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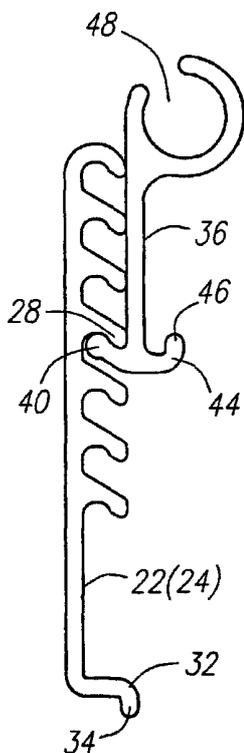
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[Continued on next page]

(54) Title: MOUNTING FOR SHEET MATERIAL



(57) Abstract: A mounting for a sheet (14) that has a bead (20) about its periphery includes frame members (22, 24) forming a rectangle with each frame member (22, 24) including mutually parallel multiple engagement surfaces (30) defined on ribs (28). An elongate retainer (36) includes an elongate flange (40) with an interlocking surface (42) which can selectively interlock with any one of the engagement surfaces (30) on the frame member (22, 24). Each of the frame members (22, 24) also has a frame rail (32) having a rail surface (34) that faces away from a retainer rail surface (46) on a rail (44) of the retainer (36). A tool (50) including pinch rollers (54, 56) squeezes the rail surfaces (34, 46) toward one another to place the sheet (14) held by the retainer (36) in tension while the interlocking surface (42) is engaged with the appropriate engagement surface (30).



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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

DESCRIPTION

Mounting For Sheet MaterialBackground of the Invention

Advertising and other information is often temporarily presented on large sheets which are placed on billboards, truck panels and the like. One form of such sheet material is tensioned vinyl sheet. Such sheet may be printed upon and surrounded by a more rigid plastic border which is RF welded to the sheet. The border typically includes a large bead, circular in cross section, which operates as a tenon in association with a C-shaped mortise associated with a mounting frame.

Mounting frames may take on a plurality of configurations. Of value is the ability to tension the sheet and to maintain it in a tensioned and wrinkle-free state. Mechanisms have been used which first lock the sheet in place and then apply tension through off-center bolts and the like.

Summary of the Invention

The present invention is directed to a mounting for a sheet having a tenon and mortise element about at least a portion of the periphery of the sheet. The mounting includes two or more elongate frame members which are parallel and displaced from one another. At least one of the elongate frame members includes an engagement surface facing away from the other elongate frame member. An elongate retainer is associated with each of the elongate frame members that has an engagement surface. The elongate retainer has an interlocking surface which can be positioned in interlocking engagement with an engagement surface. An elongate retainer tenon and mortise element on the elongate retainer engages the sheet tenon and mortise element to hold the sheet.

In a first separate aspect of the present invention, a mounting process for sheet with a tenon about the periphery includes placing the tenon of the sheet on opposite edges of the sheet in elongate retainers, engaging an interlocking surface of

one of the elongate retainers with an engagement surface of a frame member and pinching an adjacent elongate frame member and elongate retainer on the other side of the sheet progressively along the length of the elongate retainer to engage an associated engagement surface and interlocking surface with the sheet taut.

5 In a second separate aspect of the present invention, the first separate aspect is complemented by a tool which has at least two pinch rollers mutually displaced at the pinch. The pinch is adjustable and can receive the adjacent frame rail and retainer rail surfaces to draw a sheet into tension and locate the interlocking surface with the engagement surface.

10 In a third separate aspect of the present invention, at least one of the elongate frame members has mutually parallel multiple engagement surfaces. The interlocking surface can then be in interlocking engagement with any of the engagement surfaces. This allows accommodation of different sheet sizes.

15 In a fourth separate aspect of the present invention, the one or more engagement surfaces are each located on the side of an elongate rib. The one or more ribs extend outwardly from the frame member and are angled away from the opposed elongate frame member. The interlocking surface on the elongate retainer may also be placed on the side of an elongate flange to interlock with an engagement surface.

20 In a fifth separate aspect of the present invention, any of the foregoing separate aspects may be combined to complement the mounting for a sheet.

Accordingly, it is an object of the present invention to provide an improved sheet mounting. Other and further objects and advantages will appear hereinafter.

Brief Description of the Drawings

25 Figure 1 is the side view of a truck having a mounting and a vinyl sheet mounted thereto.

Figure 2 is an end view of an elongate frame member assembled with an elongate retainer of a mounting.

Figure 3 is an end view of the elongate frame member.

30 Figure 4 is an end view of the elongate retainer.

Figure 5 is an end view of a tenon associated with a sheet by RF welding.

Figure 6 is a front view of a tool for installation of the elongate retainer.

Figure 7 is an end view of the tool of Figure 6.

5 Figure 8 is an end view of a second tool for installation of the elongate retainer.

Figure 9 is a plan view of the tool of Figure 8.

Figure 10 is a front view of the tool of Figure 8.

Detailed Description of the Preferred Embodiment

10 Turing in detail to the drawings, Figure 1 illustrates a truck as one substrate upon which a mount can be fastened. The mounting system is affixed to the side panel 10 of the truck 12. A sheet 14 is mounted on the panel 10. The sheet 14 is contemplated to be vinyl which may be printed upon and tensioned when mounted. The sheet 14 may be finished with a peripheral boundary defined by a strip 16 as can best be seen in Figure 5 which is formed with an attachment plate 18 and a bead 20
15 which is roughly circular in cross section and preferably offset relative to the attachment plate 18. This offset places the attachment plate 18 on a tangent to the bead 20. The bead 20 acts as a tenon in mounting the sheet as will be described below. The offset draws the sheet closer to the substrate. The attachment plate 18 is RF welded to the sheet material. Other bonding techniques may be equally
20 applicable.

In Figure 1 two sets of frame members are illustrated to define a rectangular mounting. The first set of elongate frame members 22 is horizontally disposed with the frame members 22 being mutually parallel and mutually displaced from one another. The second set of elongate frame members 24 are vertically disposed and
25 also mutually parallel and displaced from one another. For convenience, the frame members 22 and 24 are all identical extrusions but for orientation and length. These frame members 22 and 24 are easily mounted to the side panel 10 of the truck 12 by common fasteners which may be self-tapping screws, bolts and nuts or the like. As the components are extrusions, the shape of the end views of each of the
30 components reflects the full length of the structure.

The elongate frame members 22 and 24 include a base plate 26 with parallel elongate ribs 28 extending from one side thereof. The ribs 28 are at a 90° angle to the plane of the base plate 26 but could be equally rigid with other suitable shapes. An engagement surface 30 is located on the side of each rib 28 which is angled toward the base plate 26. These engagement surfaces 30 are shown to be with an undercut portion to further enhance interlocking. The elongate frame members 22 and 24 also include a frame rail 32 having a frame rail surface 34. The outer portion of the frame rail surface 34 is shown in this embodiment as angled at 90° from the plane of the base plate 26. The frame rail surface 34 faces roughly in the same general direction as the engagement surfaces 30.

The elongate frame members 22 and 24 are arranged in sets as noted above. The frame members 22 and 24 are each oriented such that the engagement surfaces 30 and the frame rail surface 34 of one elongate frame member 22, 24 face away from the other elongate frame member 22, 24 of the same set. Thus, the elongate frame members 22, 24 are arranged on the side panel 10 of the truck 12 such that the two horizontal frame member 22 are arranged with the frame rails 32 at the top on the upper elongate frame member 22 and at the bottom on the lower elongate frame member 22. The same frame rails 32 are placed outwardly on the vertical elongate frame members 24.

The elongate retainer is illustrated in Figure 4. This retainer 36 includes a base plate 38. An elongate flange 40 is located along one edge of the base plate 38 and extends at an angle of approximately 60° from the plane of the base plate 38. The elongate flange 40 includes an interlocking surface on one side of the elongate flange 40. The interlocking surface 42 is within the included angle between the elongate flange 40 and the plane of the base plate 38.

The elongate retainer 36 includes a retainer rail 44 which has a retainer rail surface 46 on one side thereof. The retainer rail surface 46 is also to one side of an approximately 90° angle made with the plane of the base plate 38 and includes a contour mating with the contour of the frame engagement surfaces 30.

In addition to the elongate flange 40 and the retainer rail 44, the elongate

retainer 36 includes a channel of substantially circular cross section with an opening along its length to define a retainer mortise element 48. The mortise element 48 cooperates with the offset circular bead 20 forming a tenon element to capture the edge of the strip 16 attached to the sheet 14. The mortise element 48 is located at the opposite edge of the retainer base plate 38 from the elongate flange 40 and the retainer rail 44. Figure 2 illustrates an association of the elongate frame members 22, 24 and the elongate retainer 36. The elongate flange 40 is shown extending between ribs 28 such that the engagement surface 30 and the interlocking surface 42 are positioned in interlocking engagement. This engagement is with the sheet 14 in tension and extending away from the elongate retainer 36 from the mortise element 48. Naturally, the elongate flange 40 may be placed in any one of the slots defined between the ribs 28 to assure appropriate tension in the sheet 14.

From Figure 2 it can be observed that the elongate frame rail surface 34 on the frame 22, 24 is facing away from the retainer rail surface 46 on the retainer 36. These most adjacent rail surfaces 34 and 46 accommodate a tool. A first tool 50 is illustrated in Figure 6 and 7. The tool 50 includes a frame 52 rotatably supporting two sets of rollers. Each set includes two rollers 54 and 56. The rollers 54 and 56 in each set define a pinch therebetween. The frame 52 mounts the rollers 54 on a first holder 58 and mounts the rollers 56 on a second holder 60. The holders 58 and 60 include parallel guide dowels 62 and 64 and a parallel adjustment screw 66 used to move the rollers 54 and 56 to adjust the pinch. The rollers 54 and 56 are shown to be at an angle to one another. This allows them to ride on the tips of the rail surfaces 34 and 46. The rollers 54 and 56 include grooves to receive these tips.

The two pinch rollers 54 and 56 are mutually displaced at the pinch to accommodate the size of the sheet 14. The frame 52 is adjustable to place the sheet 14 in tension when the tool 50 has the rail surfaces 34 and 46 within the pinch of the rollers 54 and 56. A slight over tension is appropriate to that which will be the final state of the sheet 14 in order that the tool 50 may place the elongate flange 40 in the slots between the ribs 28. As the tool 50 moves forward with the flange 40 progressively located in one of the slots between the ribs 28, the tension from the tool

50 is released and the engagement surface 30 and interlocking surface 42 come into interlocking engagement.

A second tool 66 is illustrated in Figures 8, 9 and 10. This tool 66 includes an upper block 68 and a lower block 70 which each rotatably mount shafts 72 in bearings. The shafts include pinch roller surfaces 74. The pinch roller surfaces 74 are in pairs to create two areas of pinch for compressing the rails together as illustrated in Figure 8. To adjustably mount the two blocks 68 and 70 together, end caps 76 are fixed to either end of the lower block 70. These end caps 76 extend upwardly to pivotally receive a U-shape bracket 78, as best seen in the plan view of Figure 9. The bracket 78 is able to pivot to a small degree about the pivots 80 at either end. A pivot 82 is centrally mounted in the bracket 78 and pivotally mounts the upper block 68. Thus, the upper block can pivot in such a way the the pinch roller surfaces can alternately close and open to accommodate variations in the rails. Further, the upper block 70 can pivot relative to the lower block 68 to tighten or loosen the pinch. To control this movement, a set screw 84 extends from the U-shaped bracket 78 to the lower block 70. Tightening of the set screw 84 draws the pinch roller surfaces together.

In operation, a prepared sheet is finished by threading the tenon element 20 into the mortise element 48 of the elongate retainers 36 about the four peripheral sides of the sheet 14. The retainers 36 on the top and one side of the sheet 14 are then located in an appropriate slot between the ribs 28 on the appropriate frames 22 and 24. The tool 50 or 66 is then placed over the rails 32 and 44 on the lower frame member 22. The elongate flange 40 is then located within a slot between two ribs 28 and drawn progressively the length of the lower frame member 22. The same operation is then performed on the free end with the frame member 24. The sheet can be taken off in the same manner by compressing the rails 32 and 34 toward each other within the pinch of the tool 50 while the retainer 36 is pulled away from the associated frame member 22, 24.

Thus, an improved mounting system is disclosed for large sheet material. While embodiments and applications of this invention have been shown and

described, it would be apparent to those skilled in the art that many more modifications are possible without departing from the inventive concepts herein.

Claims

1. A mounting for sheet having a tenon about at least a portion of the periphery of the sheet, comprising: an elongate frame member including an engagement surface and a frame rail surface; an elongate retainer associated with the elongate frame member and including an interlocking surface positionable in interlocking engagement with the engagement surface, an elongate retainer mortise to engage the sheet about at least a portion of the periphery of the sheet and a retainer rail surface on the elongate retainer and facing away from the frame rail surface.

2. The mounting for sheet of claim 1 further comprising: an elongate attachment for retaining a portion of the periphery of the sheet substantially parallel to the elongate frame member, the elongate attachment including a mortise along the length thereof to receive the tenon of the sheet.

3. The mounting of claim 2 further comprising: a truck, the elongate attachment and the elongate frame member being attached to the a side of the truck.

4. The mounting of any of claims 1 through 3 further comprising: a sheet having a tenon about at least a portion of the periphery of the sheet.

5. The mounting of any of claims 1 through 4, the elongate frame member including mutually parallel multiple said engagement surfaces.

6. The mounting of any of claims 1 through 4, the elongate frame members having mutually parallel multiple engagement surfaces including parallel elongate ribs extending outwardly from the frame member, the mutually parallel multiple engagement surfaces being on the sides of the ribs, respectively, and being angled toward the frame rail surface.

7. The mounting of claim 6, the elongate retainer including an elongate flange, the interlocking surface being on the side of the elongate flange.

8. The mounting for sheet of any of claims 1 through 7 further comprising: a tool including a pinch movable along the elongate frame member and engageable with the frame rail and the retainer rail surfaces.

9. The mounting for sheet of any of claims 1 through 7 further comprising:

a tool including at least two pinch rollers mutually displaced at the pinch, the pinch being engageable with adjacent frame rail and retainer rail surfaces.

10. A mounting process for sheet having a tenon element about at least a portion of the periphery of the sheet and employing a mounting having parallel
5 elongate frame members, the elongate frame members with engagement surfaces and at least one of the elongate frame members with a frame rail, and elongate retainers with interlocking surfaces to engage the engagement surfaces and mortises to receive the tenon element and at least one of the elongate retainers with a retainer
10 rail, comprising: placing the tenon of the sheet on opposite edges of the sheet in the elongate retainers; engaging at least one of the interlocking surfaces of the elongate retainers with at least one of the engagement surfaces; pinching the frame rail and the retainer rail on an adjacent elongate frame member and elongate retainer progressively along the length of the elongate retainer to engage an associated engagement surface and interlocking surface with the sheet taut.

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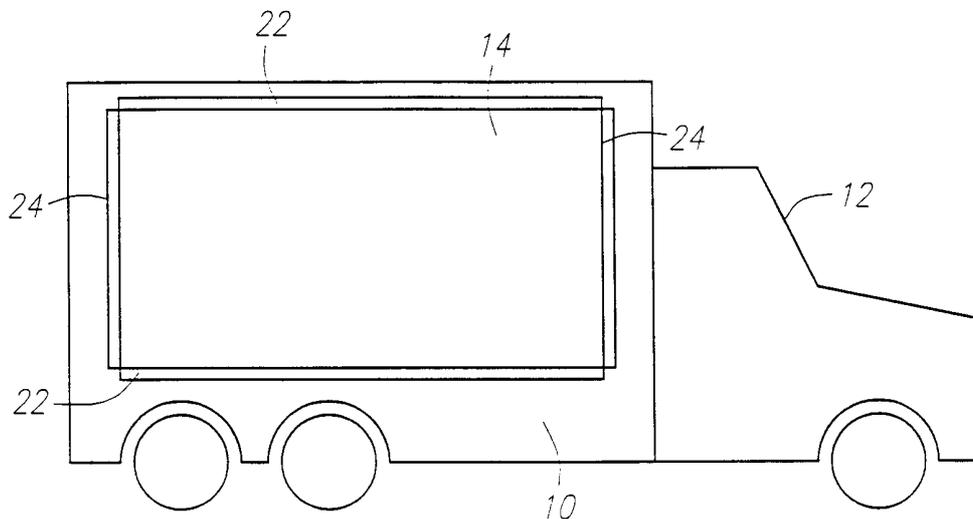


FIG. 1

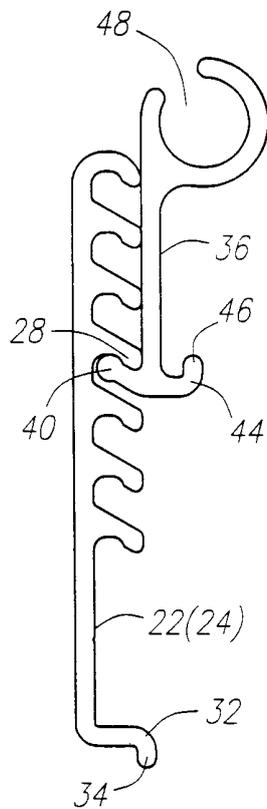


FIG. 2

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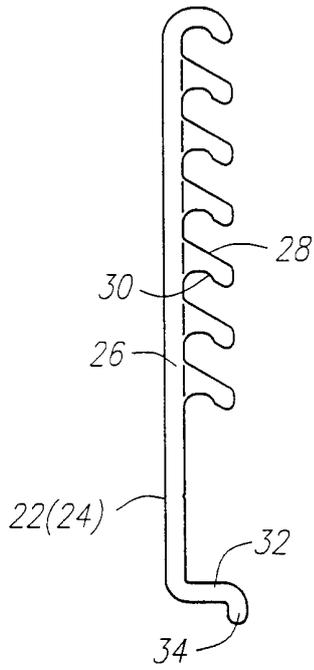


FIG. 3

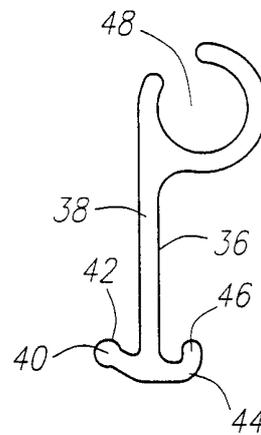


FIG. 4

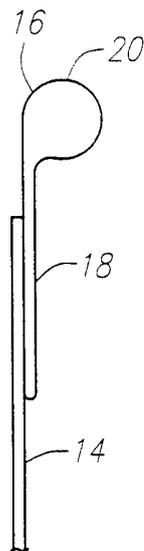


FIG. 5

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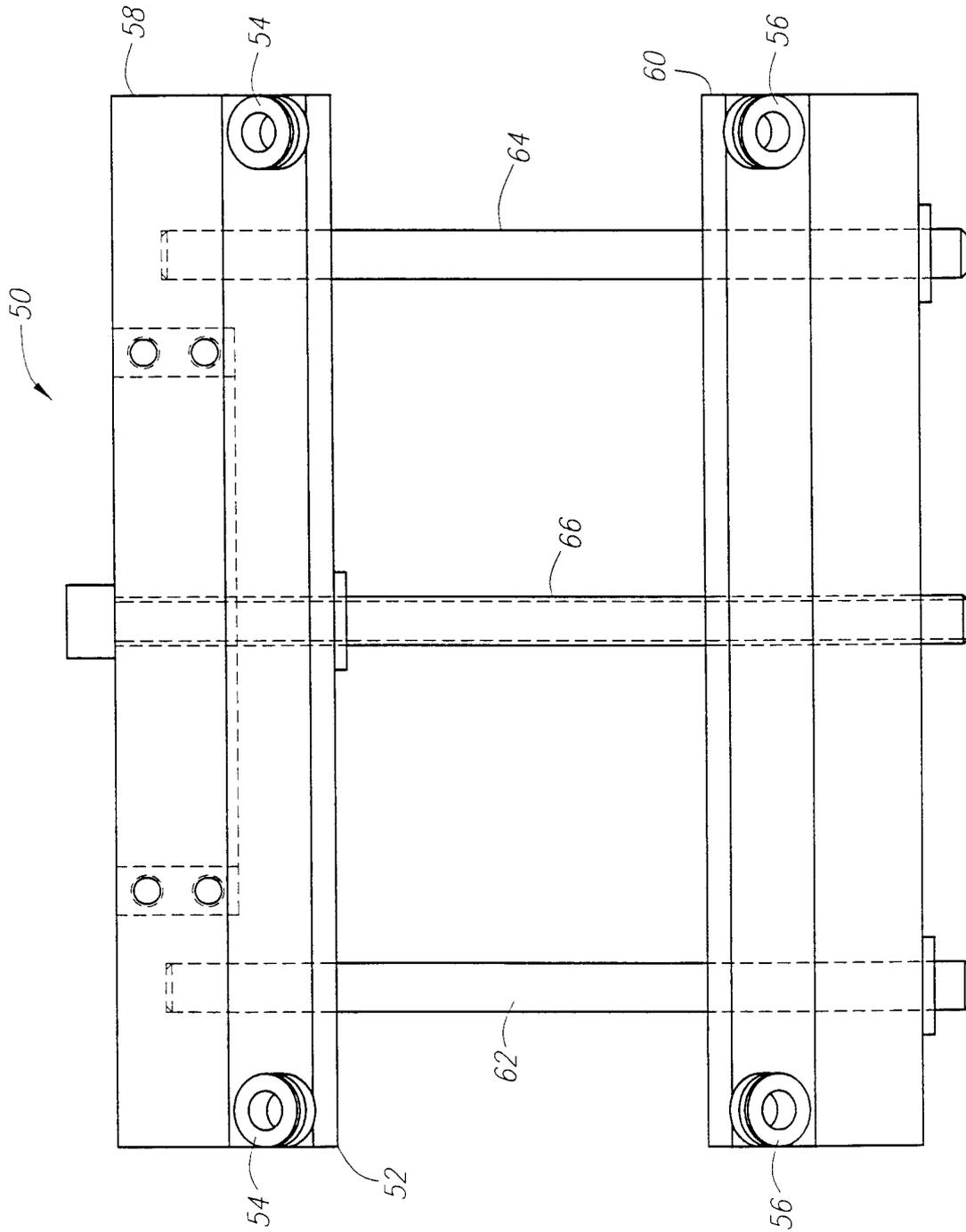


FIG. 6

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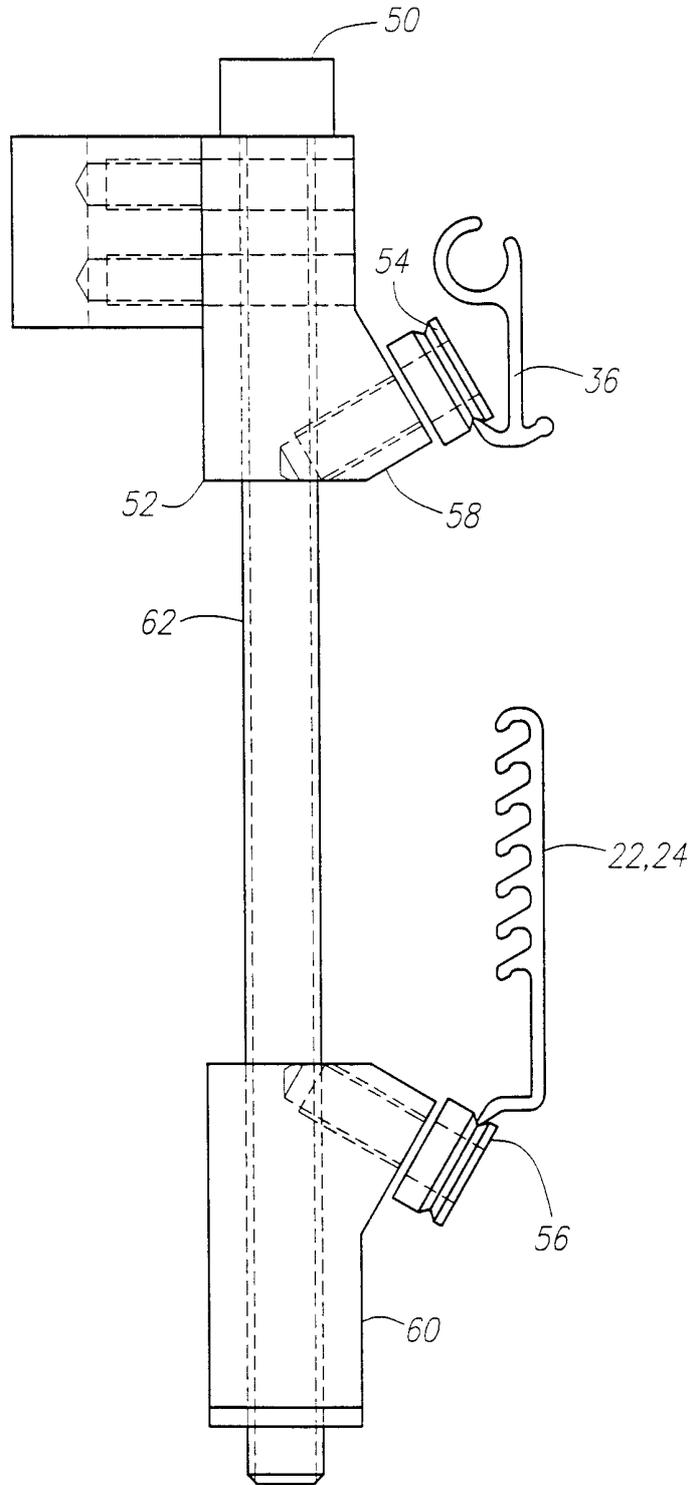


FIG. 7

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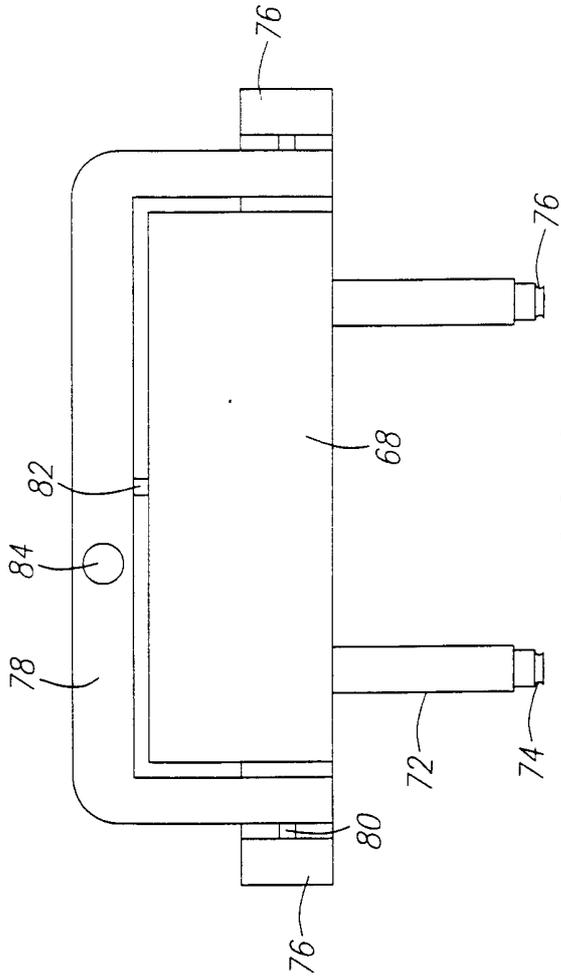


FIG. 9

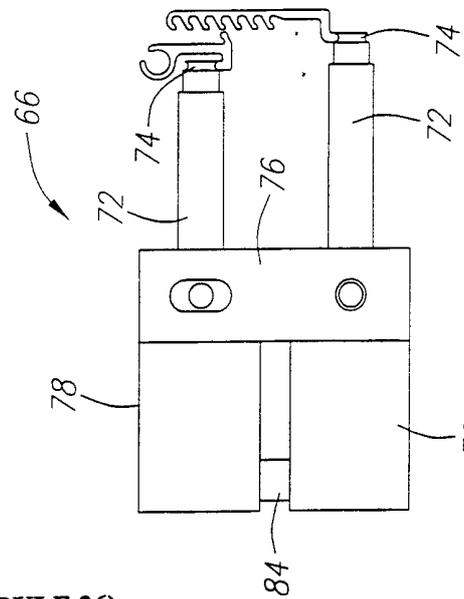


FIG. 8

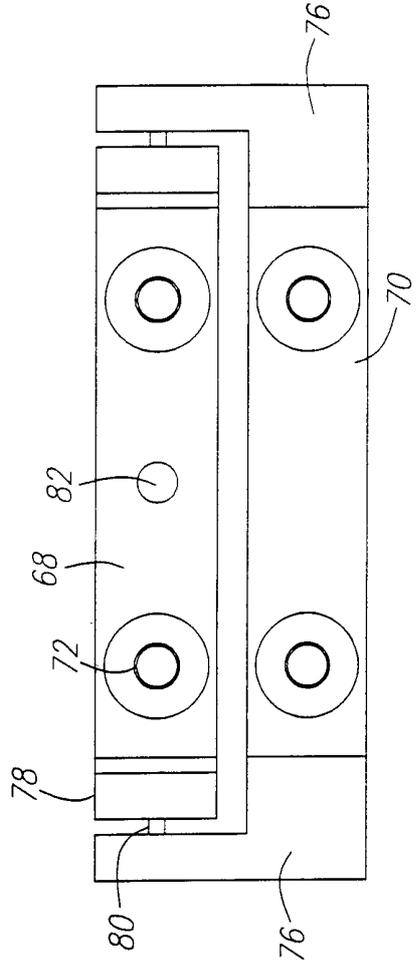


FIG. 10

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US00/16452

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) :G09F 17/00

US CL :40/603; 160/328, 378

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. : 40/590, 603, 604; 160/327, 328, 378

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
NONE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 3,373,464 A (AUSNIT) 19 March 1968 (19/03/68), see entire document.	1-2, 4/1, 4/2
Y, P	US 6,041,535 A (HOLLOWAY ET AL) 28 March 2000 (28/03/00), see entire document.	1-2, 4/1, 4/2
X	US 5,685,099 A (FAVATA) 11 November 1997 (11/11/97), see entire document.	1-3, 4/3
X	US 5,301,447 A (LOTTER ET AL) 12 April 1994 (12/04/94), see entire document.	10
A	US 5,893,227 A (JOHANSSON ET AL) 13 April 1999 (13/04/99), see entire document.	1-4, 10
A, P	US 6,073,376 A (VERRET) 13 June 2000 (13/06/00), see entire document.	1-4, 10

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

* Special categories of cited documents	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
A document defining the general state of the art which is not considered to be of particular relevance	*X* document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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P document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

04 AUGUST 2000

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US00/16452

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 4,955,928 A (TANNER) 11 September 1990 (11/09/90), see entire document.	1-4, 10
A	US 5,042,182 A (KING) 27 August 1991 (27/08/91), see entire document.	1-4, 10
A	US 5,058,299 A (SUZUKI) 22 October 1991 (22/10/91), see entire document.	1-4, 10
A	US 5,245,774 A (HUBER) 21 September 1993 (21/09/93), see entire document.	1-4, 10
A	US 5,301,447 A (LOTTER ET AL) 12 April 1994 (12/04/94), see entire document.	1-4, 10
A	US 5,467,546 A (KOVALAK JR) 21 November 1995 (21/11/95), see entire document.	1-4, 10