1) providing a side frame member, having a reentrant edge flange; (2) providing a connecting element, preferably having a reentrant edge flange; (3) engaging said connecting element and said side frame member together, thereby enabling both said connecting element and said side frame member to move relative to one another; (4) positioning said frame members around the elevator doorway to form a door frame; (5) adjusting said frame members around the doorway to a desired position; and (6) securing said connecting elements to the wall.

These and other objects, features and advantages will become more apparent in light of the detailed description of certain embodiments thereof, given by way of example only, as illustrated in the accompanying drawings.

FIG.1 is a cut-away perspective view showing diagrammatically a typical elevator door frame positioned in an elevator doorway formed in lift-well wall;

FIG.2 is a cross-sectional view showing a typical prior art door frame member grouted in position to accommodate a door frame member wider than the actual wall.

FIG.2A is a cut-away perspective view showing diagrammatically two typical elevator door frames vertically misaligned in a multi-storey building.

FIG.3 is a cross-sectional view showing a door frame assembly according to a first embodiment of the present invention, wherein the frame member is adjustable retained in position adjacent the door frame by a complementary connecting element secured to the wall.

FIG.4 is a cross-sectional view similar to Fig. 3 showing a second embodiment of the invention wherein the frame member is retained in position by a pair of the connecting elements disposed on opposite sides of the wall.

FIG.4A shows an embodiment of the invention depicted in FIG.4, with a different exterior geometry.

FIG.5 is a cross-sectional view similar to FIG.4 showing an alternative configuration suitable for use

with a "dry wall" construction.

FIGS.6 and 7 show embodiments of the invention depicted in FIG.5, with a different exterior geometries.

FIG.8 is a cross-sectional side elevation showing a top frame member and a connecting element secured to the wall by means of a door support structure.

Referring to the drawings, Fig. 1 shows the construction of a typical elevator doorway 1 formed in the front wall 2 of a lift-well 3 of a multi-story building (not shown). Lift-well walls are commonly formed by any one of a number of building construction techniques, such as cast concrete, brick lined with gyprock, steel frame, and the like. Consequently, there are significant variations in wall thickness between different buildings. Moreover, there is often also a significant degree of vertical misalignment between corresponding lift-well walls and doorways of different floors within the same building.

To accommodate vertical misalignment 73 and different wall thicknesses 74, it has been customary in the past to provide significantly oversized elevator door frames formed from frame members 10, as shown in FIGS.2 and 2A. Such frames are able to accommodate variations in wall thickness, as well as variations in position resulting from vertical misalignment between the floors, by being oversized. However, because of being oversized it is necessary to "grout" such frames in position with concrete or other cementitious material 75, a technique which is labor intensive, time consuming, and expensive.

Referring now to Fig. 3, wherein corresponding features are denoted by corresponding reference numerals, the present embodiment provides an elevator door frame formed from frame members 14, adapted adjustably to be positioned in the doorway formed in the lift-well wall 2. The frame is fabricated from a pair of spaced apart generally vertically extending side frame members 15 and a generally horizontal top frame member 16 (Fig. 8) connecting the side members. Each frame member 14 incorporates at least one longitudinally extending inwardly directed reentrant edge flange 17. The edge flange 17 is adapted for releasable engagement with a complementary locating formation 19, formed from a corresponding correcting element 20 which is adapted for attachment to the wall 2 adjacent the doorway by screws 21, or other suitable fastening means. It will be apparent that the reentrant edge flanges 17 are configured so as to accommodate a variation in the relative transverse position of the frame members 14 with respect to the associated connecting elements 20, corresponding to dimension "X". In this way, the position of the frame within the doorway can be adjusted to accommodate wide variation in wall thicknesses. The position of the connecting element 20 with respect to the vertical edge of the doorway may be adjusted by

appropriately positioning its fixing 21, whereby structural misalignment between corresponding walls of different floors may be accommodated.

Turning to describe the configuration of the frame in more detail, each frame member preferably incorporates a front panel 25 to define a corresponding door jamb section facing the doorway opening generally perpendicular to the shaft wall in which the doorway is formed. Each reentrant edge flange 17 is defined by a first side 26 extending away from the front panel 25 in a plane generally perpendicular thereto, a second side 27 extending inwardly from the first side 26 in a transverse plane generally parallel to and spaced apart from the front panel, and a third side 28 extending back toward the front panel 25 from the second side 27. Thus, the third side 28 is displaced inwardly from, and extends generally parallel to, the first side 26. In this way, the front panel and flange sides together define an open longitudinally extending channel 30 adapted slidably to receive and captively retain the locating formation 19 associated with the corresponding connecting element 20. The locating formation 19 forms a close fit between the front panel 25 and the second side 27.

Each connecting element 20 is preferably formed from sheet metal which is folded longitudinally to define the locating formation 19 in the form of longitudinal hook 35. Thus, the hook is defined by a first longitudinal edge 36 adapted to slidably abut an inner surface 37 of the front panel 25, and a second longitudinal edge 38 spaced apart from, and extending substantially parallel to, the first edge 36 to slidably abut a corresponding inner surface of the second side 27 of the reentrant edge flange. The perpendicular distance between the respective first and second edges 36 and 38 of the hook formation 35 corresponds substantially to the perpendicular distance between the second side 27 of the reentrant edge flange and the inner surface 37 of the front panel. In this way, each locating formation or hook 35 is captively retained within the open channel 30 of the respective reentrant edge flange 17, and still may accommodate a variation in the transverse position of the frame member with respect to the connecting element, corresponding to the effective transverse extent of the second side of the reentrant edge flange, as designated by dimension "X". The arrangement also allows the frame member 14 to be adjusted vertically relative to the connecting element, i.e. in a second axis of direction perpendicular to dimension "X".

FIG. 4 shows an alternative embodiment of the invention, adapted particularly for use with a rendered brick or block wall construction. In this embodiment, each frame member 14 incorporates a pair of mutually opposed inwardly directed reentrant edge flanges 17 respectively adapted for releasable engagement with the locating hook formations 35 of a corresponding pair of connecting elements 20 dis-

posed on opposite sides of the wall adjacent the doorway. In this construction, an intermediate layer 40 of suitable fibrous material or mesh is sandwiched between the connecting element and the overlying render 41, because it has been found in practice that the render does not tend adequately to bond directly to the sheet metal of the connecting element.

Conveniently, in this embodiment, the front connecting element is hidden from view behind the render on the front face of the wall, while the associated locating hook formation 35 is disposed substantially within the outer reentrant edge flange and is thereby concealed from view once the frame is assembled.

FIG. 4A shows the same basic embodiment as Fig. 4, with a slight change in the outer edge 50 geometry. Fig 4A shows one end of the outer edge geometry 50 rounded for aesthetic appeal.

FIGS. 5-7 show alternative embodiments of the invention similar in construction to that of FIG.4, but adapted primarily for use with a "dry wall" construction. In these embodiments, a spacing bracket 45 is provided to support respective front and rear wall panel sections 46 and 47 in predetermined spaced apart relationship. The front connecting element 20 is conveniently sandwiched between front wall section 46 and front fascia panel 48. The outer edges 50 of the frame members 14 may be angled (as shown in FIG. 6) or smoothly rounded for aesthetic appeal (as shown in Fig. 7).

Turning now to describe the preferred method of construction according to the invention, with reference by way of example to Figs. 3 to 7, the lift-well incorporating one or more doorways on each floor is generally constructed first. A door frame for each doorway is then fabricated from suitably dimensioned side frame members 14, each incorporating a pair of mutually opposed inwardly directed reentrant edge flanges 17, substantially as described above. Each frame is then located in the corresponding doorway, and adjusted to the desired position relative to the wall 2, in the substantial vertical alignment with frames on other floors. With the door frame in position, the locating hook formations 35 of a plurality of connecting elements 20 are engaged with the corresponding reentrant edge flanges 17 of the respective frame members in a configuration adapted to accommodate a variation in the transverse position of the frame members 14 with respect to the corresponding connecting elements 20. The connecting elements 20 are then simply secured to the wall 2 adjacent the doorway by screw 21 or other suitable fastening means, thereby to retain the frame in the adjusted position. Adjusting the position in which the connecting elements are secured allows adjustment of the frame member towards and away from the doorway opening, i.e. in a third axis of direction perpendicular to the two axes referred to above. This enables variation in vertical alignment of openings from floor to

floor to be accommodated. The front wall of the lift-well may be rendered if desired. It may, of course, be necessary or desirable to vary the construction procedure to suit particular applications and forms of wall construction. For example, in some applications, the walls may be built up around the frames.

FIG.8 is a diagrammatic side elevation showing how the top of the frame is secured to the wall to provide a door support structure 60. In this preferred configuration, the top frame member 16 incorporates a reentrant edge flange 17 extending along its rear edge 71, for engagement with modified connecting element 61, which in turn is secured to the door lintel 62. The front edge 72 of the top frame member 16 is fixedly secured to front door frame header 65 which in turn is also fixedly secured to the wall or doorway lintel. Frame header 65 incorporates a series of horizontally aligned rollers 67 in rolling engagement with complementary guide tracks 68 associated with elevator door panel 70. In this way, the elevator door 70 is slidably supported for movement between the open and closed positions by the door frame.

It will be appreciated that the door frame assembly of the present invention provides a number of inherent advantages. The frame assembly is universal in its application to different wall constructions, whether built-up, solid concrete, brick, dry wall, steel frame, or the like. The invention is readily able to accommodate walls of varying nominal thickness, dimensional variations on site, and vertical misalignment between corresponding elevator doorways on different floors. Frames can be prefabricated from standardized components, thereby minimizing on-site assembly time and simplifying inventory control. There is no need for grouting and so no "wet trades" are required during installation. Consequently, installation time and cost are substantially reduced. However, the frames can, of course, be grouted-in if desired.

Moreover, the system is applicable to all common types of sliding lift doors. Damaged frames or frame sections can be readily replaced on site without the need to cut and reform grouting or masonry. Advantageously, different frame profiles can be used within the same system and the frame is readily able to accommodate changes in construction methods during building progress. In this way, the system allows for a variety of different frontal finishes.

It is also important to note that lift doors and door frames must be fire-rated and positioned in a way which blocks any flame path from outside the door into the elevator shaft. The frame assembly according to the invention achieves this flame blocking function without any special modification or insulation. Accordingly, the invention represents a commercially significant improvement over the prior art.

Although the invention has been described with reference to specific examples, it will be appreciated

by those skilled in the art that the invention may be embodied in many other forms.

Claims

1. An adjustable elevator door frame comprising:
 - a side frame member, having a reentrant edge flange; and
 - a connecting element for connecting the frame member to a wall of an elevator shaft, wherein said connecting element is received by said reentrant edge flange, thereby enabling said edge flange and said connecting element to adjustably accommodate different wall geometries and misalignment.
2. An adjustable elevator door frame according to claim 1 wherein said frame comprises a face which in use faces toward the doorway opening generally perpendicular to the shaft wall in which the doorway opening is formed, and said reentrant flange comprises a portion which is substantially parallel to and spaced apart from said face.
3. An adjustable elevator door frame according to claim 2, wherein a portion of said connecting element forms a close fit between said face and said spaced apart flange portion.
4. An adjustable elevator door frame according to claim 1, 2 or 3, wherein said reentrant edge flanges and said connecting elements comprise mating geometries, thereby enabling adjustment of the frame member relative to the connecting element in two axes of direction.
5. An adjustable elevator door frame according to claim 4, wherein the positioning of the connecting elements on the wall can be adjusted to provide adjustment of the door frame in a third axis of direction.
6. An adjustable elevator door frame according to any preceding claim, wherein said side frame member further comprises a front panel having an inner surface; and
 - wherein said reentrant edge flange comprises a first side perpendicular to said front panel having a length, a second side parallel to said front panel, and a third side parallel to said first side extending a distance less than said length of said first side.
7. An adjustable elevator door frame according to claim 6, wherein said connecting element further comprises a longitudinal hook having a first long-

itudinal edge, wherein said first longitudinal edge abuts said inner surface of said front panel, and a second longitudinal edge spaced apart from and extending substantially parallel to said first longitudinal edge.

8. An adjustable elevator door frame, according to any preceding claim further comprising:
 - a top frame member, having a reentrant edge flange;
 - a connecting element for connecting the top frame member to the wall of the elevator shaft, wherein said connecting element is received by said reentrant edge flange, thereby enabling said edge flange and said connecting element to adjustably accommodate different wall geometries and misalignment.
9. An adjustable elevator door frame, according to claim 8, wherein said top frame member is fixed, along an edge opposite said reentrant edge flange, to a door frame heading having a series of rollers for supporting a sliding door.
10. A method of forming an adjustable elevator door frame for an elevator doorway in a wall, comprising the steps of:
 - providing a side frame member, having a reentrant edge flange;
 - providing a connecting element;
 - engaging said connecting element and said side frame member together, thereby enabling both said connecting element and said side frame member to move relative to one another; and
 - positioning said side frame member in the elevator doorway, to form a door frame;
 - adjusting said frame members around the doorway to a desired position;
 - securing said connecting elements to the wall.
11. A method of forming an adjustable elevator door frame for an elevator doorway in a wall according to claim 9, further comprising the steps of:
 - providing a plurality of said connecting elements;
 - providing a top frame member, having a reentrant edge flange;
 - engaging one of said connecting elements and said top frame member together, thereby enabling both said connecting element and said top frame member to move relative to one another;
 - positioning said top and side frame members around the elevator doorway to form a door frame;
 - adjusting said top and side frame mem-

bers around the doorway to a desired position;
and
securing said connecting elements to the
wall.

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- 12.** A method of forming an adjustable elevator door
frame according to claim 9 or 10, using a door
frame according to any of claims 1 to 8.

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fig. 1

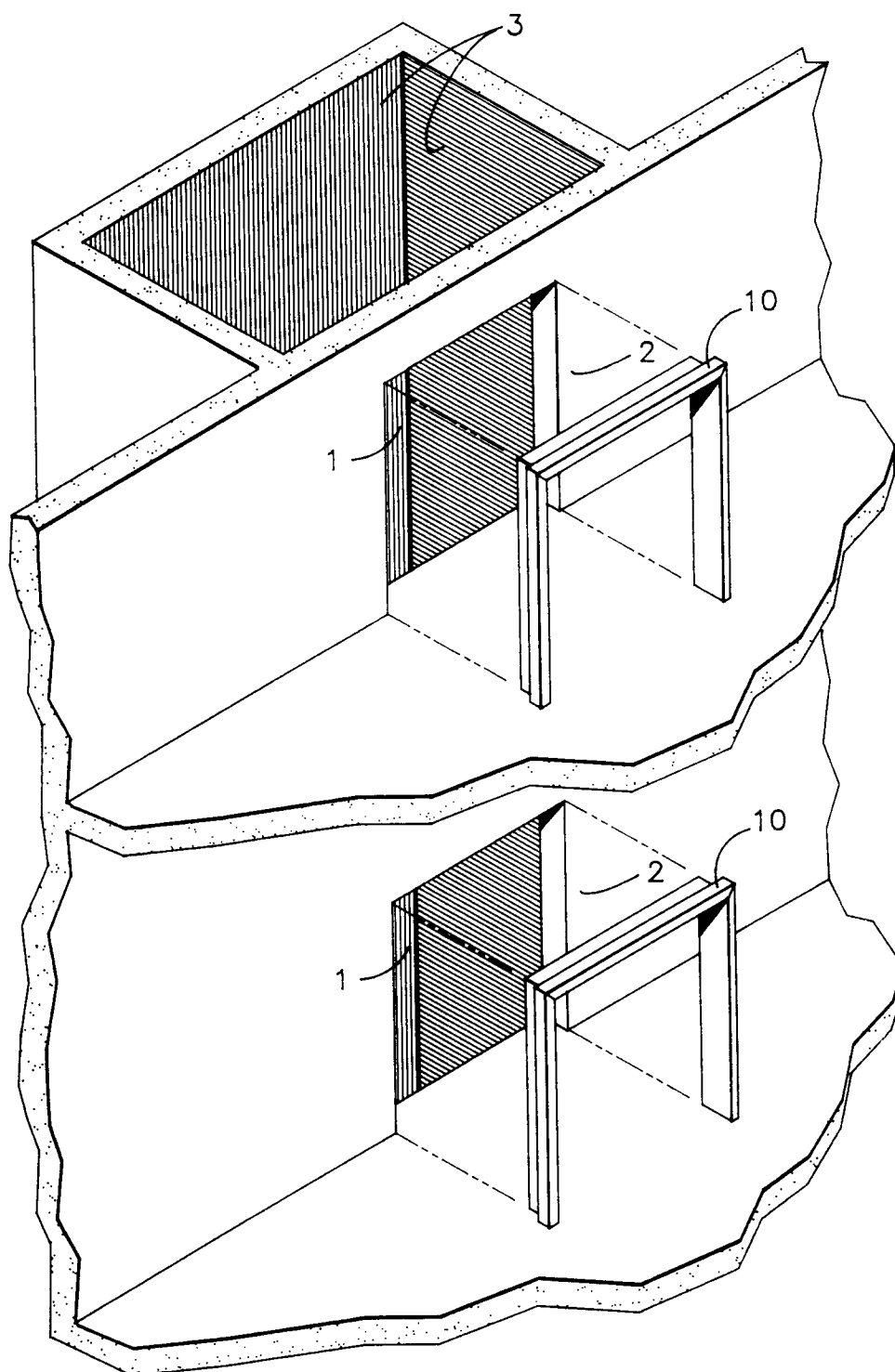


fig.2
prior art

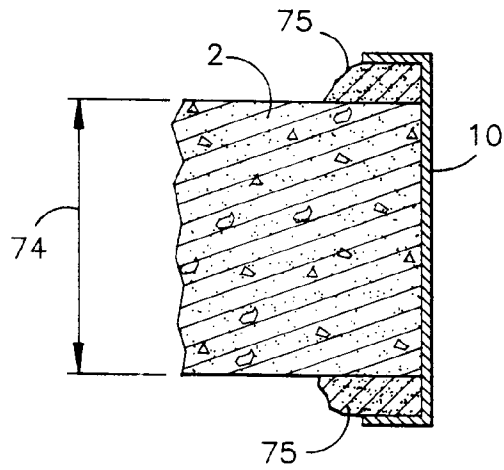


fig.2A
prior art

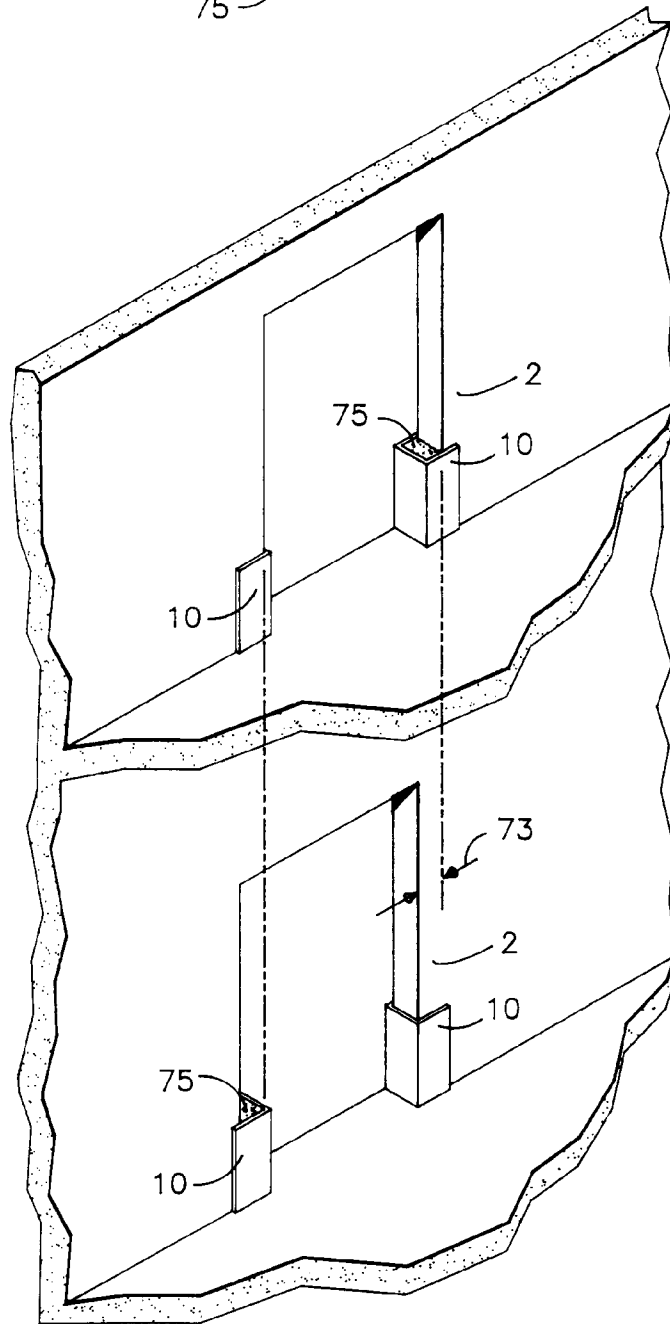


fig.3

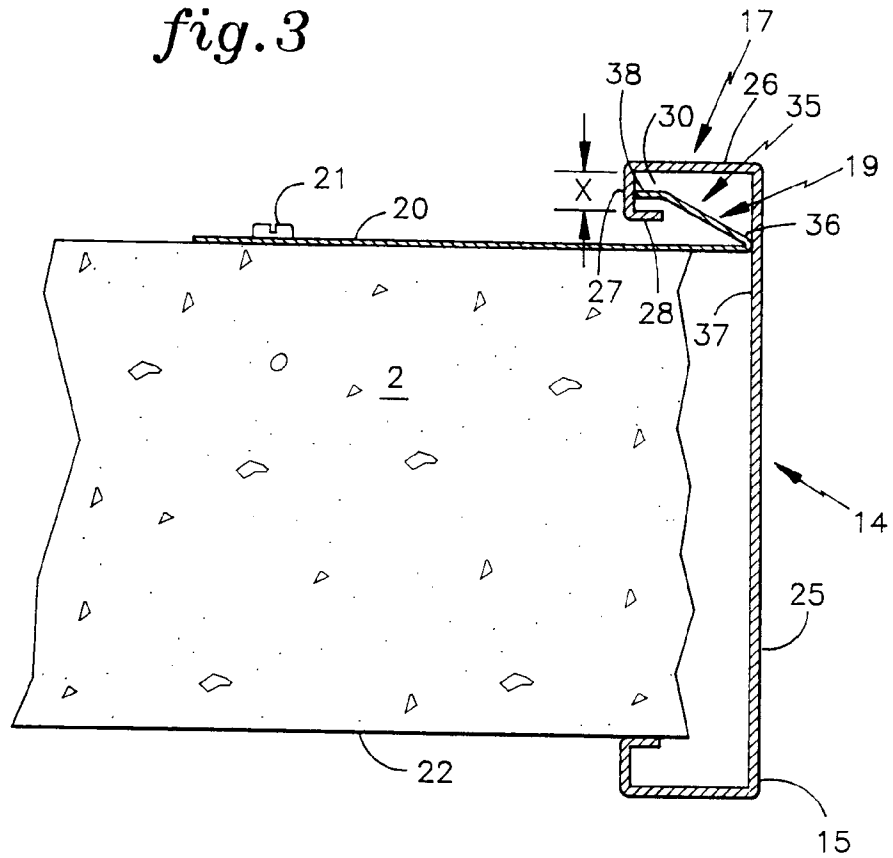


fig.4

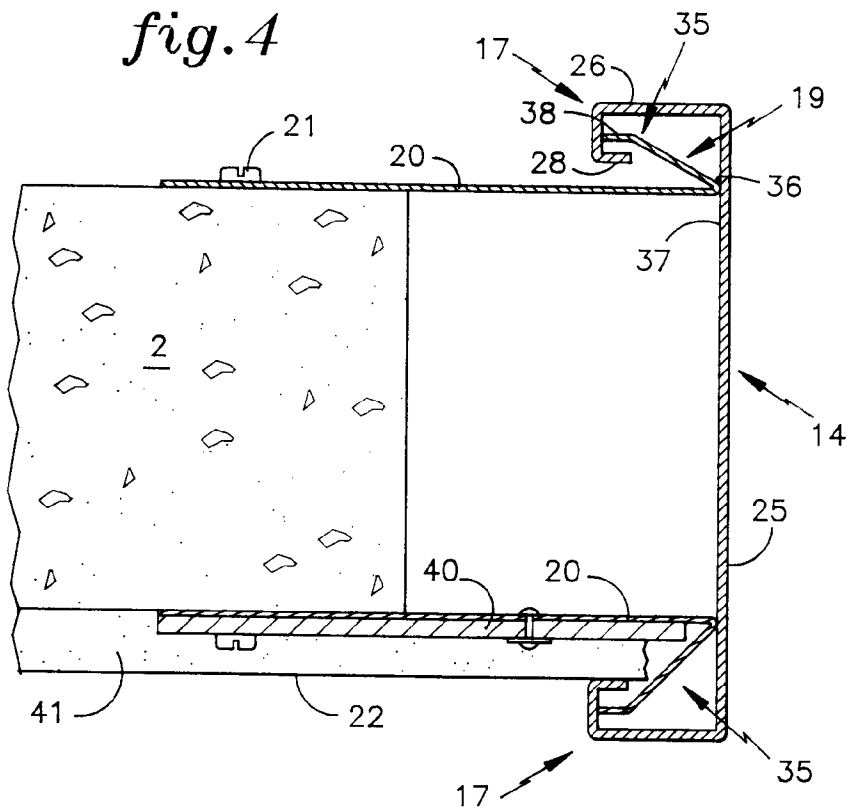


fig. 4A

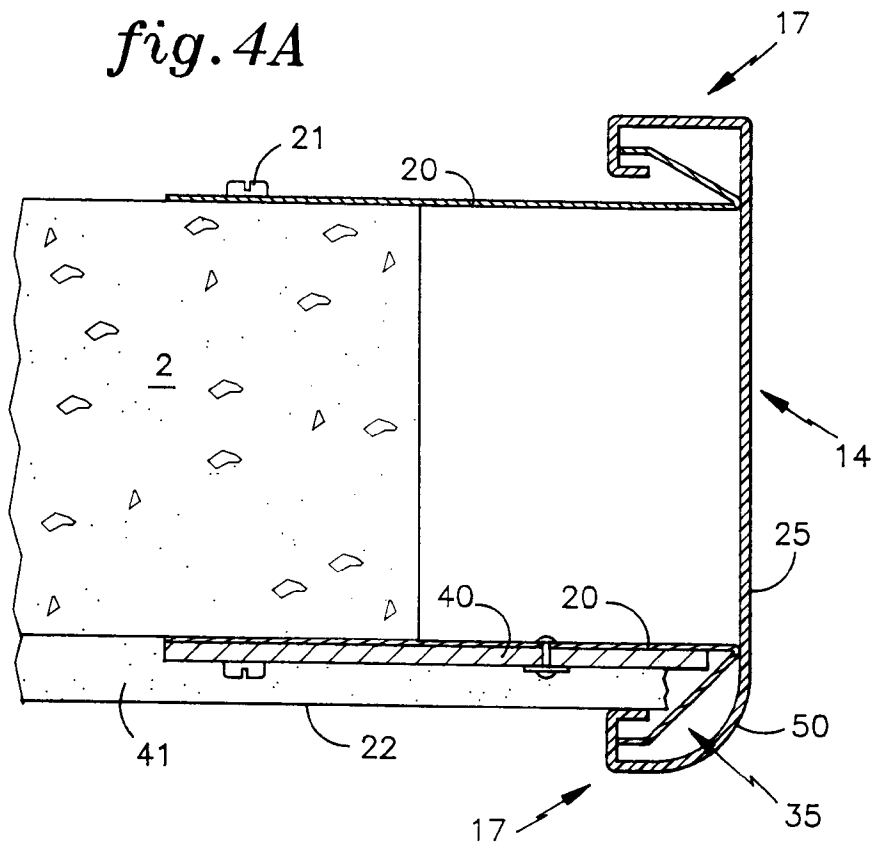


fig. 5

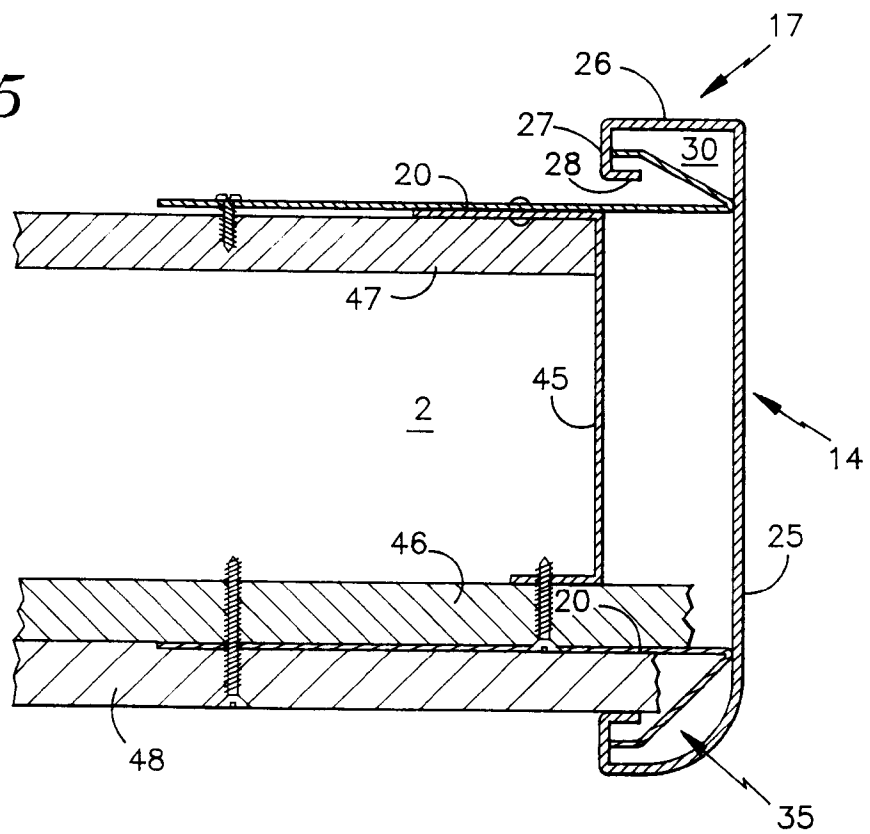


fig. 6

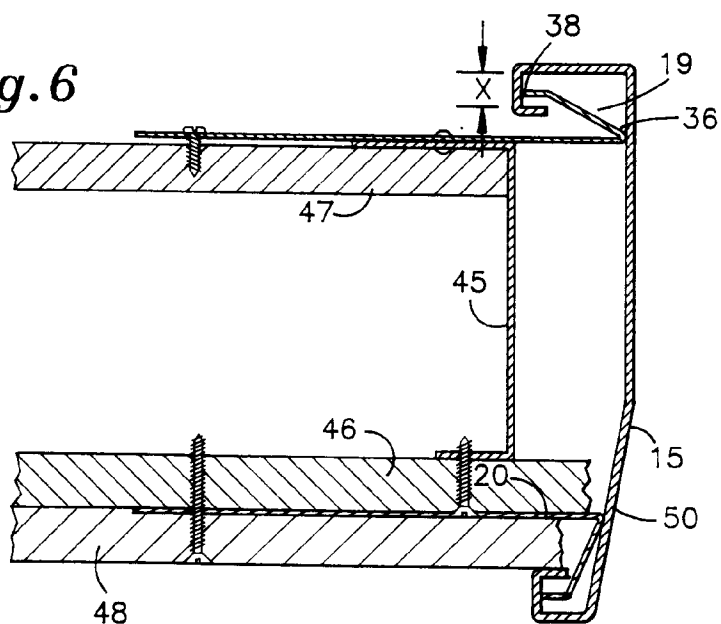


fig. 7

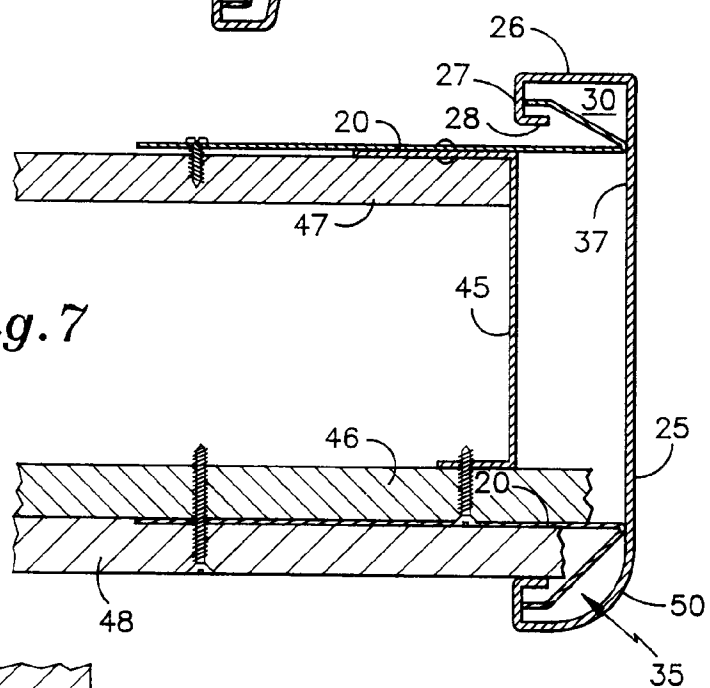
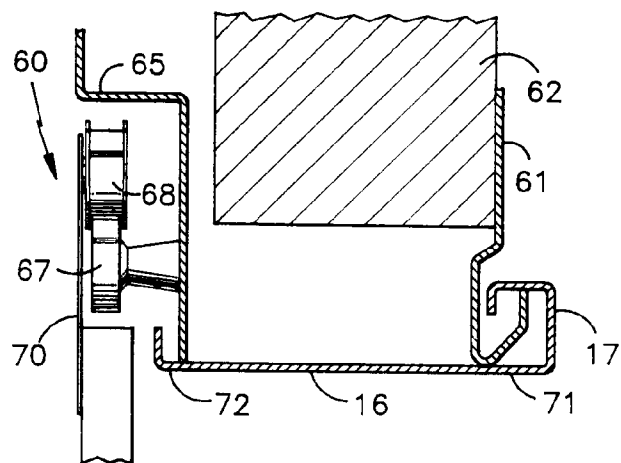


fig. 8





European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 92 30 8776

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.5)
X	DE-A-2 245 156 (FELIX FIAND)	1-5, 10, 12	E06B1/60 B66B13/30
Y	* page 8, paragraph 8 - page 13, paragraph 2; figures *	6, 8	
Y	--- US-A-2 818 947 (GOLDBERG)	6, 8	
A	* column 2, line 22 - line 52 * * column 3, line 22 - line 40 * * figures 5, 9 *	1-3, 7, 10, 11	
A	--- DE-A-2 445 833 (STAHLBAU GRESCHBACH)	1-5, 10, 12	
	* page 6, line 5 - page 7, line 18 * * page 10, line 1 - page 11, line 11 * * figures 1, 7A, 7B *		
A	--- US-A-3 721 055 (JERCHOWER)	1-3, 6	
	* column 1, line 66 - column 2, line 20 * * column 4, line 54 - line 67 * * figures 1, 6, 10, 13, 14 *		
A	--- GB-A-1 512 262 (CATNIC SCHANZ)	1-3, 7	TECHNICAL FIELDS SEARCHED (Int. Cl.5) E06B B66B
	* page 1, line 80 - page 2, line 29; figures 1, 2 *		
A	--- FR-A-2 420 012 (ZILLI)	1, 4, 5	
	* page 2, line 11 - line 36; figure 1 *		
A	--- US-A-4 530 189 (RANDALL)	2, 8, 9, 11, 12	
	* column 5, line 33 - column 6, line 18; figures *		
A	--- CH-A-515 409 (HEIMBÖCK)		

The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 15 DECEMBER 1992	Examiner DEPOORTER F.
CATEGORY OF CITED DOCUMENTS 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		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	

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