AUSTRALIA

Form 1/Form 2

Patents Act

621215

APPLICATION FOR A STANDARD PATENT / ~~PETTY PATENT~~

I/We ERIC HOLMES

of 4 Toorak Avenue, Baxter, 3911, Vic

hereby apply for the grant of a standard / ~~petty~~ patent for an invention entitled: PANEL MOUNTING SYSTEM

which is described in the accompanying *~~petty~~ patent specification.

~~*Convention Application — Details of basic application:-~~

Number of basic application:

Name of Convention country in which basic application was filed:

~~Date of basic application:~~

*Divisional Application — Details of parent of divisional application:-

Number of original application: 82,723/87

Person by whom made: ERIC HOLMES

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Dated this 4th day of April 19 90

PATENT ATTORNEY SERVICES
Attorneys for the Applicant(s)

To: The Commis

DIVISIONAL APPLICATION
2723/87 Lodged 2/11/87

PF-1-1

AUSTRALIA

Patents Act

DECLARATION IN SUPPORT OF AN APPLICATION FOR A PATENT ~~/PETTY PATENT~~

*Delete if non-Convention application

In support of the *~~Convention~~ application made by

*Insert applicants name

ERIC HOLMES

*Delete if standard patent application

for a *~~petty~~ patent for an invention entitled

Insert title

PANEL MOUNTING SYSTEM

Individual applicants insert full name and address. Corporate applicants—insert full name and address of authorised official of company

I, Eric Holmes

of 4 Toorak Avenue, Baxter 3911

do solemnly and sincerely declare as follows:

Individual applicants delete 1(b)

1. (a) I am the applicant for the patent.

Corporate applicants delete 1(a)

(b) ~~I am authorised by the applicant(s) for the patent to make this declaration on its/their behalf.~~

Applicant who is the inventor delete 2(b) Otherwise delete 2(a) and insert inventor(s) name(s) and address(es) at 2(b)

2 (a) I am the actual inventor of the invention.

(b) .....

~~of~~ .....

~~is/are the actual inventor(s) of the invention and the facts upon which I am/the applicant(s)~~ is/are entitled to make the application are as follows.

If inventor(s) employed by applicant(s) delete (i)

(i) The actual inventor(s) made the invention in the course of employment by the applicant(s) and the applicant(s) is/are entitled to the invention and any patent granted therefor in accordance with Sub-Section 34(1)(fa) of the Patents Act.

If inventor(s) assigned invention to applicants delete (i)

(ii) The applicant(s) is/are the assignee(s) of the actual inventor(s) in respect of the invention.

If other situation exists, delete (i) and (ii) and explain applicants right to apply in (iii)

(iii) .....

If non-Convention application delete paragraphs 3 and 4

3. The basic application(s) as defined by Section 141/Section 142 of the Patents Act was/were as follows:

Country: .....

Applicant(s) .....

Country: .....

Applicant(s) .....

4. The basic application(s) referred to in paragraph 3 of this Declaration was/were the first application(s) made in a Convention country in respect of the invention the subject of the application.

Place of signing

Declared at: Box Hill, Vic.

Date

Dated this 30th day of March 1990

Signature

.....

To: The Commissioner of Patents

PATENT ATTORNEY SERVICES
26 Ellingworth Parade,
Box Hill, Victoria, 3128 Australia.

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PANEL MOUNTING SYSTEM

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AU 554778 88752/82 E06B 3/62, 3/60
AU 444398 14058/70 81.5; 78.85, 81.2
AU 422187 24708/67 81.3; 81.5

(57) Claim

1. A structural assembly comprising a panel mounting system which is mounting and supporting the edge of a panel, the panel edge which is supported being curved along its length, the mounting system comprising an elongated support mullion which in transverse section includes a body portion and a panel support extending laterally from one side of the body portion, the support mullion having been formed as a straight section and subsequently formed into a curve of the desired radius of curvature for the panel edge so that the sectional shape of the support mullion after being curved is the same as the sectional shape thereof before being curved, the panel support being arranged so that it supports the edge of the panel, the mounting system further including an elongated cover mullion which in transverse section comprises a mounting portion mounting the cover mullion to the body portion of the support mullion, the cover mullion further including a panel retainer extending laterally from one side of the mounting portion, the cover mullion having been formed as a straight section and subsequently formed into a curve of the desired radius of curvature for the panel edge that the sectional shape of the cover mullion after being curved is the same as the sectional shape thereof before being curved, the panel retainer being arranged so that it opposes the panel support in spaced relationship thereto with the edge of the panel located between the opposed panel retainer and panel support, the support mullion and cover mullion forming a

.../2

structural strength support assembly so that the support assembly supports the panel edge received within the opposed panel retainer and panel support, the body portion or the mounting portion including a connecting web extending generally towards the mounting portion or body portion respectively, the connecting web having a retaining projection projecting laterally therefrom and being relatively thin and being resiliently deformable generally transverse to the general plane of the web to enable the web to move laterally and to resiliently spring back to engage the retaining projection thereof with a cooperating shoulder provided by the mounting portion or body portion respectively to thereby couple the mounting and the body portions together, the connecting web although being relatively thin being proportioned so as not to distort when the body portion or the mounting portion respectively is curved to the desired radius of curvature and so that the ability of the web and its retaining projection to fit with the cooperating shoulder and couple the mounting and body portions together is preserved after curving of the mullion without distortion of the web interfereing with the fitting of the projection and cooperating shoulder together.

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PATENTS ACT

621215

COMPLETE SPECIFICATION

ORIGINAL

(FOR OFFICE USE)

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Application Number:
Lodged:

Complete Specification Lodged:
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Priority:

Related Art:

Name of Applicant(s): ERIC HOLMES

Address of Applicant(s): 4 Toorak Avenue, Baxter, 3911, Vic

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Complete specification for the invention entitled:

PANEL MOUNTING SYSTEM

The following statement is a full description of this invention, including the best method of performing it known to me :-

PANEL MOUNTING SYSTEM

This invention relates to panel mounting systems and particularly although not exclusively to glazing systems such as glazed roofing systems for skylights. It will be convenient to generally describe the invention with particular reference to glazing although the invention is applicable to other panel mounting systems.

One presently known glazing system for glazing of barrel vaults in which glazing panels are arcuate has a mounting arrangement for the lower edges of the glazing panels around the vault opening. The glazing bars which support the curved edges of the glazing panels and which terminate at the peripheral edges of the vault opening are mounted to specially constructed brackets. These brackets are usually manufactured off site and are expensive to manufacture. On site, the brackets must be precisely mounted in the exact positions where the glazing bars will be located. This mounting arrangement does allow a glazing bar to extend upwardly from the bracket at any angle within a range. This feature is needed because the vault may be a full semi-circle in cross section or may form a shallower arc.

This known system includes a glazing mullion which is an aluminium alloy extrusion and which forms a structural support at the line of jointing of adjacent glazing panels. The glazing mullion is provided with drainage channels for moisture. In use the adjacent glazing panels overlie the glazing mullion and a four piece gasket assembly is installed over the top of the glazing panel edges to retain the glazing panels to the glazing mullion and also provide weather sealing.

This presently known system above is expensive to manufacture, particularly in labour content of the manufacture. Also the system requires considerable skill and expertise to install and the installation is expensive because of the labour costs.

It is an object of the present invention to provide a panel edge mounting system which can use mass produced items and which can therefore be fabricated from relatively cheap components.

It is a further object of the present invention to provide a panel edge mounting system which is relatively simple and quick to install so as to minimise or reduce labour costs.

According to the present invention there is provided a structural assembly comprising a panel mounting system which is mounting and supporting the edge of a panel, the panel edge which is supported being curved along its length, the mounting system comprising an elongated support mullion which in transverse section includes a body portion and a panel support extending laterally from one side of the body portion, the support mullion having been formed as a straight section and subsequently formed into a curve of the desired radius of curvature for the panel edge so that the sectional shape of the support mullion after being curved is the same as the sectional shape thereof before being curved, the panel support being arranged so that it supports the edge of the panel, the mounting system further including an elongated cover mullion which in transverse section comprises a mounting portion mounting the cover mullion to the body portion of the support mullion, the cover mullion further including a panel retainer extending laterally from one side of the mounting portion, the cover mullion having been formed as a straight section and subsequently formed into a curve of the desired radius of curvature for the panel edge that the sectional shape of the cover mullion after being curved is the same as the sectional shape thereof before being curved, the panel retainer being arranged so that it opposes the panel support in spaced relationship thereto with the edge of the panel located between the opposed panel retainer and panel support, the support mullion and cover mullion forming a structural strength support assembly so that the support assembly supports the panel edge received within the opposed panel retainer and panel support, the body portion or the mounting portion including a connecting web extending generally towards the mounting portion or body portion respectively, the connecting web having a retaining projection projecting laterally therefrom and being relatively thin and being resiliently deformable generally transverse to the general plane of the web to enable the web to move laterally and to resiliently spring back to engage the retaining projection thereof with a cooperating shoulder provided by the mounting portion or body portion respectively to thereby couple the mounting and the body portions together, the connecting web although being relatively thin being proportioned so as not to distort when the body portion or the mounting portion respectively is curved to the desired radius of curvature and so that the ability of the web and its retaining

projection to fit with the cooperating shoulder and couple the mounting and body portions together is preserved after curving of the mullion without distortion of the web interfereing with the fitting of the projection and cooperating shoulder together.

For supporting two panel edges, the support mullion preferably includes two panel supports extending laterally on opposite sides of the body portion and the cover mullion includes two panel retainers extending laterally on opposite sides of the mounting portion, each panel retainer being arranged so that it opposes a respective one of the two panel supports in spaced relationship thereto with the edge of respective panel located between the opposed panel retainer and respective panel support and with the support and cover mullions together defining a H-beam structural support for the panel edges.

The mounting portion may include two connecting webs integral with and extending from generally centrally of the cover mullion towards the body portion of the support mullion, each of the connecting webs being of relatively thin material so as to be resiliently deformed away from the other connecting web or towards the other connecting web, the connecting webs being constructed and co-operating with the body portion of the support mullion with a snap fitting engagement.

In this emobidment, preferably the connecting webs are both provided with retaining barbs projecting laterally therefrom, the body portion of the support mullion being provided with complementary cooperating shoulders whereby each of the webs is resiliently deformed until the barb reaches its respective shoulder whereupon the web returns resiliently towards its original undeformed position and the barb engages with the shoulder to resist separation of the cover and support mullions. Each of the connecting webs may be provided with a barb extending generally towards the other connecting web, the body portion of the support mullion being provided with outwardly facing cooperating shoulders, each of which is cooperating with a respective one of the barbs. The body portion of the support mullion may include diverging outer faces engageable by the connecting webs so as to cause the connecting webs to be resiliently urged apart as the cover mullion and support mullion are pressed into engagement with each other.

Each connecting web may be formed with a body of material on the side of the general plane of the web opposite to the side from which the retaining projection extends, the body of material and the

retaining projection together enabling the web to be curved without distortion leading to interference with the fitting of the projection and the cooperation shoulder together.

Resilient sealing gaskets may extend along each of the panel supports and panel retainers, the sealing gaskets extending along and engaging the opposite faces of the associated panel edge to seal therewith. A seal retaining channel may extend along each panel support and panel retainer and facing the associated panel edge, the seal retaining channel being provided with a restricted mouth facing the panel edge, the sealing gasket being provided with a retaining bead extending lengthwise along the gasket, the retaining bead being received within the channel with the restricted channel mouth resisting disengagement of the bead from the channel. The panel support and panel retainer may each include a drainage channel outside of the sealing gaskets relative to a general direction transverse to the longitudinal direction of the mullions, the drainage channel facing towards the associated panel edge whereby any moisture condensing or penetrating and reaching the mullion assembly can collect in the drainage channel and be drained therefrom.

Possible and preferred features of the present invention will now be described with particular reference to the accompanying drawings. However it is to be understood that the features illustrated in and

described with reference to the drawings are not to be construed as limiting on the scope of the invention. In the drawings:

Fig. 1 is a side sectional view of a possible arrangement of base member mounted to a perimeter curb, say around a skylight opening to be covered by a barrel vault,

Fig. 2 is a side sectional view showing an anchor member being assembled with the base member of Fig. 1,

Fig. 3 is a side sectional view showing the anchor member generally in desired final position and a glazing mullion positioned preparatory to fastening,

Fig. 4 is a side sectional view showing the final panel edge mounting assembly,

Fig. 5 is a perspective view showing an anchor member assembled with the base member,

Fig. 6 is a side sectional view showing an alternative base member in an assembly allowing ventilation through the assembly,

Fig. 7 is a cross sectional view of a support mullion and a cover mullion embodying the invention and before assembly,

Fig. 8 shows a glazing mullion assembly using the mullions of Fig. 7,

Fig. 9 shows the preferred mullion assembly in use with, say, 6mm glazing panels,

Fig. 10 shows the preferred glazing assembly with a 10mm glazing panel and a 0.6mm sheet metal panel,

Fig. 11 shows the preferred glazing assembly with double glazing and an angled glazing panel,

Fig. 12 shows the preferred glazing assembly with a barrel vault end arrangement and say a thick insulating panel,

Fig. 13 is the preferred glazing assembly with a strengthening channel secured thereto for flat sheet glazing,

Fig. 14 is the preferred glazing assembly fixed to a wall by a concealed fixing bracket.

The panel edge mounting system illustrated in Figs 1 to 6 is for mounting a panel 11 to a structure 10. An anchor piece 12 is for fixing to an edge of the panel 11. A base member 13 is mounted to a structural frame member 14. The mounting system includes a tongue 16 provided by the anchor piece 12 and a mouth 17 provided by the base member 13, the tongue 16 being receivable within the mouth 17 for a

range of angular positions of the panel 11 so that the anchor piece 12 and the base member 13 can be assembled together at one angular position of the panel 11 and remain assembled together while the panel 11 is moved towards another angular position being the desired final position of the panel 11.

Although the tongue 16 is shown provided by the anchor piece 12 and the mouth 17 by the base member 13, the reciprocal arrangement is also possible.

In the drawings the base member 13 comprises an elongated base member 13 for extending along the line of the panel edge. The mouth 17 provided by the base member 13 is therefore elongated and extends along the base member 13 so that the tongue 16 of the anchor piece 12 can be inserted into the mouth 17 at any longitudinal position. The elongated base member 13 comprises a metal section such as an aluminium alloy extrusion. The elongated mouth 17 opens generally upwardly, when the base section 13 is being used at the peripheral edge of a skylight opening e.g. for covering with a barrel vault, enabling the tongue 16 to be inserted into the mouth 17 from above after the base section 13 has been installed at the edge of the opening to be spanned by the vault.

The base section 13 includes a base web 20 arranged to overlie the structural frame member 14 shown as a perimeter curb provided around the opening spanned by the vault. The base web 20 includes an evaporation tray 21 for enabling evaporation of any moisture penetrating the edge assembly or condensate collected between inner wall 22 at the inner edge of the base web 20 and a wall 23 of the mouth 17. The outer edge of the base member 13 is provided with a downwardly extending skirt 25 arranged to overlap a length of flashing 26 or the like for water proofing purposes.

The anchor piece 12 comprise a length of metal section such as an aluminium alloy extrusion. Any desired length of anchoring section 12 may be used depending for example on the strength of the anchoring force required. In the case of barrel vaults, anchoring section lengths of say 10cm may be used at approximately every metre of panel edge length.

The anchor piece 12 in the illustrated embodiment includes a base support portion 27 for locating and/or supporting the edge of the panel 11. The anchoring section 12 also includes a side support

portion 28 for location at and overlapping a face of the panel 11 at the edge. The base and side support portions 27, 28 are comprised by two flanges, the flanges being arranged at substantially 90° to each other. The tongue 16 of the anchor piece 12 extends from the flanges 27,28 on the opposite side to the V shaped notch 29 defined by the flanges 27, 28.

In the illustrated embodiment the tongue 16 is arcuate in section, and the mouth 17 is of complementary arcuate shape so that as the tongue 16 is inserted deeper into the mouth 17, the anchor piece 12 changes its angular position relative to the base member 13. The tongue 16 and complementary mouth 17 define in cross-section respective segments of a circle. Preferably the tongue 16 is a close fit within the mouth 17 to limit relative rocking or vibrating movement. The centre of curvature 30 of the part circular mouth 17 is preferably the same centre of curvature of the tongue 16 when the anchor piece 12 and base members 13 are assembled together.

The panel edge mounting system further includes an elongated panel edge member 35 for mounting to the panel edge, the edge member 35 having a weather flange 36 extending outwardly therefrom and arranged to co-operate with the base member 13 to form a weather barrier. The weather flange 36 comprises a skirt extending downwardly and arranged to overlap the base member 13 on an outside or exposed side of the base member 13. In the preferred embodiment the skirt 36 extends downwardly to overlap the skirt 25 of the base member 13 which in turn in use overlaps the flashing 26. The base member 13 includes a weather-side flange 37 standing up from the base member 13 and arranged to co-operate with the weather skirt 36 so that water running down the panel 11 and over the outside of the panel edge member 35 will be inhibited or prevented from penetrating the edge mounting assembly by the weather-side flange 37. The weather skirt 36 is arcuate in cross section and the weather-side flange 37 is complementary so that the weather skirt 36 closely overlaps the weather-side flange 37 for a range of angular positions of the panel edge member 35 relative to the base member 13. This will enable the proper weather sealing to be achieved regardless of the angular position of the panel 11.

The panel edge member 35 comprises a panel bead in the form of a channel section 39, e.g. an extruded aluminium alloy section, the channel section 39 being arranged to receive therein the edge of the panel 11 such as a glazing panel 11. The edge of the panel 11 received within the channel section 39 is retained and sealed along its edge by means of a U-shaped sealing gasket 40 which is a tight frictional fit in the channel section 39 and receives the edge of the panel 11 therein. The gasket may be of neoprene or rubber or other suitable material and removal of the gasket 40 from the channel section 39 is innibited by serrations 41 on the inside surfaces of the channel 39.

As shown in Fig. 6 a barrier strip 43 provides a barrier against penetration of weather/insects/debris. The barrier strip 43 is operatively located in use between the base member 13 and the panel edge member 35. Preferably the barrier strip 43 is located between the weather skirt 36 of the panel edge member 35 and the base member 13. In this arrangement the base member 13 may not be provided with the weather-side flange 37. The barrier strip 43 may comprise a perforated strip mounted to the base member 13 and extending outwardly therefrom and in use pressing against the inner surface of the weather skirt 36 of the panel edge member 35. The perforated strip 43 for example may be riveted at its inner edge to the base member 13 or may be fitted into a pocket 44 formed on the outer side of the base member 13. The outer wall of the pocket 44 may be deformed inwardly to clamp the perforated strip 43 and retain it against removal. With the provision of a perforated barrier strip 43, ventilation can be deliberately permitted through the mounting system in use as shown by arrows C.

In Figs. 1 to 4 the steps of assembling a panel edge mounting system are shown in sequence. In Fig. 1 the elongated base section 13 is laid over and secured by a bolt 50 to the perimeter curb 14 provided around the opening to be spanned by a barrel vault. A conventional flashing strip 26 is provided which the downwardly extending skirt 25 of the base section 13 overlaps to provide for water runoff. The evaporation tray 21 is defined between the inner wall 22 and wall 23 defining one side of the mouth 17, the other side of the mouth 17 is defined by the generally S-section wall 51 so that the mouth 17 is of part circular cross section, the centre 30 of the

circle being shown by an "X". The highest part of the base section 13 is the top edge 52 of the inner wall 23 of the mouth 17 so that condensation or other moisture reaching any part of the section to the outside of that highest point will preferentially flow to the outside of the assembly.

Base members 13 may be arranged around the entire perimeter of an opening to be spanned by a vault with the ends of the base members 13 along each side of the opening being mitred together.

The anchor piece 12 in Fig. 2 has a part circular section tongue 16 together with a base support flange 27 and side support flange 28 defining a right angled notch 29. As shown in Fig. 2 the anchor piece 12 may be first arranged so that the tip of the tongue 16 is located at the opening to the mouth 17. The anchor piece 12 can then be rotated in the direction of arrow A to the position shown in Fig. 3. In this position the tongue 16 is penetrating the mouth 17 and will inhibit disassembly of the anchor piece 12 from the base section 13 except by reversal of the rotational movement back to the position shown in Fig. 2. The anchor piece 12 in Fig. 3 can adopt any desired angular position relative to the base section 13 as exemplified by the range of possible positions indicated with the arrow B in Fig. 3. This allows the panel edge to project vertically upwardly from the anchor piece 12 (as shown in Fig. 4) or the panel 11 can extend from the anchor piece 12 at an angle to the horizontal.

The panel edge mounting system of Figs. 1 to 6 can be used with the panel joining system described later in relation to Figs. 7 to 14. In assembling a barrel vault using the mounting system of Figs. 1 to 6 and the mullion assembly described later in relation to Figs 7 to 14, the support mullion 60 can be placed generally in position with the bottom end of the support mullion being located against the base and side support flanges 27, 28 of the anchor piece 12 (Fig. 3). The support mullion has laterally projecting flanges to which the anchor piece 12 can be secured, e.g. by passing screws through the side support flange 28 into the flanges of the support mullion 60.

In the base support flange 27 there is formed a drainage channel 53 so that water running down the support mullion 60 (which is provided with drainage channels for condensate) can collect in the drainage channel 53 of the anchor piece 12, the water from there

falling onto the base member 13 to the outside of the highest point provided at the top edge 52 of the inner wall 23 of the mouth 17.

Fig. 4 shows a glazing panel mounted in position. The bottom edge of the glazing panel 11 has a panel edge member 35 in the form of a metal section. The edge 35 section has a weather flange or skirt 36 which extends downwardly and overlaps the weather-side flange 37 standing up from the outside of the base section 13. As shown, both the weather skirt 36 and the weather-side flange 37 are sections of a circle having the same centre of curvature "X" as the tongue 16 and mouth 17, thus enabling close overlapping of the weather skirt 36 and weather-side flange 37 regardless of the angular position of the panel edge within its range of possible positions.

The panel edge section 35 has a U-shaped channel 39 in which the glazing panel 11 edge is received together with the U-shaped sealing gasket. The panel edge member 35 may be secured to the anchor piece 12 by a rivet 54 or other fastener. The cover mullion 70 is shown as it would be finally assembled over the side edge of the glazing panel 11.

Drainage holes 55 (Fig. 3) can be provided at intervals along the length of the base section 13, the drainage holes 55 being provided through both the bottom edge of the weather-side flange 37 and into the mouth 17 so that any moisture collecting in these low points can be drained to the outside of the assembly.

Fig. 5 shows a perspective view of a length of base section 13 with a short length of say 10cm of anchor section 12 assembled therewith. The support mullion could then be brought downwardly into position against the anchor piece 12. The exact position of the anchor piece 12 lengthwise of the base section 13 is not critical.

The line of sight from inside the assembly shown in Fig. 6 by the broken line and indicated by the letter "D" is the "horizon" line for people within a building provided with the glazed vault. Keeping the height of the side support flange 28 of the anchor piece 12 at or below that line will ensure that the anchor piece does not visibly project upwardly from the assembly and possibly spoil the aesthetic finish.

The panel edge mounting system illustrated in Figs 1 to 6 is easy to assembly on site and is therefore believed will result in substantial labour savings. The base section 13, anchor piece 12 and

panel edge section 35 can all be extrusions which can be readily manufactured in continuous lengths and cut to size either in the factory or on site. The panel edge sections 35 can be cut to size first in a factory, namely cut to the widths of the glazing panels 11, and the glazing bars or mullion sections will fit together without the need for very close tolerances to be observed. It may only be necessary to cut on site the last one of a number of panel edge sections 35 along a long extent of a vault. The preferred mounting assembly illustrated and described enables all water or condensing moisture to drain to the outside of the assembly. If there is any moisture that penetrates or reaches the inside of the highest point 52 of the base section 13, the evaporation tray 21 is operative to collect and allow evaporation of such moisture.

Referring now to Figs. 7 to 14, the panel mounting system embodying the present invention includes an elongated support mullion 60 which in section includes a body portion 61 and two panel supports 62 extending laterally on opposite sides of the body portions 61, each of the panel supports 62 being capable in use of supporting the edge of a panel 11. The system includes an elongated cover mullion 70 which in section comprises a mounting portion 71 for mounting of the cover mullion 70 to the body portion 61 of the support mullion 60. The cover mullion 70 includes two panel retainers 72 extending laterally on opposite sides of the mounting portion 71, the panel retainers 72 being arranged so that in use each opposes a respective panel support 62 in spaced relationship thereto with the edge of a panel 11 located between the opposed panel retainer 72 and respective panel support 62.

The designations "support mullion" and "cover mullion" are not to be understood as restricting the invention to an arrangement in use in which the "support mullion" lies below or inside of the cover mullion or which the "support mullion" provides exclusively a supporting function for the cover mullion and/or the panel.

The support mullion 60 and cover mullion 70 both contribute structural strength to the mullion assembly. For this purpose both the support and cover mullions 60, 70 are made of metal such as extruded aluminium alloy. In the case of the mullions 60, 70 being for use in a curved skylight, such as barrel vault shaped skylight, the mullions 60, 70 are curved along their lengths and are of the

same radius of curvature as the associated panels 11 which in this case would be glazing panels. The mullions 60, 70 extend across the entire span of the vault so as to be in compression and to constitute structural support for the vault. The mullions 60, 70 may be curved to the general radius required as part of the manufacturing thereof or may be curved on site.

The body portion 61 of the support mullion 60 and the central mounting portion 71 of the cover mullion 70 are of generally complementary shape and are arranged to directly fit with each other in assembly. The body portion 61 and the mounting portion 71 fit together and are held together in use without the use of penetrating fasteners. For this purpose the body portion 61 and mounting portion 71 form a tight frictional fit or a snap fit together.

In the illustrated embodiment where the body portion 61 and mounting portion 71 snap fit together, there are provided complementary retaining barbs 73 and retaining shoulders 63 on the respective mullions 70, 60 so that the cover mullion 70 which in the illustrated arrangement in provided with the barbs 73 is in use resiliently deformed until each barb 73 reaches the respective shoulder 63 whereupon each of the barbs 73 returns resiliently back towards its original position and the barbs 73 engage with the shoulders 63 to resist separation of the two mullions 60, 70. The barbs 73 are provided at the ends of respective ones of the two spaced webs 74 which extend from the cover mullion 70 towards the support mullion 60. The two outwardly facing shoulders 63 are provided on the support mullion 60 and these snap fit with the barbs 73 when the two mullions 60, 70 are pressed together. The shoulder 63 are provided on opposite sides of the central body portion 61. The thickness of each web 74 is relatively thin so as to enable the webs 74 to resiliently flex away from each other when the cover mullion 70 is being pressed into engagement with the support mullion 60. The ends of the barbs 73 are provided with ramp surfaces 75 which engage with diverging outer faces 65 of the central body portion 61 when the two mullions 60, 70 are being pressed together. The body portion 61 is shown as an enlarged body facing and extending towards the cover mullion 70. The body portion 61 has a continuously curved outer face 65, shown as a semi-circular outer face in cross-section. A complementary concave inner face 76 is provided by the central mounting portion 71 of the cover mullion 70.

Sealing means 80 is provided between each panel support 62 and adjacent edge of a panel 11 and between each panel retainer 72 and the adjacent panel edge. The sealing means 80 is shown in Figs. 9 to 12 as sealing gaskets 81, 82, 83 extending along the opposite faces of the edge of the panel 11. The gaskets 81, 82, 83 are made of a resilient material such as a rubber or plastics material so as to provide an effective weather sealing at the panel edges while at the same time allowing thermal expansion and contraction. Each sealing gasket 81, 82, 83 includes a main body portion 85 contacting the edge of the panel 11 and having an outer portion 86 contacting the panel support 62 or panel retainer 72.

The sealing means 80 includes a seal retaining means 90 which comprises a retaining channel 91 extending along the panel support 62 or panel retainer 72 and facing the panel edge in use. The seal retaining channel 91 is provided with a restricted mouth 92 facing the panel edge and the sealing gasket 81, 82, 83 for use with this channel 91 is provided with a retaining bead 93 extending lengthwise along the gasket 81, 82, 83, the retaining bead 93 being in use received within the channel 91 with the restricted channel mouth 92 resisting disengagement of the bead 93 from the channel 91.

Different sealing gaskets 81, 82, 83 are particularly constructed for the different kinds of panels 11 to be used. For example in Fig. 9 the sealing gaskets 81 on either side of the edge of the panel 11 are identical with each other so that the panel 11 will be centred between the panel support 62 and the panel retainer 72. In Fig. 10 at the right, the sealing gasket 82 has a larger main body so that the panel 11a, which for example may be a thin metal sheet, will be supported closer to either the panel support 62 or panel retainer 72. As shown at the right of Fig. 11, the sealing gaskets 81 may be resiliently deformable or may be shaped to enable a panel 11b to extend at an acute angle to the general line extending parallel to and midway between the facing panel support 62 and panel retainer 72. Also as shown in Fig. 11, for double glazing, there may be provided an intermediate gasket 87 between the two panels 11c, 11d, the intermediate gasket 87 both sealing and providing a spacing member between the panels 11c, 11d.

Each of the mullions 60, 70 is provided with drainage means in the form of drainage channels 95 provided in the panel supports 62 and panel retainers 72 at the outer ends thereof, i.e. outside of the sealing means 80. The drainage channels 95 face inwardly towards the associated panel 11 so that any moisture condensing or penetrating and reaching the mullion assembly will collect in a drainage channel 95 and run along the channel under gravity, e.g. to the opposite edges of the barrel vault.

The mounting system is principally designed for use with a curved glazing structure. However the system is also usable with the flat glazing assembly such as a flat skylight. In this case the mullions 60, 70 may be subject to a bending force or may be in tension as a result of wind forces and particularly if the glazing panels are horizontal or other than vertical. To provide strength in this situation, the system may include an elongated strengthening piece 100 (Fig. 13) for securing to one of the mullions 60, 70 so as to extend along that mullion and strengthen the assembly in use. The strengthening piece 100 comprises a strengthening strip 101 having an elongated web 102 which extends away from the associated mullion 60 and which in use is secured to the mullion 60 at points along the length thereof. The strip 101 is shown as being a generally U-shaped channel having in cross-section two opposed legs 102, 103 which extend away from the mullion 60 and a connecting web 104 at the base of the channel shape, the connecting web 104 in use being secured to the mullion 60, e.g. to the central body portion 61 of the support mullion 60. This securing is shown as including self tapping screws 106 or the like which pass through the web 104 and into the body portion 61.

Other components may be included in the system according to the preferred embodiment of the present invention in order to make the system usable in different environments. For example, where the system is to be used in a barrel vault structure, for the opposite ends of the barrel vault there may be provided an inwardly facing channel 110 (Fig. 12), i.e. a channel facing towards the general centre of curvature of the barrel vault, the channel 110 being adapted in use to receive an end panel 111 of the barrel vault. This channel 110 may be secured to the inner mullion which is shown as the support mullion 60. The channel 110 is shown as connected to the

outer end of the panel support 62, e.g. by fastening rivets 112 or the like passing through the base web 113 of the channel 110 and through the outer end of the panel support 62. A closure strip 114 in the general form of a part annular gasket is provided for fitting within the facing panel support 62 and panel retainer 72 at the outer end of the barrel vault. This closure strip 114 serves aesthetic purposes as well as sealing against ingress of moisture, dirt and pests.

In Fig. 14 there is shown another accessory that the system may include. In this drawing there is a wall fixing bracket 120 for enabling the mullion assembly in use to abut against a flat wall 121. The fixing bracket 120 comprises either a plurality of individual brackets of relatively short length or a continuous bracket strip arranged to be secured to the wall 121. Each bracket or bracket strip includes a flange 122 which extends outwardly from the wall 121 and is arranged to fit within the recess defined between the facing panel support 62 and panel retainer 72. The flange 122 closely overlies either the panel retainer 72 or, as illustrated, the panel support 62 enabling fastening elements (not shown) such as rivets to be passed through the support 62 into the flange 122 to retain the assembly to the wall 121. With this arrangement the wall fixing bracket 120 is substantially concealed from view.

The mullion assembly described and illustrated in relation Figs. 7 to 14 can be seen to be relatively simple to use and install. The components can be manufactured relatively cheaply since the complex gasket assembly of the prior known system described has been eliminated. Both support and cover mullions 60, 70 serve structural purposes and each can be of lighter construction than the glazing mullion used in the prior system. Furthermore the system can be sufficiently versatile to be used in most skylights or other such glazed structures and in use the assembly can be aesthetically pleasing with no or few visible fasteners or the like.

It is to be understood that various alterations, modifications and/or additions may be made to the features of the possible and preferred embodiment(s) of the invention as herein described without departing from the scope of the invention as defined in the appended claims.

The claims defining the invention are as follows:

1. A structural assembly comprising a panel mounting system which is mounting and supporting the edge of a panel, the panel edge which is supported being curved along its length, the mounting system comprising an elongated support mullion which in transverse section includes a body portion and a panel support extending laterally from one side of the body portion, the support mullion having been formed as a straight section and subsequently formed into a curve of the desired radius of curvature for the panel edge so that the sectional shape of the support mullion after being curved is the same as the sectional shape thereof before being curved, the panel support being arranged so that it supports the edge of the panel, the mounting system further including an elongated cover mullion which in transverse section comprises a mounting portion mounting the cover mullion to the body portion of the support mullion, the cover mullion further including a panel retainer extending laterally from one side of the mounting portion, the cover mullion having been formed as a straight section and subsequently formed into a curve of the desired radius of curvature for the panel edge that the sectional shape of the cover mullion after being curved is the same as the sectional shape thereof before being curved, the panel retainer being arranged so that it opposes the panel support in spaced relationship thereto with the edge of the panel located between the opposed panel retainer and panel support, the support mullion and cover mullion forming a structural strength support assembly so that the support assembly supports the panel edge received within the opposed panel retainer and panel support, the body portion or the mounting portion including a connecting web extending generally towards the mounting portion or body portion respectively, the connecting web having a retaining projection projecting laterally therefrom and being relatively thin and being resiliently deformable generally transverse to the general plane of the web to enable the web to move laterally and to resiliently spring back to engage the retaining projection thereof with a cooperating shoulder provided by the mounting portion or body portion respectively to thereby couple the mounting and the body portions together, the connecting web although being relatively thin being proportioned so as not to distort when the body portion or the mounting portion respectively is curved to the desired radius of curvature and so that the ability of the web and its retaining

projection to fit with the cooperating shoulder and couple the mounting and body portions together is preserved after curving of the mullion without distortion of the web interfereing with the fitting of the projection and cooperating shoulder together.

2. An assembly as claimed in Claim 1 and supporting two panel edges wherein the support mullion includes two panel supports extending laterally on opposite sides of the body portion and the cover mullion includes two panel retainers extending laterally on opposite sides of the mounting portion, each panel retainer being arranged so that it opposes a respective one of the two panel supports in spaced relationship thereto with the edge of respective panel located between the opposed panel retainer and respective panel support and with the support and cover mullions together defining a H-beam structural support for the panel edges.

3. An assembly as claimed in Claim 1 or 2 wherein the mounting portion includes two connecting webs integral with and extending from generally centrally of the cover mullion towards the body portion of the support mullion, each of the connecting webs being of relatively thin material so as to be resiliently deformed away from the other connecting web or towards the other connecting web, the connecting webs being constructed and co-operating with the body portion of the support mullion with a snap fitting engagement.

4. An assembly as claimed in Claim 3 wherein the connecting webs are provided with retaining barbs projecting laterally therefrom, the body portion of the support mullion being provided with complementary cooperating shoulders whereby each of the webs is resiliently deformed until the barb reaches its respective shoulder whereupon the web returns resiliently towards its original undeformed position and the barb engages with the shoulder to resist separation of the cover and support mullions.

5. An assembly as claimed in Claim 4 wherein each of the connecting webs is provided with a barb extending generally towards the other connecting web, the body portion of the support mullion being provided with outwardly facing cooperating shoulders, each of which is cooperating with a respective one of the barbs.

6. An assembly as claimed in Claim 5 wherein the body portion of the support mullion includes diverging outer faces engageable by the connecting webs so as to cause the connecting webs to be resiliently urged apart as the cover mullion and support mullion are pressed into engagement with each other.

7. An assembly as claimed in any one of Claims 1 to 6 wherein the or each connecting web is formed with a body of material on the side of the general plane of the web opposite to the side from which the retaining projection extends, the body of material and the retaining projection together enabling the web to be curved without distortion leading to interference with the fitting of the projection and the cooperation shoulder together.

8. An assembly as claimed in any one of Claims 1 to 7 and further including resilient sealing gaskets extending along each of the panel supports and panel retainers, the sealing gaskets extending along and engaging the opposite faces of the associated panel edge to seal therewith.

9. An assembly as claimed in Claim 8 and further including a seal retaining channel extending along each panel support and panel retainer and facing the associated panel edge, the seal retaining channel being provided with a restricted mouth facing the panel edge, the sealing gasket being provided with a retaining bead extending lengthwise along the gasket, the retaining bead being received within the channel with the restricted channel mouth resisting disengagement of the bead from the channel.

10. An assembly as claimed in Claim 8 or 9 wherein one or each panel support and panel retainer includes a drainage channel outside of the sealing gaskets relative to a general direction transverse to the longitudinal direction of the mullions, the drainage channel facing towards the associated panel edge whereby any moisture condensing or penetrating and reaching the mullion assembly can collect in the drainage channel and be drained therefrom.

11. An assembly as claimed in any one of the preceding claims and substantially as herein before described with particular reference to the accompanying drawings.

Dated this 17th day of December, 1991

PATENT ATTORNEY SERVICES
Attorneys for
ERIC HOLMES

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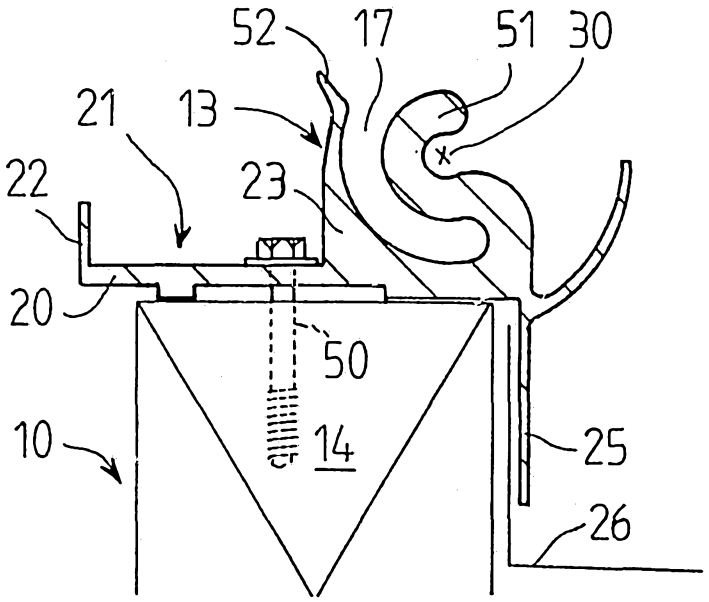

FIG. 1

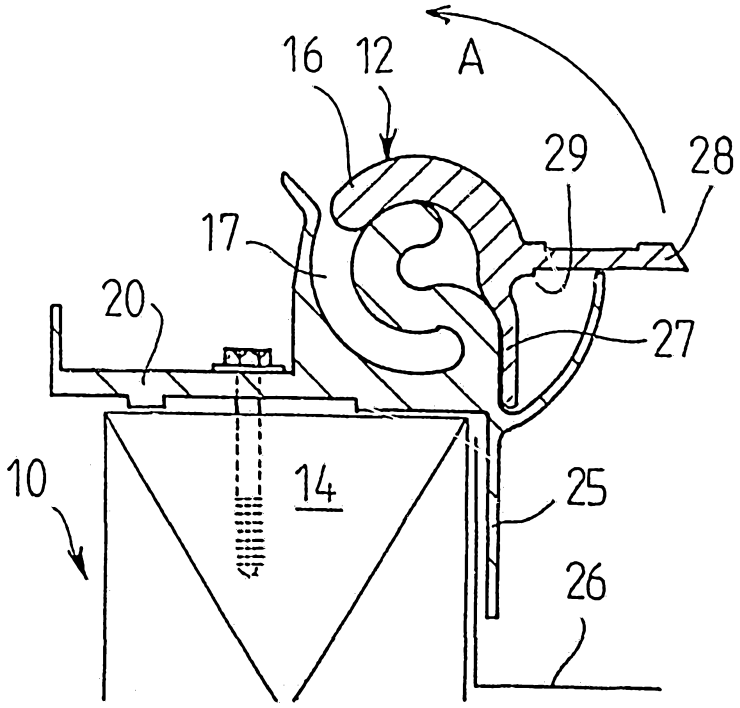

FIG. 2

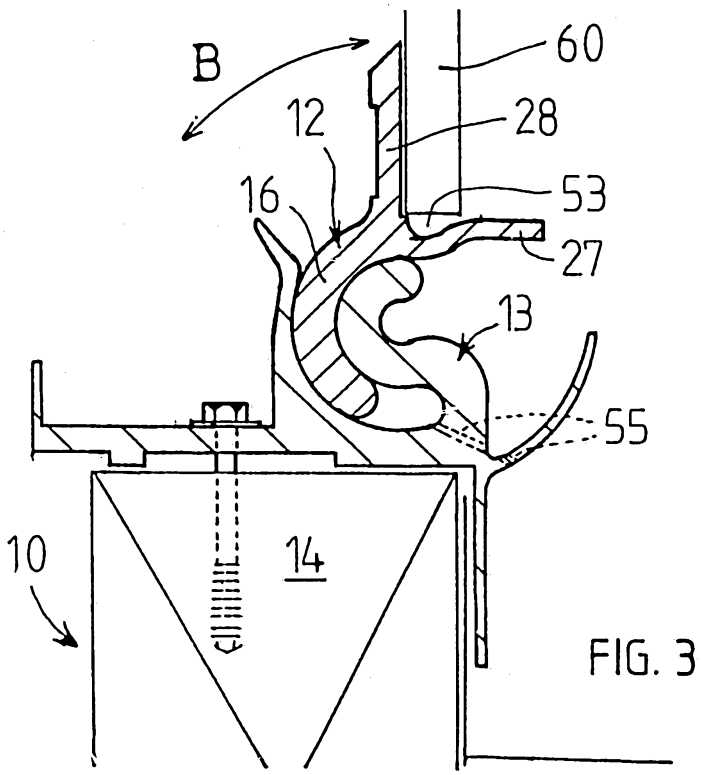
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FIG. 3

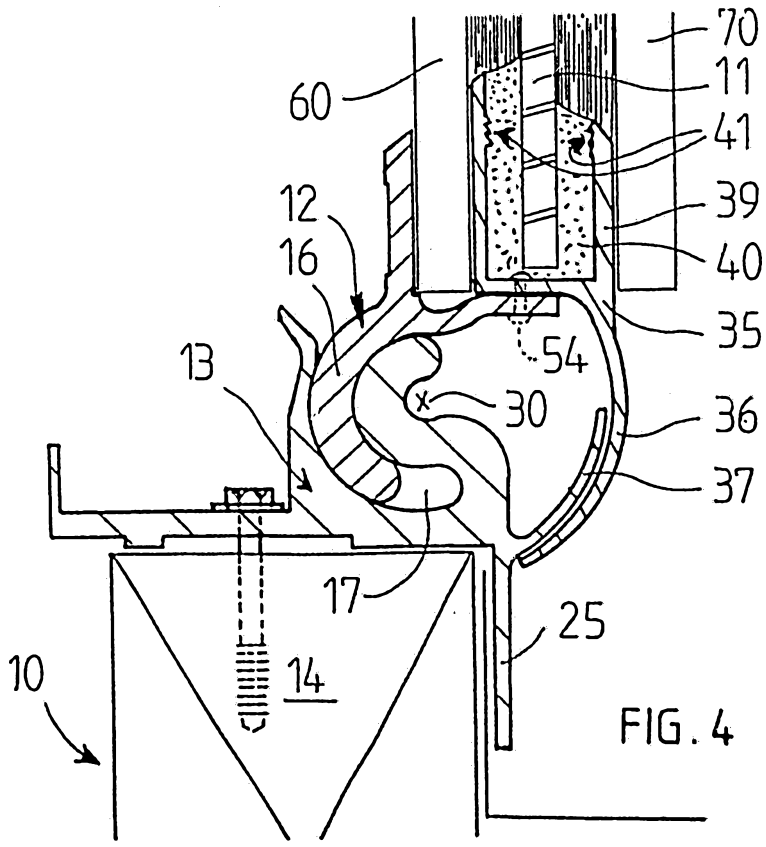
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FIG. 4

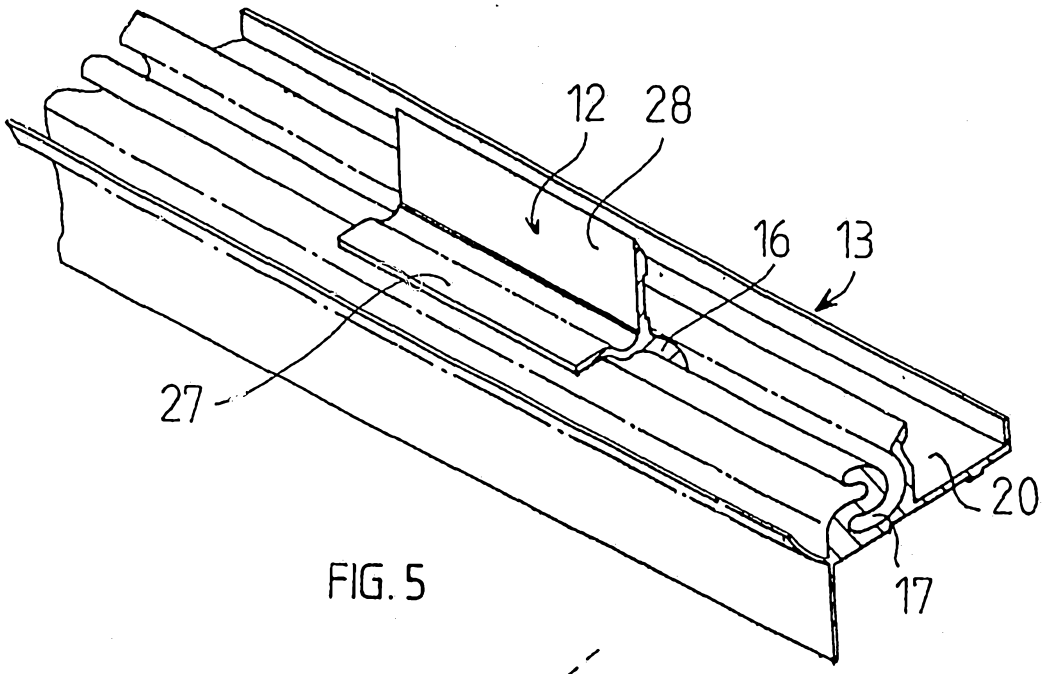

FIG. 5

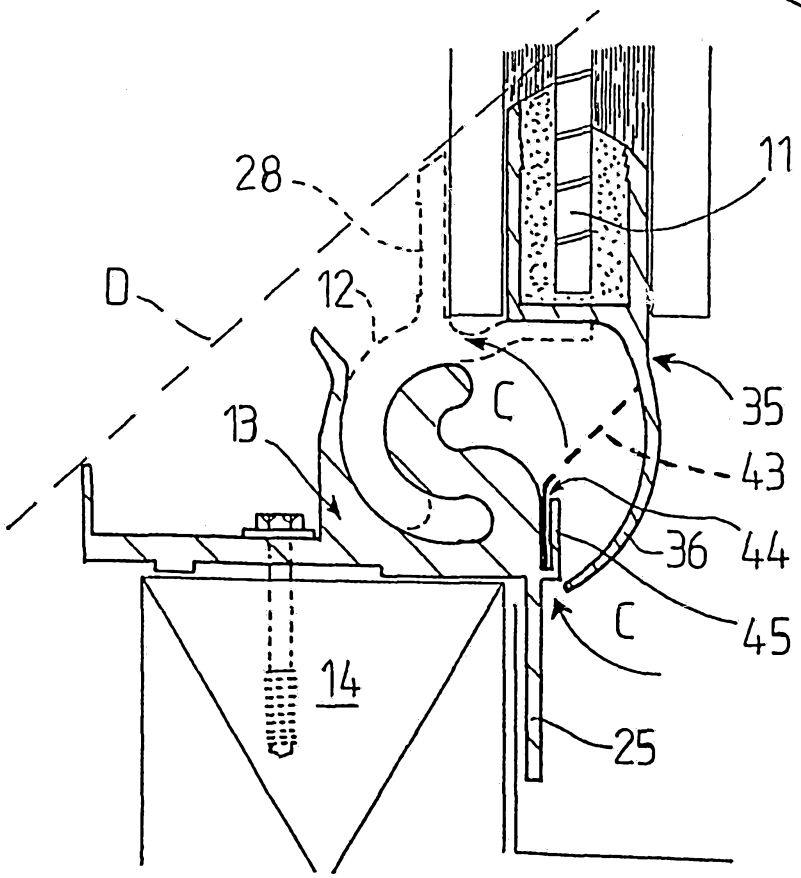

FIG. 6

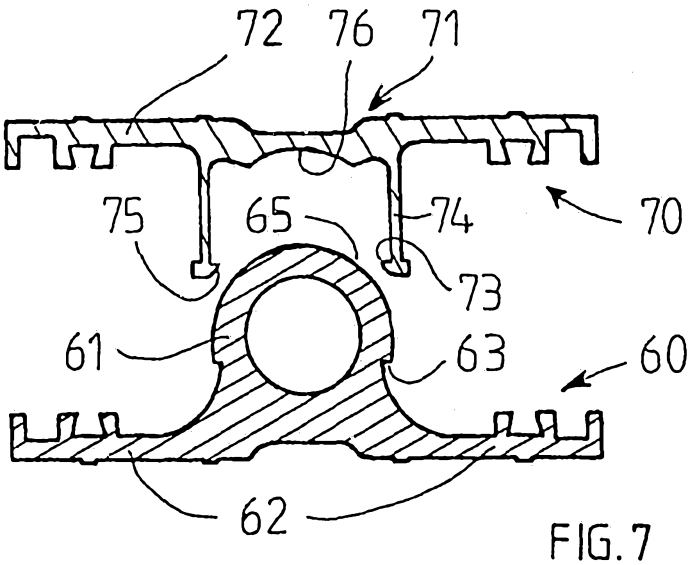

FIG. 7

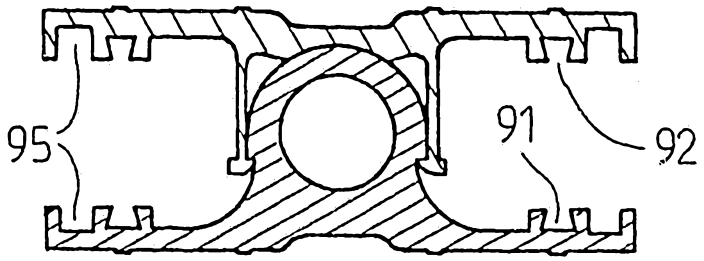

FIG. 8

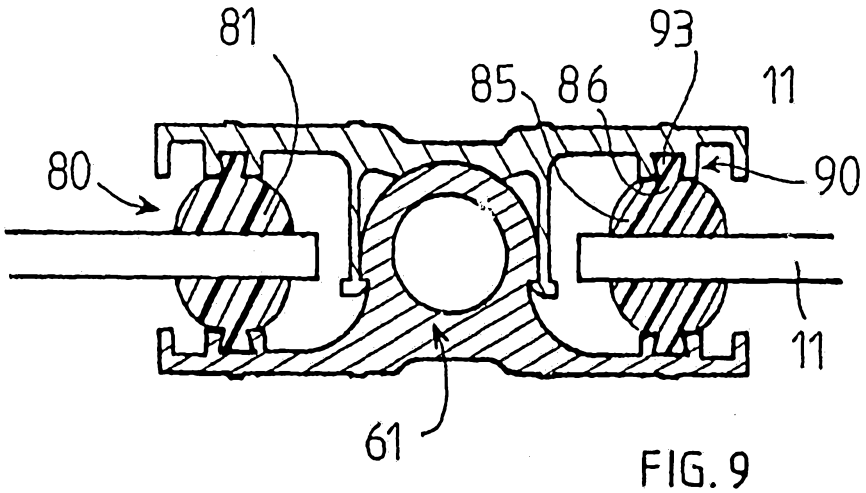

FIG. 9

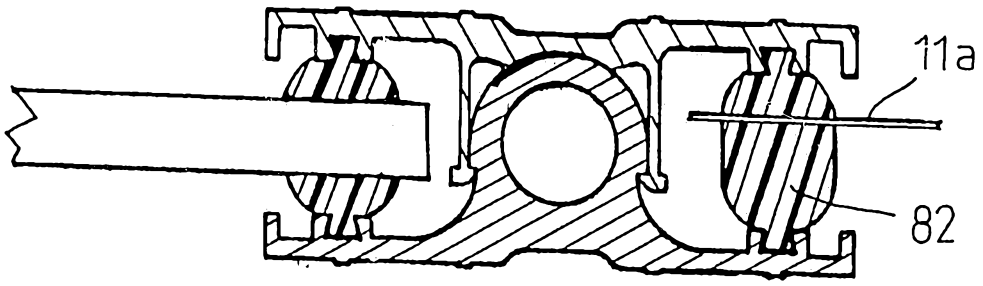

FIG. 10

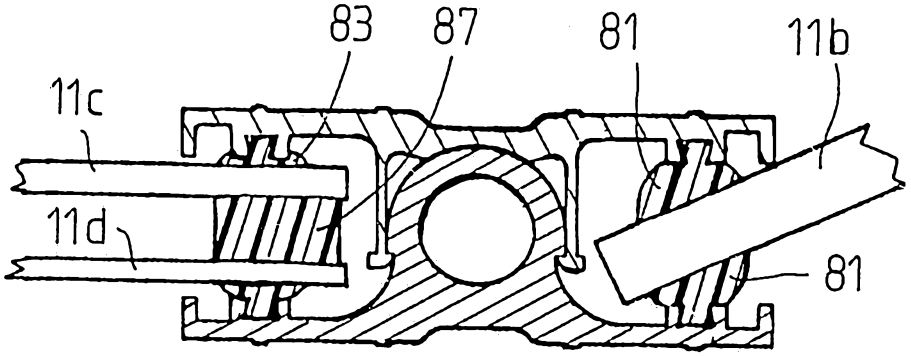

FIG. 11

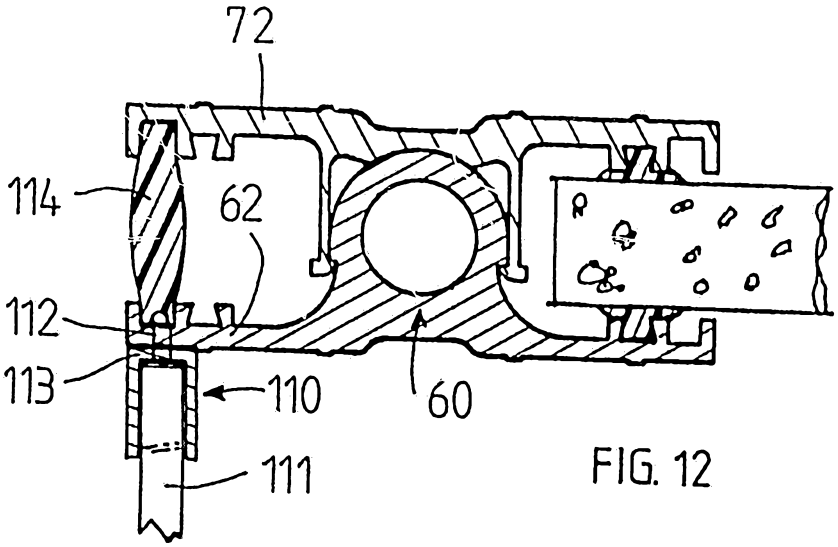

FIG. 12

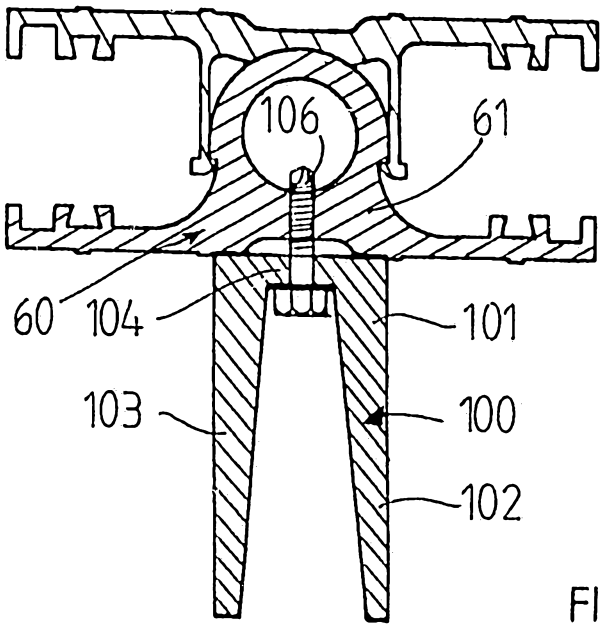

FIG.13

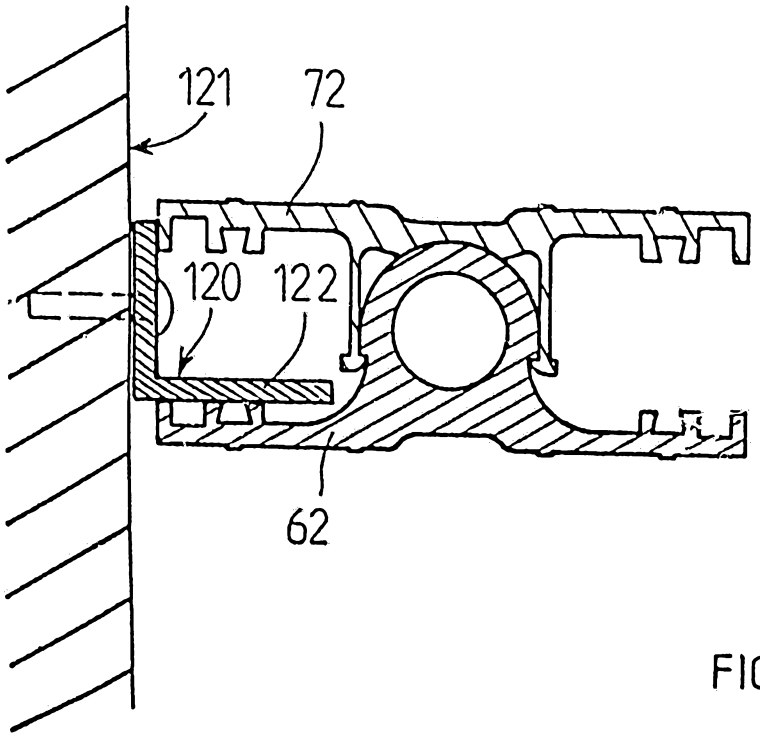

FIG.14