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(12) # EUROPEAN PATENT APPLICATION

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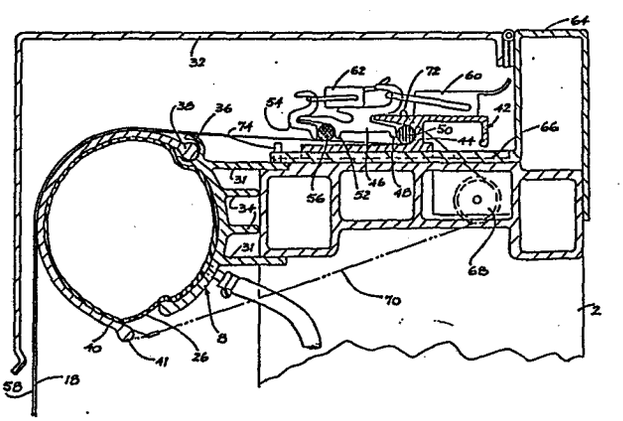
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(54) **Tension device.**

(57) A display sign of the type which utilizes a flexible sheet as a graphics carrier has a polygonal frame (2) to withstand the forces necessary to tension the sheet, latch assemblies (44, 46) on the frame which grip the edge of the graphics screen (18).

A fluid chargeable ring (26) situated at the perimeter of the flexible sheet between the latter and the support which upon charging tensions the sheet without wrinkling it.

Instead of latches the flexible sheet may have a peripheral hem (20) with a drawstring (22). Instead of latches a captive roller screen tensioner 76 is disclosed.



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FIELD OF THE INVENTION

This invention concerns display signs and expecially large signs of the scale which would normally be reserved for installation on the tops of buildings, pole mounted, outdoor and indoor situations.

BACKGROUND OF THE INVENTION

The elevation of such signs exposes them to strong wind forces and their exposure to atmosphere subjects them to weathering, corrosion and temperature variations. One known type of sign comprises a rectangular box-like frame about 4m x 4m which houses a bank of fluorescent lights. A sheet of translucent plastic bearing advertising material is stretched over the open face of the box-like frame and tensioned by a series of tensioning devices arranged around the edge of the box. Each device consists of a pair of tunnions fixed to the frame, a bell crank mounted in the trunnions with jaws for gripping the edge of the sheet located at one end of the crank and a screw at the opposite end by which the sheet can be tensioned. Forty such tensioning devices are commonly provided to pull the wrinkles out of a sheet. In larger installations one hundred and twenty devices may be provided. These are expensive, must be adjusted individually and are subject to wear.

U.S. 3,762,080 discloses a frame for tensioning printing screens in which a locking strip in one side of the frame frictionally grips one edge of the screen and a roller in the opposite side of the frame accommodates the remainder of the screen. A ratchet and pawl enable the roller to be tensioned

across the frame.

U.S. 4,041,861 represents a variation of the earlier multiple individual clamp arrangements and utilizes a pull bar containing a trapper roller for nipping one edge of the pivoting screen while the opposite edge is held by a static clamp. The pull bar is tensionable by a pair of screws.

Australian Patent No. 499655 makes use of a rigid frame to support a spring stretched film bearing the advertisement. The wind forces on the screen are balanced by providing wind ducts leading from outside to the interior of the frame. These make use of the ram effect of the prevailing wind.

U.S. 4,372,071 discloses a billboard in which the problem of wrinkling is directly tackled. A frame is constructed to mount a rigid billboard made of plywood. A layer of fabric is stretched across the billboard and a continuous action blower operating through a hole in the back of the billboard applies a continual pressure which inflates the air pocket between the billboard and the fabric.

SUMMARY OF THE INVENTION

One apparatus aspect of the invention provides a display sign of the type which utilizes a flexible sheet as a graphics carrier which sign comprises:

a support capable of withstanding the forces necessary to tension the sheet;

means to clamp the edges of the sheet; and

one or more fluid chargeable tubes situated at the perimeter of the sheet between the surface of the flexible

sheet and the support, which upon charging, tensions or tension and flexible sheet.

Preferably the support is part of the frame of the display sign and the perimeter of the support is the same shape as the flexible sheet.

Preferably the sheet has an edge which is adapted to engage the support and to be secured thereto under initial tension. A pocket or seam around the edge of the flexible sheet which contains a drawstring or boltrope is a convenient means of securing the flexible sheet on the support prior to final tensioning. Eyelets in the sheet edge and hooks on the perimeter of the support are an alternative. Various other equivalent modes are acceptable but if the support has a trough, well or purpose built edge the drawstring mode is cheap and effective.

The fluid operable means may comprise one or more fluid chargeable tubes situated between the surface of the flexible sheet and the support which upon charging tensions or tension the flexible sheet.

Conveniently, the chargeable tube is formed as a ring which is mounted permanently in a continuous well at the edge of the frame of the display sign.

The well may be defined by a wall, the outermost surface of wich provides an engagement surface against which the drawstring of the flexible sheet may be tightened.

For rectangular display signs or other shapes having corners it is convenient to have two opposite pairs of straight tube-supporting cavities linked by corner-pieces.

DESCRIPTION OF THE DRAWINGS

Fig. 1 is a cross section through a fragment of a display sign.

Fig. 2 is a diagrammatic front view of the sign with the edge covers removed.

Fig. 3 is a cross section through a fragment of another embodiment of the display sign.

Fig. 4 is a diagrammatic cross section of another embodiment of the display sign.

Fig. 5 is a diagrammatic perspective view of a still further embodiment of the display sign.

Fig. 6 is a diagrammatic cross section of yet another embodiment of the display sign.

DETAILED DESCRIPTION OF THE EMBODIMENTS

Referring firstly to Figs. 1 and 2 the case of an illuminated display sign is formed from four aluminium frame members 2. The rear of the sign is closed by a panel 4. The members 2 support a bank of fluorescent tubes one of which is indicated by 6. Four straight aluminium extrusion 8 (one shown) are rivetted to the edges of the four frame members 2. The rounded corners of the sign are formed by joining the adjacent ends of the straight extrusion 8 by curved bridge pieces 10 in aluminium. Each extrusion 8 has an integral well 12 of arcuate cross-section extending over about 240° formed by an outer wall 14 and an inner wall 16.

A display sheet 18 made of translucent PVC carrying an advertising motif has a welded hem 20 housing a drawstring or boltrope 22. One end ofthe drawstring 22 is tied to post 24

(see Fig. 2) while the opposed end is secured to a lockable tensioning lever 26. An inflatable rubber ring 26 is housed in the wall 12 and inflated from outside the device by a pump (not shown) via tube 28 and adapter 30. A sheet metal cover 32 is hinged along each side of the sign toobscure the extrusions 8 and to provide an opaque border for the sign.

In use the flexible sheet is made to size and offered up to the open face of the sign. The rubber ring 26 is collapsed by deflation. The hem is tucked into the valley created between the wall 14 and the upper part of the extrusion 8. The drawstring is drawn tight which imposes initial tension on the flexible sheet. The remaining wrinkles are removed by inflating the rubber ring 26. When the sign is to be changed the sheet is removed by reversing the procedure.

We have found the advantages of the above embodiment to be:

1. The expensive mechanical tensioners are eliminated.
2. High tensions can be imposed on the flexible sheet as desired.
3. Maintenance of the tension can easily be subject to automatic control.
4. The flexible sheet can be manufactured to a lower order or acuracy.
5. The flexible sheet can be mailed to its destination as a parcel because no stiffeners are necessary.

In another embodiment the inflatable rubber ring is maintained at the desired pressure by a known electric pump

and valve.

Referring now to Fig. 3 the frame member 2 is an extruded aluminium beam. The well extrusion 8 has a pair of ribs 32 which are rivetted to the front of the beam. The spacers 34 position the well in a common display plane. The well extrusion has half of a snap-in hinge formation 36. The remaining half 38 of the snap-in hinge is a bead running along one edge of an arcuate, extruded cover strip 40. A latch body extrusion 42 is rivetted to the frame member 2 and constitutes a fixed jaw 44. A major movable jaw extrusion 46 has a first jaw 48 for nipping the welded bead 50 of the graphics screen 18. The jaw extrusion also has a second jaw 52 which together with the minor movable jaw extrusion 54 nips the welded bead 56 of the protective screen 58. The major extrusion 46 is clamped and unclamped by the over centre latch 60. The minor extrusion 54 is clamped and unclamped by over centre latch 62. This arrangement permits the protective screen 58 to be released and changed without disturbing the graphics screen. The sheet metal cover 32 is hinged to a housing 64 mounted on the frame 2.

There are four sheet metal covers which form a border around the sign and protect the patch mechanisms fro the weather, birds and the like.

The latch body extrusion 42 is slidable toward and away from the changeable ring 26 on tracks 66 (one shown). The beam 2 has three pulleys 68 (one shown) per side and a wire tie 70 is connector between the beaded edge 40 and a cleat 72 on the latch body. The tie is tensioned by the inflation of

the ring 26 became the screens tend to pull the latch body forwardly while the cover strip 40 tends to pull the latch body rearwardly. The stop 74 prevents the latch body from leaving the track. The interconnection of the latch body and the cover strip 40 tends to damp wind induced ripples in the screens. The use of several wire ties on each side of the sign assists in the smooth sliding of the latch body.

The ring is kept inflated by an sentric compressor controlled by a pressure monitoving valve, all of wich are not shown.

In Fig. 4 the graphics sheet is tensioned by captive roller devices 76 (one shown) situated along each edge of the display sign. There provided initial tension and have the advantage that a plain edge for the screen will suffice, no beaded edge or drawstring being necessary.

Fig. 5 illustrates the use of four separate tubes 78 instead of a ring.

Fig. 6 illustrates the use of graphics screen which is welded to the equatorial region of the ring 26. The ring has a border 80 which is threaded into the tensioners 66.

CLAIMS:

1. A display sign of the type which utilizes a flexible sheet (18) as a graphics carrier characterised in that the sign comprises :

a support (12) capable of withstanding the forces necessary to tension the sheet; and

means (20,22) to grip the edge of the sheet and a fluid chargeable ring (26) situated near the perimeter of the sheet which upon charging, expands between the sheet and the support thereby tensioning the sheet.

2. A display sign as claimed in claim 1 characterised in that the support defines a well (12) capable of seating and retaining the chargeable ring such well defining the major part of the perimeter of the flexible sheet.

3. A display sign as claimed in claim 2 characterised in that the channel has an inner edge and an outer edge (14), the edge of the flexible sheet incorporated a seam pocket (20) and a drawstring (22) which runs in the seam pocket and the channel (8) defines between its outer edge and the support, a groove for receiving the seam pocket such that the flexible sheet is subjected to preliminary stretching over the channel (8) when the seam pocket is located in the groove and the drawstring is tightened.

4. A display sign as claimed in claim 2 characterised in that the support (2) has straight sides, a ring-like well capable of seating the chargeable tubular ring and a cover strip (40) for each of the straight sides which overlie the straight parts of the well and are hinged to tilt into contact with the screen when the tube is charged.

5. A display sign as claimed in claim 4 wherein the well is defined by at least four straight extrusions (8) of arcuate

section which are fixed to the support each of which have along an outer edge thereof, half of a snap-in hinge formation (36) and the cover strips are separate extrusions (40) bearing along one longitudinal edge thereof the complementary half (38) of the snap-in hinge.

6. A display sign as claimed in claim 5 characterised in that the cover strips (40) are of semicircular section and are of a curvature radius smaller than the curvature radius of the well whereby a series of elongate hinged pockets is formed for the chargeable tube allowing the tube to be substantially enclosed and shield from sunlight.

7. A display sign as claimed in claim 1 characterised in that a first set of tension devices (44,48) mounted on the support tensions the graphics screen; and a second set of tension devices (46,54) tensions the protective screen (58), the second set being operable independently of the first set enabling the protective screen to be changed without disturbing the graphics screen.

8. A display sign as claimed in claim 7 wherein at least one of the sets of tension devices is a gripper (52,54,62) with an over-centre latch action.

9. A display sign as claimed in claim 1 characterised in that the support has four edges, each surrounded by a sheet metal housing (32) of L-section which is hinged to the support in order to tilt between a shroud position in which it acts as a border to the screens and an access position in which it permits access to the chargeable tube.

10. A display device as claimed in claim 4 characterised in that the means (44) to clamp the edge of the graphics sheet is slidable toward and away from the chargeable ring (26),

the cover strips (40) each have a leading edge (41) and a captive edge (38) the captive edge being hinged and the leading edge being connected to the edge clamping means by at least a pair of ties (70) which are thereby capable of counter balancing the tension imposed on the edge clamping means by the screen when the ring is charged.

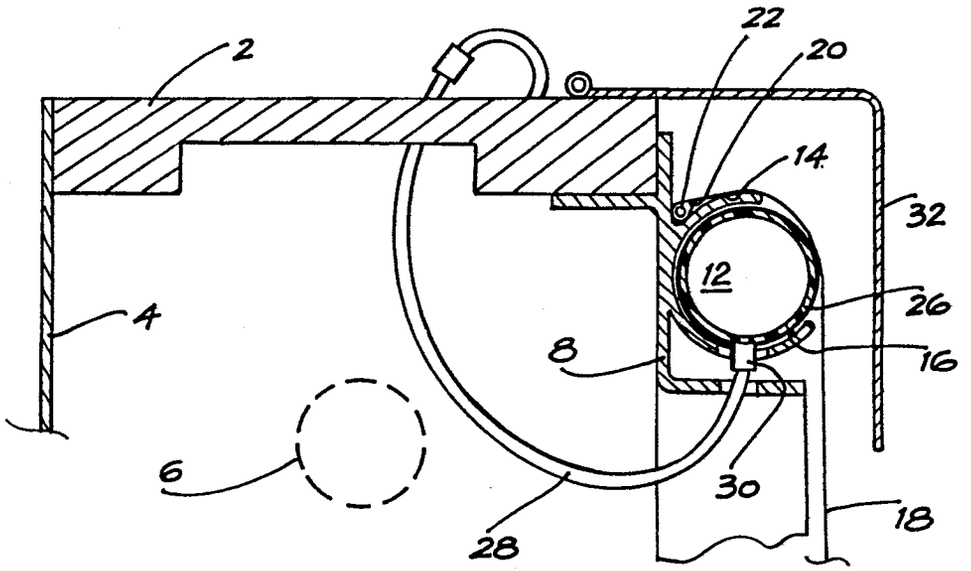


FIG. 1

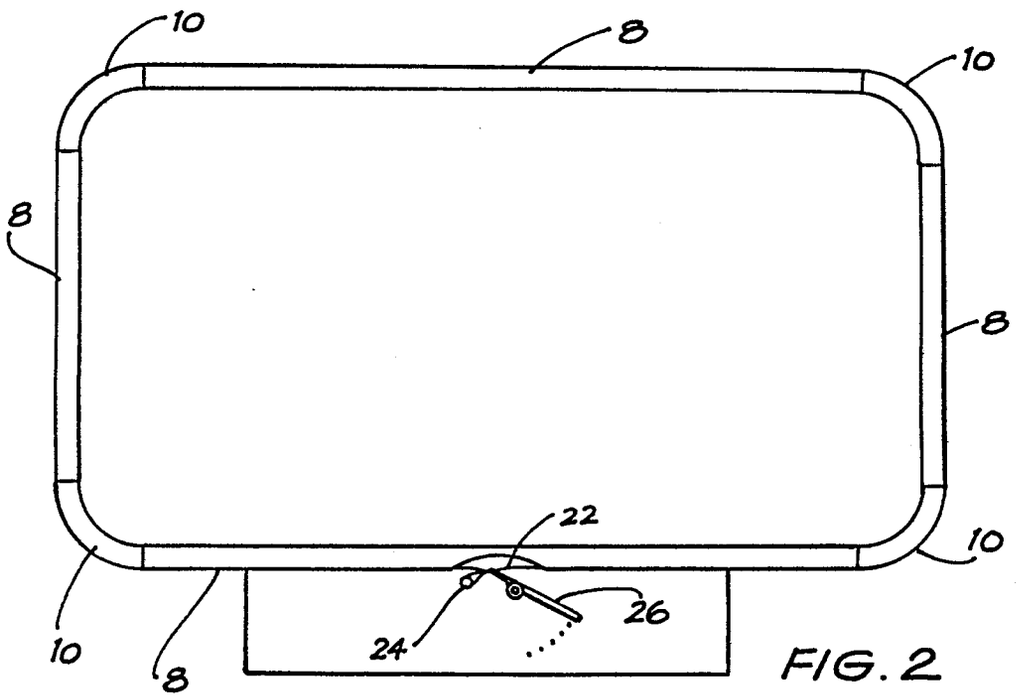


FIG. 2

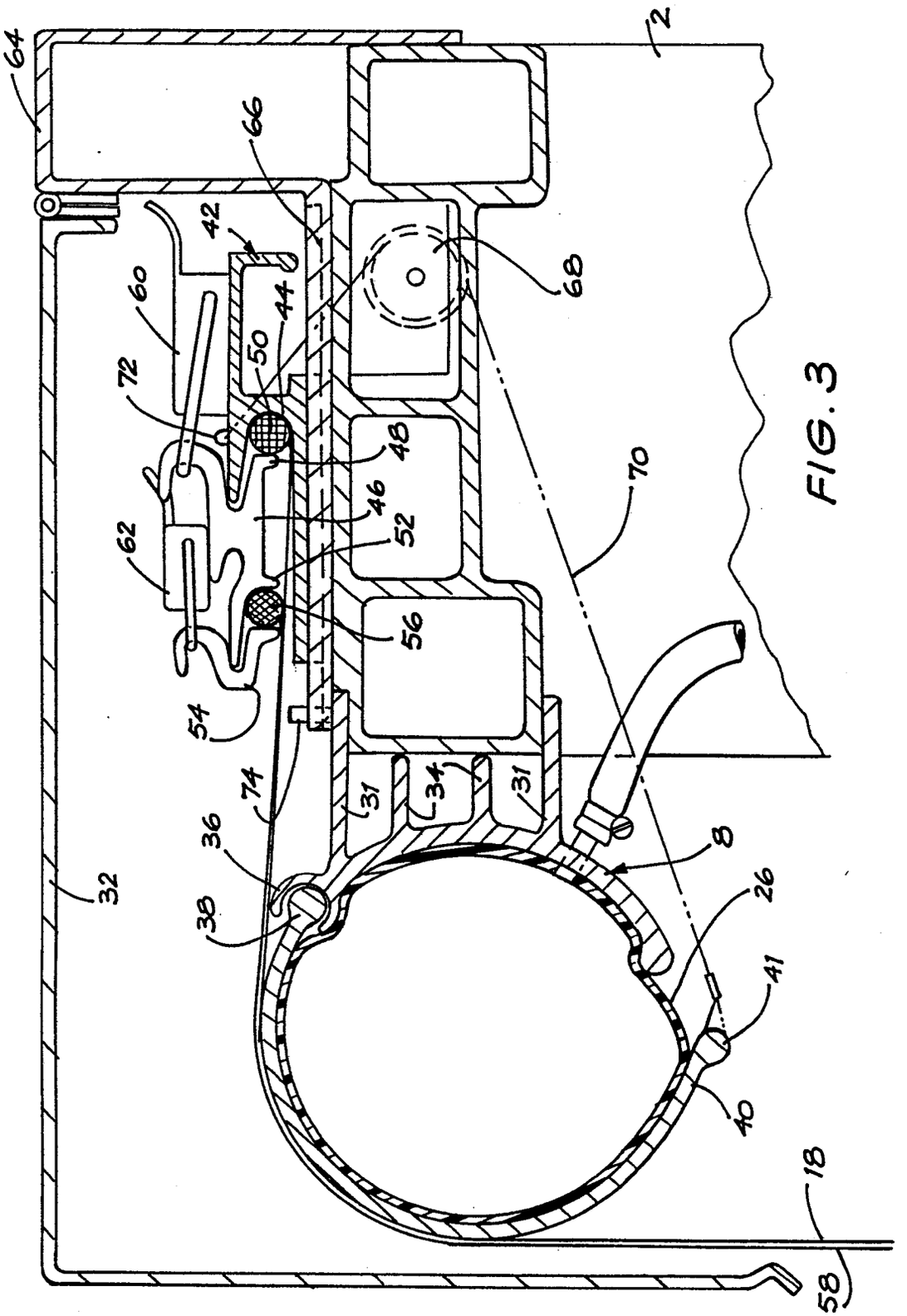

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FIG. 3

FIG. 6

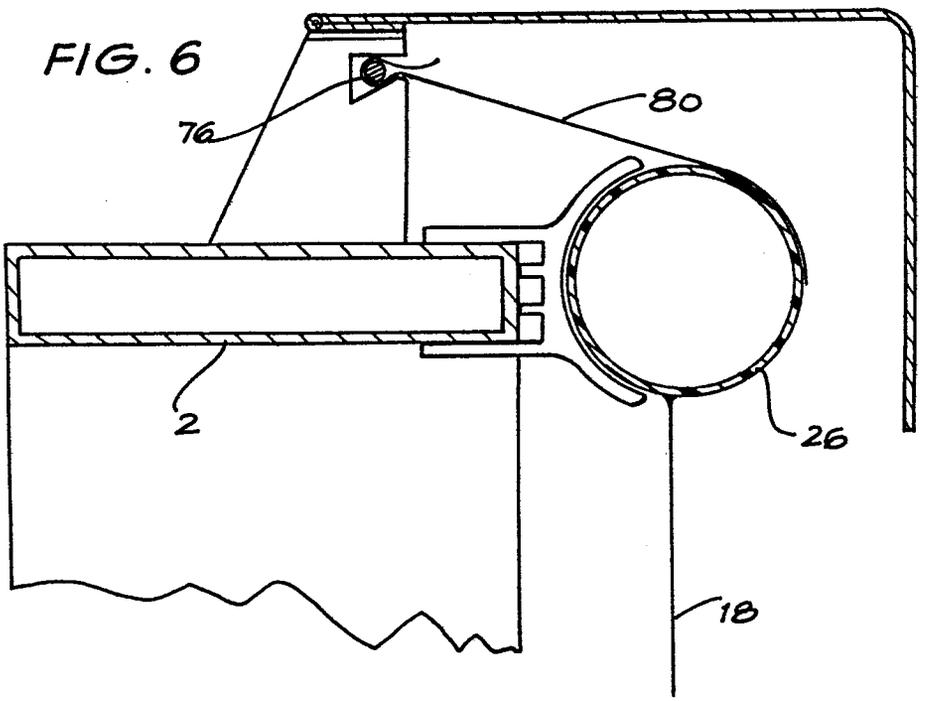
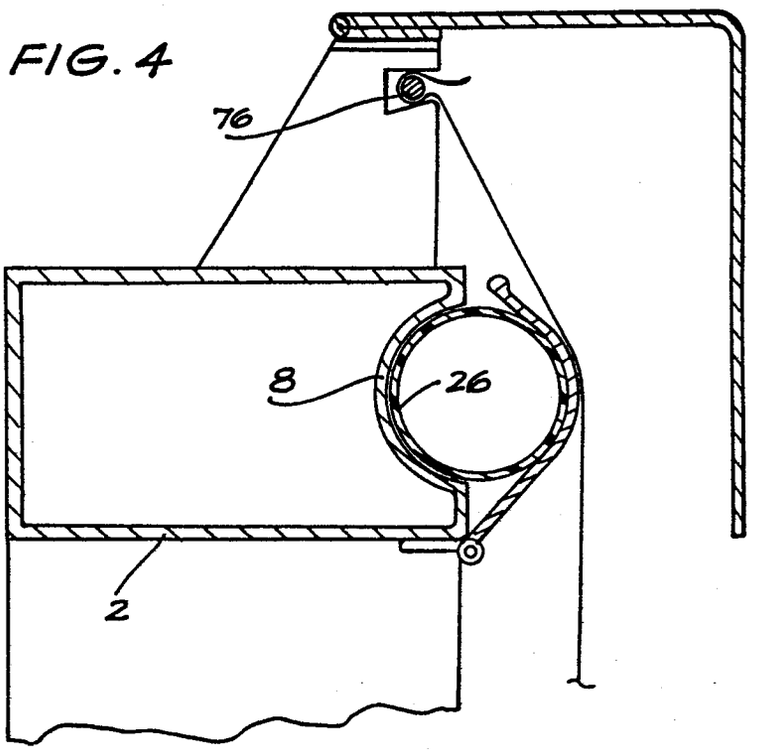


FIG. 4



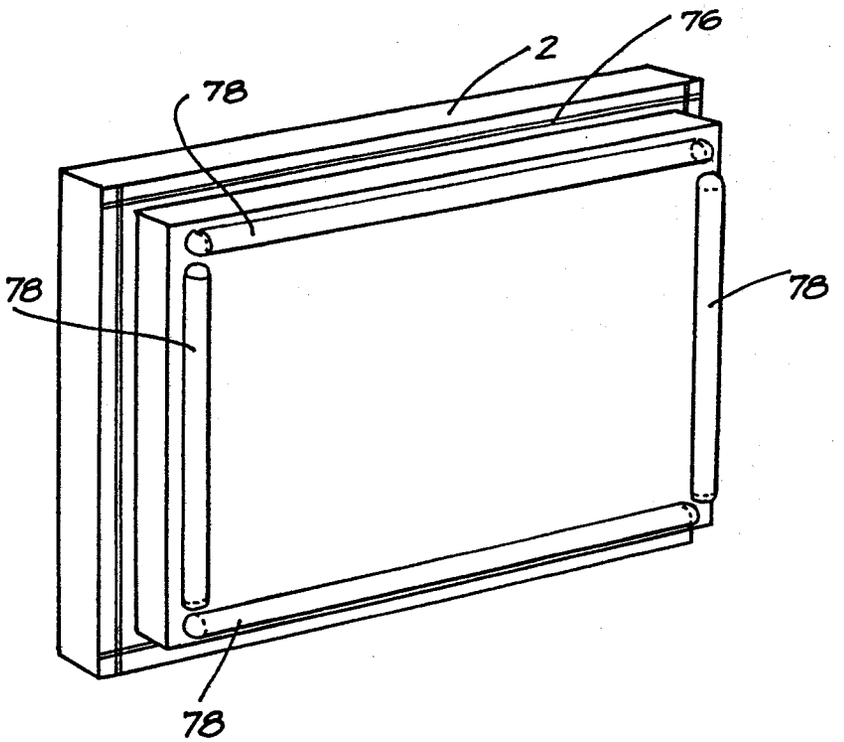


FIG. 5

European Patent Office

EUROPEAN SEARCH REPORT

Application number

EP 84 30 4240

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. ³)
A	US-A-4 372 071 (ROBERT K. VICINO) * column 2, lines 10-34; column 3, lines 9-23; figures 1,3 *	1,7	G 09 F 15/00
A	FR-A-2 289 991 (G.G.A. DUPERRON) * page 1, lines 34-39; page 2, lines 1,18-21 *	1,2	
A	WO-A-7 900 939 (GÖSTA WADSTEIN) * abstract; page 2, lines 25-30; figure 2 *	1	
A	US-A-4 265 039 (JACKSON R. BROOKS) * abstract; figures 1-5 *		

TECHNICAL FIELDS SEARCHED (Int. Cl. ³)

G 09 F
B 41 F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	13-09-1984	ODGERS M.L.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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D : document cited in the application
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