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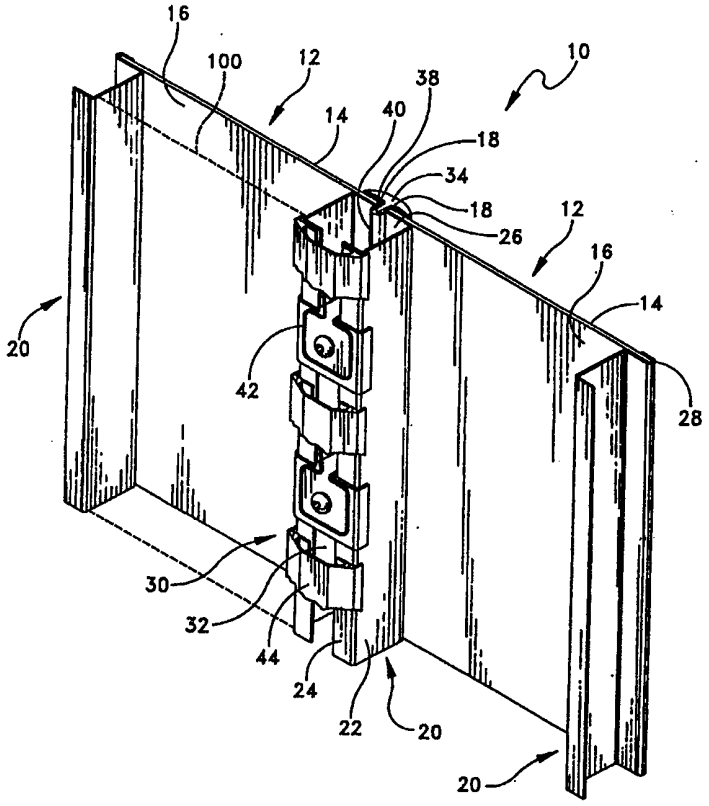
(54) Title: WALL PANEL SYSTEM

(57) Abstract

A wall panel system (10) comprising a plurality of wall panel members (12) each comprising a flat panel having outwardly facing channel portions (20) at one pair of opposed edges thereof. When adjacent panel members (10) are aligned in planar side–by–side relation, adjacent channel portions (20) face each other to provide a box–like fastening channel (30) that receives fasteners (42) for connecting together adjacent panel members (10). The fasteners (42) have specially provided flanges (48) that engage opposite sides of the box–like channel (30) to prevent adjacent panel members (10) from being pulled apart. The flat panels (12) and their channel portions (20) are separate parts that may be conveniently shipped to the customer in disassembled condition and then assembled in the field.



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WALL PANEL SYSTEM

Background and Summary of the Invention

This invention relates to a modular wall system that may be efficiently assembled in the field without the need for heavy equipment or building apparatus.

Modular wall systems may be utilized for a number of different applications. In various work industries, such as an office environment, corporate building or even a manufacturing plant, it is oftentimes necessary to change the physical make up of the work space. In order to accommodate increasing personnel, new machinery, or even upgrade of the facility, it is necessary to be able to quickly build and assemble wall dividers within the working facility. Also, in manufacturing plants it is necessary to have protective soundproof enclosures assembled around particularly loud and noisy machinery. Such enclosures provide for a more desirable work place by shielding surrounding workers from excessive noise, and also protect the machinery which oftentimes are expensive investments. The enclosures further safeguard against accidents and people who are not permitted to have access to the machine.

The modular wall systems are also utilized for outdoor applications, such as on the roof of an

industrial building to protect machinery and equipment from the outdoor weather elements and to further block access to persons who are not permitted to operate or maintain the machinery.

The instant invention represents improvements over assignee's prior U.S. Patent No. 5,170,604, although the fastener members are quite similar, but not identical. An important feature of the present invention is the construction and assembly of the panel members which readily permit said panels to be pre-painted, more conveniently and less expensively shipped, and easily assembled in the field. In addition, the instant invention includes a rubber gasket which extends between spaced edges of adjacent panel members to provide a seal at the exterior of the wall panel system. The introduction of the gasket seal between panel members eliminates the need for the hollow post between panel members disclosed in the `604 patent. A further improvement over my prior patent resides in a pair of oppositely disposed retaining flanges which extend from the side edges of the clamping plate of the fastener. The flanges grip walls of the fastening channel to prevent the panels from forcibly separating from each other. In the prior wall system, the panels could be pulled apart if insufficient clamping force existed.

The instant invention is directed to a wall panel system which overcomes the disadvantages associated with my prior wall system, and which for the first time provides a system, the components of which can be pre-prepared at the factory, and then conveniently shipped to the user for easy assembly in the field. The system includes a plurality of flat panel members adjacent one another in the same general plane. Adjacent panel members have a pair of oppositely positioned channel members attached at opposing side edges thereof defining a fastening channel. A rubber sealing gasket extends between side edges of adjacent panel members at the front of the fastening channel providing a seal at the exterior of the system for maximum integrity and soundproofness. A plurality of fasteners are provided for attachment of the panel members at the rear of the fastening channels for maintaining the panel members in an upright fixed relationship defining the wall panel system of the instant invention. The fasteners of the wall panel system include a clamping plate having a pair of retaining flanges which extend from the side edges of the clamping plate. The retaining flanges engage opposing side surfaces of the fastening channel for preventing inadvertent and undesirable separation of adjacent panels, which is an improvement over the fastener of the `604 patent. Aside from this difference, the fastener of

the instant invention is the same as that of the `604 patent, and includes an aperture formed in the clamping plate for receiving an adjustment bolt therethrough, a locking bar having an aperture formed therein for threadable attachment along the bolt, friction springs and a nut threadably received along the bolt, and a pair of inwardly extending tongues which define a gap in the fastening channel opposite the sealing gasket. The arrangement is such that rotation of the adjustment bolt in clockwise and counter- clockwise directions moves the locking bar between a first open position wherein the locking bar extends longitudinally within and along the gap, and a second closed position wherein the locking bar bridges the gap between the fastening channels. One of the tongues of the clamping plate has a stopping element perpendicularly extending therefrom for engaging and limiting movement of the locking bar when it is adjusted between the open and closed positions.

Accordingly, among the several objects of the instant invention are: the provision of a modular wall system that may be easily assembled in the field without the need for extensive tooling or professional help; the provision of a modular wall system that may be utilized for different applications in different industries; the provision of a modular wall system having a special sealing gasket; and the provision of a system for simple

and efficient assembly of the wall panel by a customer in the field; and the provision of a modular wall system which is cost effective to manufacture and which may be more conveniently and inexpensively shipped. Other objects, features and advantages of the invention shall become apparent as the description thereof proceeds when considered in connection with the accompanying illustrative drawings.

Brief Description of the Drawings

In the drawings which illustrate the best mode presently contemplated for carrying out the present invention:

FIG. 1 is a perspective view of the wall system of the instant invention with portions broken away for purposes of illustration;

FIG. 2 is a fragmentary front view showing the wall panels and fastener with a portion broken away for purposes of illustration;

FIG. 3 is a cross-sectional view taken along line 3-3 of FIG. 2;

FIG. 4 is an exploded perspective view of the wall system fastener of the instant invention;

FIG. 5 is a section taken on line 5-5 of Fig. 3 showing the locking bar in its closed or locked position;

FIG. 6 is a view similar to Fig. 5 but showing the locking bar in its open or unlocked position;

FIG. 7 is a fragmentary front view showing a second embodiment of the wall panels of the instant invention; and

FIG. 8 is a cross-sectional view taken along line 8-8 of FIG. 7.

Detailed Description of the Preferred Embodiment

Referring now to the drawings, and more particularly to FIG. 1, the preferred embodiment of the wall panel system of the instant invention is shown and generally indicated at 10. As will hereinafter be more fully described, the instant invention provides for an improved wall panel system and fastener that may be easily assembled in the field without the need for extensive hardware, tooling or machinery.

As shown in FIGS. 1 and 2, the wall panel system 10 includes at least two panel members, generally indicated at 12, adjacent one another in the same general plane. The panel members 12 have a front side 14, a rear side 16, and opposing side edges 18 to which separate channel members, generally indicated at 20, are attached. The channel members 20 include a wall 22 having an inwardly extending flange 24 at one edge and an inwardly extending

flange 26 at its other edge so as to define a generally U-shaped outwardly facing configuration. Specifically, the flange 26 which is adjacent the rear side 16 of panel member 12 has a reverse bend 28 formed therein for snugly receiving the side edge 18 of the panel member 12 and effecting attachment thereto either by gluing or by mechanical means. Preferably the slot or bend 28 is filled with glue so that the channel member 20 is fixedly attached to the side edge 18 of the panel member 12. Channel members 20 are attached at adjacent side edges 18 of adjacent panel members 12 to define a plurality of fastening channels, generally indicated at 30, each of which extends rearwardly from the panel system 10 providing a fastening area for fixedly maintaining the panel members 12 of the panel system 10 in an assembled relation. Specifically, the fastening channels 30 take on a generally elongate rectangular shape having a gap 32 at the rear of the channel 30 between adjacent flanges 24 of the channel members 20. There is also a small gap 33 between adjacent bends 28 (see Fig. 3), which gap 33 frictionally receives therein a rubber gasket 34 which provides a seal between adjacent panel members 12 of the wall panel system 10. The gasket 34 has a substantially flat elongated body portion 36 which engages the front side 14 of adjacent panel members 12, an elongated extension 38 which extends from the body 36 of the gasket

34 between the bends 28 of adjacent panel members 12, and a lip portion 40 which engages the rear side 16 of adjacent panel members 12. A plurality of fasteners 42, which will be described in greater detail as the description proceeds, engage adjacent channel members 20 at the rear of the fastening channel 30 for fixedly maintaining the panel members 12 of the panel system 10 in an assembled relation. A dust cover 44 extends along the rear of the fastening channel 30 to provide a more attractive appearance at the interior of the panel system 10.

Referring now to FIGS. 3 and 4, fasteners 42 used for connecting panel members 12 of the wall panel system 10 are more clearly depicted. Specifically, the fasteners 42 include a substantially flat clamping plate 46 having a pair of oppositely disposed flanges 48 which extend from the side edges of the plate 46. The clamping plate 46 further includes a pair of oppositely disposed tongues 50 and 52 which extend downwardly from the top and bottom edges of the clamping plate 46. A stopping element 54 extends perpendicularly from tongue 50 of the clamping plate 46. The clamping plate 46 further has a centrally located bore 56 formed therein for receiving an adjustment bolt 58 which runs transversely through the clamping plate 46. A locking bar 60 is threadably received along the shaft 62 of the adjustment bolt 58 as

well as friction springs 64 and 65 having a frusto-conical shape. Spring 64 lies along the shaft 62 of the adjustment bolt 58 between the locking bar 60 and a nut 66 which is threadably received at the opposite end of the shaft 62 of the bolt 58, while spring 65 surrounds shaft 62 between locking bar 60 and hex head 68. A suitable number of fasteners 42 are attached in spaced relation at the rear of the fastening channels 30 for maintaining the panel members 12 in assembled relation. Specifically, the rear side of the clamping plate 46 engages flanges 24 of the channel members 20, and flanges 48 engage walls 22 of the channel members 20. The tongues 50 and 52 of the clamping plate 46 extend through the gap 32 defined at the rear of the fastening channel 30, and the hex head 68 located at the front side of the clamping plate 46 is operable for rotating the adjustment bolt 58 which in turn moves the locking bar 60 between a first open or unlocked position where the bar 60 extends longitudinally of the gap 32, and a second closed or locked position where the locking bar 60 bridges the gap 32. As previously mentioned, an elongated dust cover 44 extends over the fasteners 42 at the rear of the fastening channel 30 to provide a more attractive appearance at the interior of the panel system 10. Specifically, the cover 44 is releasably attached by a wire spring clip 70 having resilient spring arms 72 which

extend rearwardly from the cover 44. The spring arms 72 are resiliently received within the gap 32 at the rear of the fastening channel 30 and are biased outwardly to engage flanges 24 of the channel member for releasably maintaining the cover 44 over the fastening elements 42 at the rear of the fastening channel 30, it being understood that the cover 44 extends from top to bottom of panels 12 to completely cover gap 32. As will be noted, cover 44 has opposed trackways 45 which slidably receive opposed legs 71 of square portion 73 of wire clip 70 to mount cover 44 in place over gap 32.

Referring to FIGS. 5 and 6, the locking bar 60 of a fastener 42 is depicted in both an open and closed position. First, referring to FIG. 5, the locking bar 60 is illustrated in the closed position bridging the gap 32 between channel member flanges 24 defined at the rear of the fastening channel 30. Specifically, the stopping element 52 engages the side edge of the locking bar 60 when the adjustment bolt 58 is rotated in a clockwise direction. FIG. 6 shows the locking bar 60 in an open position extending longitudinally of the gap 32 wherein the side edge of the locking bar 60 engages the stopping element 54 when the adjustment bolt is rotated in a counter-clockwise direction. The stopping element 54 provides a limit stop to movement of bar 60 in either

direction and an indicator of when the locking bar 60 is in the open or closed position.

As previously stated, with the exception of flanges 48, fasteners 42 are identical in operation and structure to the fastener disclosed in the `604 patent. Referring now to FIGS. 7 and 8, a second embodiment of the wall panel system is shown and generally indicated at 74. This embodiment differs from the preferred embodiment in that the channel members are integrally formed with the panel members as opposed to being separate parts attached at respective side edges. This embodiment includes at least two panel members 76 adjacent one another in the same general plane. The panel members 76 are reversely bent at one side edge 78 thereof defining the integrally formed channel member 80. The channel member 80 includes a wall 82 slightly angled inwardly towards the rear side of the panel member 76 and a flange 84 extending inwardly from the edge of wall 82 opposite to bend 78 so as to achieve the same general U-shaped configuration as channel members 20. As previously set forth in the preferred embodiment, adjacent channel members 80 define a fastening channel 86 which extends rearwardly from the rear side of the panel members 76 providing a mounting surface for fasteners to maintain the wall panel system in an assembled relation. A rubber gasket 88 extends between

side edges 78 of the panel members 76 at the front of the fastening channel 86 defining a seal at the exterior of the wall panel system 74. At the rear of the fastening channel 86 opposite the gasket 88 is a gap 90 between side walls 84 of the channel members 80. A plurality of fasteners 92, identical to those used in the preferred embodiment, are attached at the rear of the fastening channel 86 in the same manner described in the preferred embodiment for fixedly maintaining the panel members 76 in an assembled relation. A dust cover 94 is attached at the rear of the fastening channel 86 by a spring clip 96 for releasably maintaining the cover 94 along the fastening channel 86 covering gap 90 and fasteners 92, exactly as in the preferred embodiment.

To enhance soundproofness of the panel assembly, absorption panels 100 of fiberglass, mineral wool or the like may be secured to all of the rear surfaces of panels 12 and 76 as shown at one location in broken lines in FIG. 1. The securement may be by adhesive means or mechanical clips, not shown.

In the preferred embodiment of FIGS. 1 - 6, all of the unassembled components can be easily and inexpensively shipped to the customer, since the flat panels 12 take up little room, and the channel members 20 also can be conveniently packed for shipment. The other components, such as the gasket 34, the dust covers 44,

and the fastener 42 take up little room. Since there is no spot welding during assembly, the flat panels can be pre-painted. All the customer has to do is interfit the edges of the flat panels in the reverse bends of the channel members after applying the glue necessary to make a secure and permanent connection. Adjacent panel and channel assemblies are then aligned with each other so as to create the gaps 32 and 33, the latter of which receives gasket 36, and the former of which receives the fasteners 42 which are then actuated so as to clamp flanges 24 between clamping plate 46 and locking bar 60 to effect the desired assembly of adjacent wall panels. Since the flat panels 12 are shipped unassembled, they can be cut down or shortened by the customer wherever necessary to meet specific dimensional requirements.

It can therefore be seen that the instant invention provides for an effective modular wall panel system that can be easily assembled in the field without the need for extensive tooling and machinery. The instant invention enables a prospective purchaser to assemble the system without the need for hiring professional installers. For these reasons, the instant invention is believed to represent a significant advancement in the art which has substantial commercial merit.

While there is shown and described herein certain specific structure embodying the invention, it will be

manifest to those skilled in the art that various modifications and rearrangements of the parts may be made without departing from the spirit and scope of the underlying inventive concept and that the same is not limited to the particular forms herein shown and described except insofar as indicated by the scope of the appended claims.

WHAT IS CLAIMED IS:

1. A wall panel system comprising a plurality of identical wall panel members:

each wall panel member comprising a flat rectangular panel having front and rear surfaces, said flat panel having channel portions extending rearwardly from one pair of opposite edges thereof, said channel portions being generally U-shaped and facing outwardly with respect to said panel, said channel portion extending for the entire length of its respective edge.

2. In the system of claim 1, said channel portions each comprising separate and distinct units, and means for connecting said units to said opposite edges.

3. In the system of claim 2, said connecting means comprising a reverse bend on one of said channel walls that snugly receives the adjacent edge of said flat panel therein.

4. The system of claim 3, further characterized in that said interfitting edge and reverse bend are glued together.

5. In the system of claim 1, said channel portions comprising integral extensions of said flat panels.

6. The system of claim 1 further characterized in that adjacent panel members are aligned in side-by-side planar relationship with the adjacent channel portions of adjacent panel members facing each other in spaced relation to form a generally box-like channel having a front gap between the edges of adjacent flat panels, and an oppositely disposed rear gap, at least one fastener extending through said rear gap, said fastener having a clamping plate bridging said rear gap and engaging the front surfaces of the adjacent flat panels, and a locking bar movable between a first non-locking position wherein said bar does not bridge said rear gap and a second locking position wherein it does bridge said rear gap and engages the rear surfaces of the adjacent flat panels to clamp said wall panel members between said clamping plate and locking bar to maintain adjacent wall panel members in assembled planar relation to form a wall structure.

7. In the system of claim 6, said clamping plate having spaced flanges extending therefrom, said flanges engaging the outer surfaces of the oppositely disposed rearwardly extending walls of said box-like channel to prevent adjacent wall panel members from being pulled apart.

8. The system of claim 6 further characterized in that a sealing gasket is frictionally mounted in said front gap.

9. In the system of claim 6, said channel portions each comprising separate and distinct units, and means for connecting said units to said opposite edges.

10. In the system of claim 9, said connecting means comprising a reverse bend on one of said channnel walls that snugly receives the adjacent edge of said flat panel therein.

11. In the system of claim 7, said channel portions each comprising separate and distinct units, and means for connecting said units to said opposite edges.

12. In the system of claim 11, said connecting means comprising a reverse bend on one of said channnel walls that snugly receives the adjacent edge of said flat panel therein.

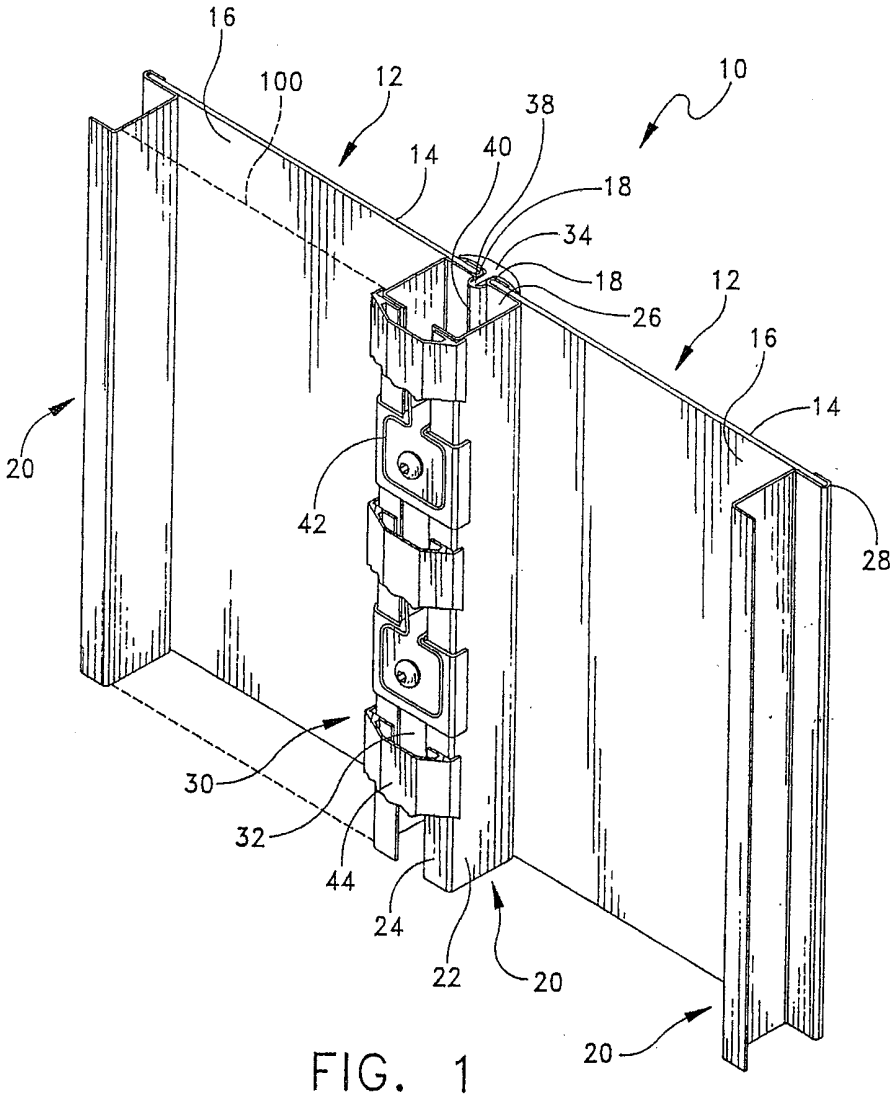

FIG. 1

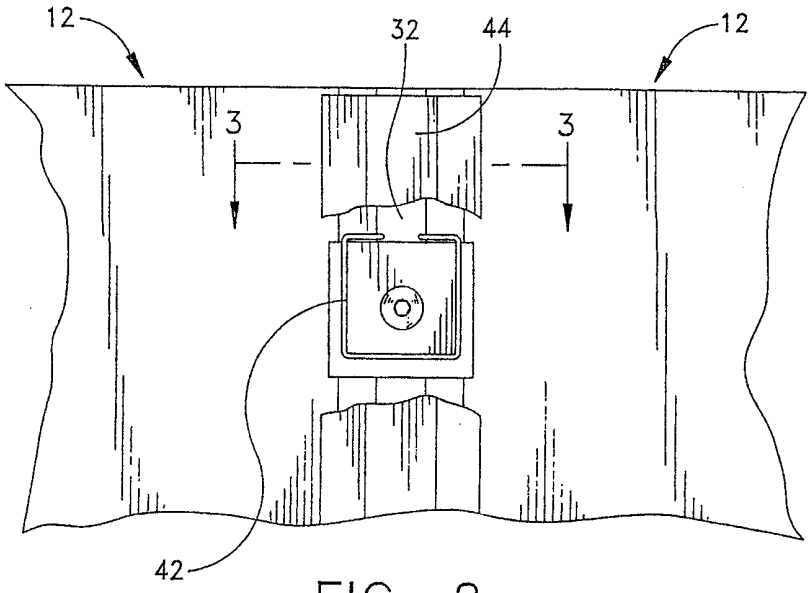
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FIG. 2

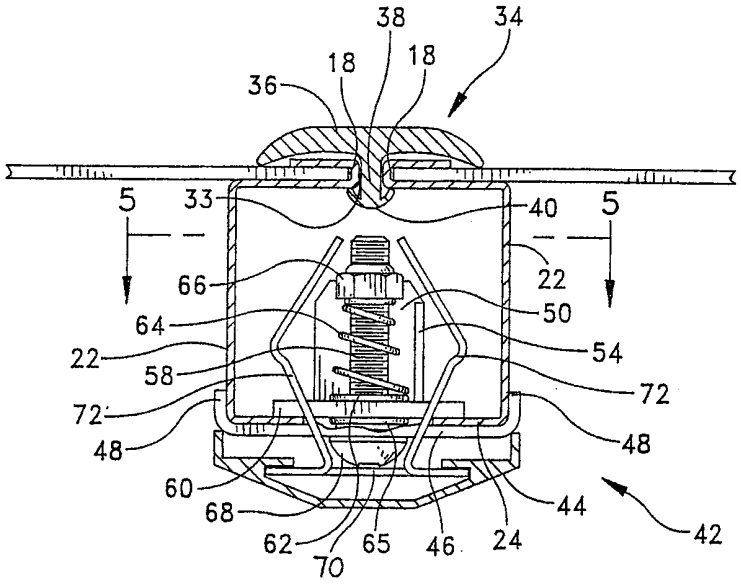
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FIG. 3

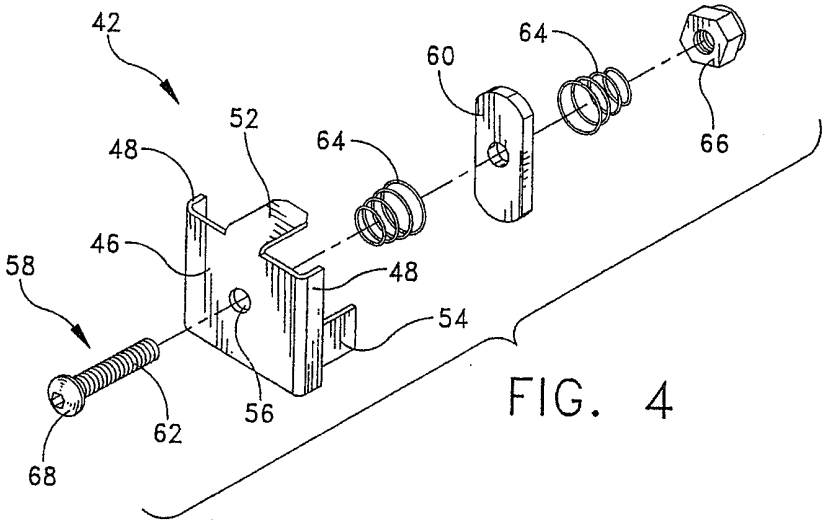

FIG. 4

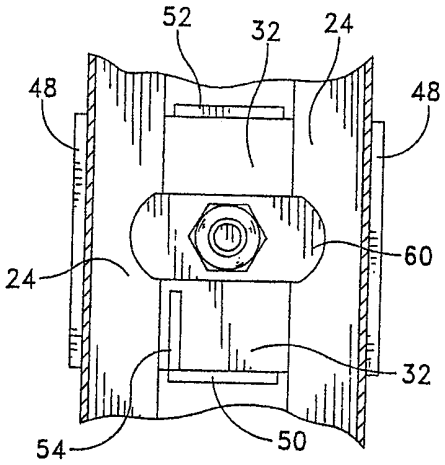

FIG. 5

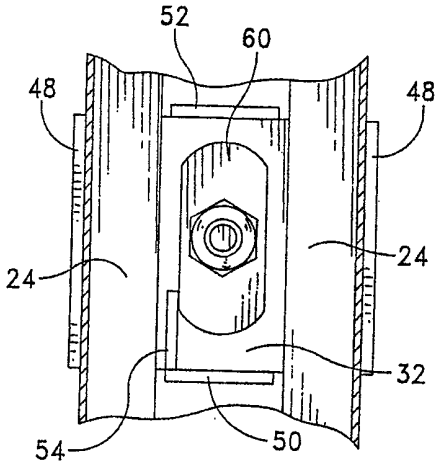

FIG. 6

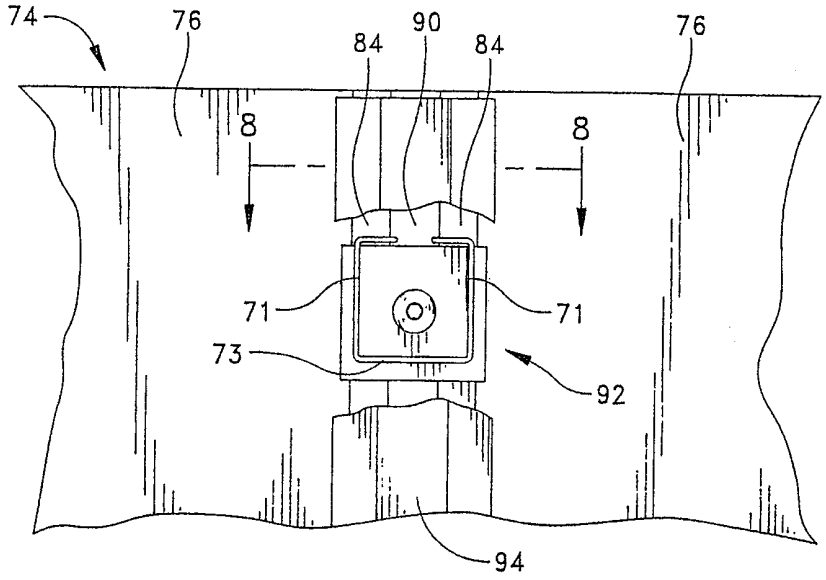
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FIG. 7

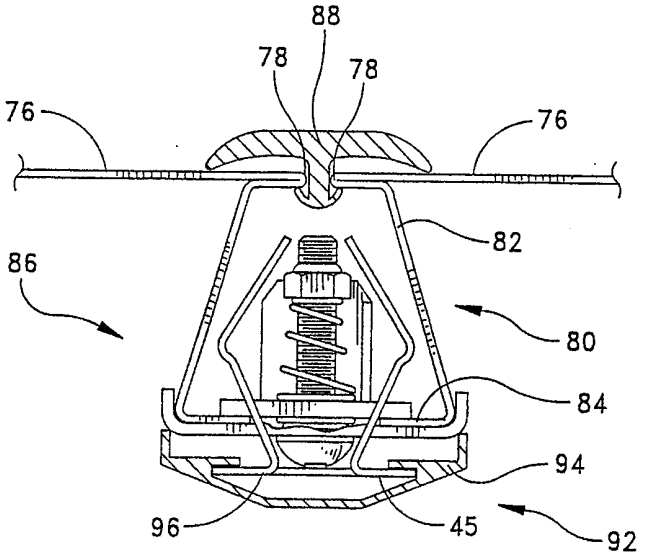
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FIG. 8

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US98/17027

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :EO4B 1/31

US CL :52/584.1, 464

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 52/584.1, 464, 461, 463, 465, 466, 467, 468, 768, 769, 772, 775, 777, 778

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X ---- Y	US 4,936,065 A (HUTCHINSON) 26 June 1990 (26/06/90), see figure 1.	1-4 ---------- 9-12
X ---- Y	GB 692,941 A (ATTKINS) 17 June 1953 (17/06/53), see especially figure 3.	5 -------- 6-12
Y	US 5,170,604 A (HEDLY) 15 December 1992 (15/12/92), see entire document, especially figures 6-7.	6-12
Y	US RE 8,688 A (HAYES) 29 April 1879 (29/04/1879), see especially, figure 6.	7, 11-12
A	US 4,555,885 A (RAYMOND ET AL.) 03 December 1985 (03/12/85), see figure 3.	1-12

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
25 SEPTEMBER 1998	23 OCT 1998
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer TIMOTHY KANG Diane Smith for Telephone No. (703) 308-2168

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US98/17027

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5,481,839 A (LANG ET AL.) 08 January 1996 (08/01/96), see figure 7.	1-12