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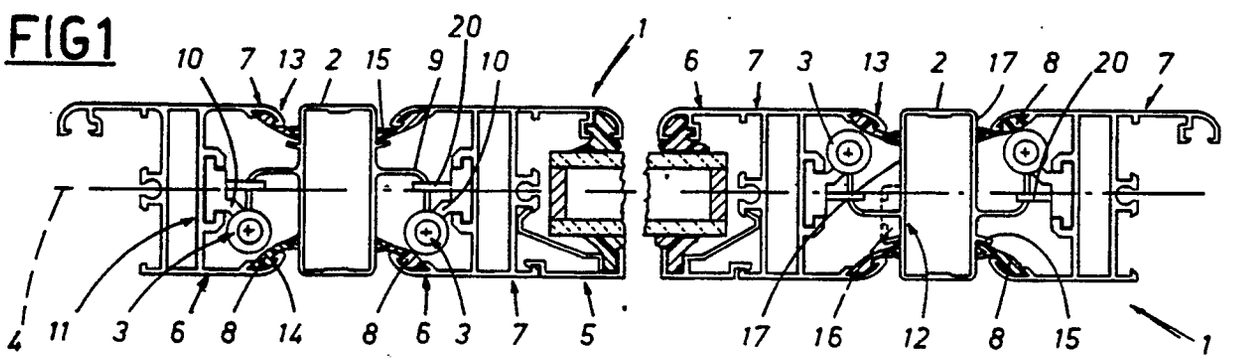
(54) Folding partition.

(57) The folding partition structure consists in a set of adjoining panels (5) and has intermediate hinge post sections (2) located one between each pair of adjacent panels, of which the hinge parts (3) are located between the longitudinal median plane (4) of the panels and one or other of the faces (6) of the panel sash, in such a way that the stiles of the sashes can be brought close to the intermediate sections (2) and the seals (8) positioned between them can be made correspondingly more compact; the hinge (3) is contained within the space occupied by the stile section (7) used to fabricate the sashes, and incorporates an interference element (20) that disallows relative axial movement of the hinge post (2) and panel (5) once a certain angle of rotation has been exceeded.

FIG1



EP 0 401 180 A1

A folding partition structure consisting in a set of adjoining panels slidable in tracks, alternated with intermediate hinge post sections and joined together by concealed hinges.

The invention relates to a folding partition structure consisting in a set of adjoining panels slidable in tracks, alternated with intermediate hinge post sections and joined together by hinges that are concealed from external view. Numerous types of partition systems are currently marketed, which consist in folding panels designed to glide between top and bottom horizontal tracks. These folding panel systems are especially useful for partitioning off and protecting open spaces such as terrace roofs, balconies, porticoes, etc.. The panels can be stowed away one against the next in simple fashion to the end of minimizing the space taken up when not in use. Moreover, folding panel systems of the type in question can be used advantageously to partition off internal spaces in a wide variety of ways, each such partition being swiftly removable.

Folding panels are practical, and well liked by virtue of the simple method of opening out and stowing away, and above all, of the undeniable advantages afforded as outlined above. Nonetheless, there are certain drawbacks currently discernible currently in partition systems which detract from their functional potential.

A first drawback stems from the fact that the structure of most partitions is somewhat complex and costly.

The principal drawback, however, is that heat and sound insulation tend to be of poor efficiency, especially along the fold lines between panels. One attempt to create a seal across the fold lines between panels consists in bridging the gaps with strips of rubber or other such material that deform elastically when the panels are rotated on their hinges.

Clearly, the continued use of folding partitions over a period of time will subject these seals to notable wear, diminishing their effectiveness. In addition, it must be said that the seals do not present an acceptable appearance, especially when the panels are folded and stowed.

Another folding partition structure incorporates an intermediate hinge post section, located between and articulating with each two adjacent panels. The upright stile sections of the panel sashes in this system are provided at each articulation with two contact surfaces contoured in the shape of an arc to a circle, each concentric with the point of articulation itself, and the intermediate section with two corresponding seals designed to engage the contact surfaces as the panels rotate. Whilst able to solve the problems of heat and sound insulation, this latter solution is still by no means free from drawbacks; in effect, such folding structures have proved slow to sell by reason of the high cost of manufacture involved in producing the particular contour of the sash stile section.

A second disadvantage stems from the fact that tight contact must be ensured between the contoured surfaces of the panel sash stile sections and the respective seals in order to obtain good acoustic insulation during rotation of the panel; thus there is strong sliding friction between the surfaces and the seals, resulting in heavy wear on the seals.

A further limitation affecting structures of this type is due to the fact that the extended partition can be made to follow a curved track on one side only. In effect, the single panel can rotate in relation to the intermediate post section through no more than 90° from the fully open position to the folded and stowed position, so that no rotation whatever is possible in the direction opposite to the folding direction.

Another drawback affecting conventional folding panel structures, especially when exposed to the weather (as will normally be the case), is that the sashes can become separated from their hinges by the force of the wind, presenting a serious hazard to life and limb. Accordingly, the axial movement of hinge parts in relation to one another needs to be prevented in order to ensure that the panels of the structure afford stability against wind, not to mention strength in the face of attempted break-in. The prior art embraces folding partition systems in which the relative axial movement of hinge parts is prevented by a locking ring; such a ring is located in a seating afforded by the hinge pivot, and thus disallows removal of the relative bushing.

This is an expedient that betrays certain drawbacks nonetheless, and tends toward impracticality.

A first drawback stems from the fact that the pivot to which the locking ring is fitted must first be machined, and therefore requires prior adaptation to suit the type of hinge adopted.

A second drawback stems from the fact that, in the event of the sash and frame needing to be separated from one another, the locking ring must first be removed; not only is this an operation requiring special tools, but notable additional difficulties also arise, especially with hinges installed in positions that deny easy access.

The object of the present invention is to overcome the drawbacks mentioned above.

The stated object is achieved in a folding panel structure as characterized in the appended claims,

which resolves the problem of providing good heat and sound insulation without the use of sliding surfaces, and is also economical in production.

One of the advantages of the invention, in fact, derives from the adoption of simple sections which are thus easy to manufacture and inexpensive.

A further advantage consists in the fact that the structure according to the invention can be used easily for non-rectilinear partitioning, whereby the panels, which swing to either side of the hinge centre through a certain angle, can be positioned along any given curved trajectory.

Not least among the advantages afforded is that the seals adopted are not affected by problems of wear. In fact, the significant proximity of the sash stile sections and the intermediate post sections, attributable to the particular arrangement of the hinge, enables the use of ordinary abutting seals. In addition to the flexibility and simplicity of the structure disclosed, mention should be made of its pleasing appearance, gained by virtue of the fact that the hinges are totally concealed from view and thus do not affect the visual design of the panels when in their extended configuration. An additional advantage of the structure disclosed is that no relative axial movement of hinge parts can occur, and the risk of sashes being blown off by the wind is thus eliminated. Moreover, routine maintenance of the panels is much facilitated, even of the external faces that are often difficult if not altogether impossible to reach in conventional structures, as the sashes can be lifted easily from their pivots when folded into the stowed position.

The invention will now be described in detail, by way of example, with the aid of the accompanying drawings, in which:

-fig 1 is a cross section of the folding partition structure, seen in plan in its extended rectilinear configuration;

-fig 2 is a cross section of the folding partition structure of fig 1, seen in plan, showing a point at which two adjacent panels are folded through 90° from the configuration of fig 1;

-fig 3 illustrates a first alternative embodiment of the invention;

-fig 4 illustrates a second alternative embodiment of the invention.

With reference to the drawings, the structure 1 consists substantially in panels 5 and intermediate sections 2 located between the panels 5. The panels 5 consist preferably in centred panes of glass, and sash frame members 7 surrounding the panes.

Each intermediate section 2 connects on either hand with the adjacent panel 5 by way of a hinge 3 that is located between the longitudinal median plane 4 of the panel 5 and one or other of the two external faces 6 of the sash.

Each hinge 3 is accommodated within the dimensional compass of the corresponding panel sash member 7, in such a way as to remain concealed from external view and thus ensure that the appearance of the panels 5 will not be adversely affected when the partition is extended.

The positioning of the hinge 3 is advantageous in particular as it enables the upright sash members, i.e. the stile sections 7, to be brought markedly close to the corresponding intermediate sections 2, when the panels 5 are drawn out into the extended configuration of the partition.

In fact, the proximity of the two sections 2 and 7 will be the more pronounced the closer the single hinge 3 can be stationed behind the face 6 of the panel 5.

By logical extension, a close position of the panel section 7 in relation to the adjacent intermediate section 2 will enable the insertion of seals 8 with correspondingly compact dimensions, which in turn brings about an improvement in the heat and sound insulation properties of the structure 1.

To this end, the seals 8 can be of different types and differently disposed.

In figs 1 and 2 for example, the longitudinal edges of the stile sections 7 nearest to the intermediate section 2 are moulded with appropriate seatings 14 to accommodate the seals 8.

In fig 3, on the other hand, the seals 8 are fitted directly to the intermediate section 2, anchored in relative seatings 18 located at the vertical edges. Accordingly, when the panels 5 are folded away into the stowing position, each seal 8 will be located between the flank surface 17 of the intermediate section 2 and the adjacent external face 6 of the panel 5. Positioned thus between the two surfaces, the seal 8 functions as a soft cushioning medium.

Another possible arrangement of the seals 8 is that illustrated in fig 4, where each seal 8 is split into two matching parts 8a and 8b.

In this instance, both the intermediate section 2 and the stile section 7 afford seatings 18, 14 to accommodate the respective parts 8a and 8b.

Again, the seatings denoted 18 are located along the vertical edges of the intermediate section 2; the seatings denoted 14, on the other hand, are the same as in figs 1 and 2.

This particular arrangement of the seals 8a, 8b is especially advantageous in cases where magnetic types are adopted. In practice, the magnetic force of attraction, which persists when the lips of the seals 8a and 8b are offered to one another, is such as to ensure an efficient excluding action even with seals that have become especially worn or deformed.

The intermediate section connects with the hinge 3 by way of an element 9 which, being appropriately profiled, allows the adjacent stile sec-

tion 7 to rotate freely, but in such a way that no contact is possible geometrically between the stile and the element 9 when the panel 5 is rotated.

More exactly, the interconnecting element 9 issues from the flank 17 of the intermediate section 2 directed toward the hinge 3 and is L-shaped, thus creating a recess in which to accommodate the edge 13 of the stile section 7 when the relative panel 5 is folded into the stowed position.

Moreover, the stile sections 7 are fashioned with a rounded profile at the edges 13, in such a way as to minimize the space necessary for rotation.

Naturally enough, the hinge 3 is connected by way of a second element 10 with the stile section 7 of the panel.

To facilitate assembly, in a preferred embodiment, the two interconnecting elements 9, 10 will engage with the intermediate section 2 and the stile section 7, respectively, by way of positive sliding fittings 11 and 12. Clearly enough, the elements 9 and 10 might equally well be associated removably with the sections by means of other fasteners such as screws, bolts etc.

Preferably, the fitting denoted 12 consists in a slot 16 running longitudinally and in relief along the flank 17 of the intermediate section 2. The side face of the slot 16 farthest from the hinge 3 is located advantageously behind and directly adjoining one of the seals 8; in this way, the face also provides a stop to check the inwardly-directed flexural movement of the seals 8, caused by wind or draught, while presenting an internal labyrinth profile to any air that may in fact infiltrate.

Alternatively, in the event that the element 9 is attached to the intermediate section 2 other than by way of a positive fitting 12, integrally for example, the check for the seals 8 can be fashioned as illustrated in fig 2, in the form of a simple fin 15. Such a fin will be located, clearly enough, in the area opposite that occupied by the hinge 3 in relation to the longitudinal median plane 4 of the panel 5, and positioned longitudinally on the flank 17 of the intermediate section 2; needless to say, the fin 15 will extend continuously along the entire length of the seal 8 if its function as a stop is to be performed to best effect. Disposed thus, the fin 15 provides an effective labyrinth against any infiltration of air, water etc.

Given that between each stile section 7 and the relative intermediate section 2 there is a certain degree of clearance (however minimal), the folding partition disclosed possesses the capacity to bend marginally, even toward the side opposite that on which the panels are folded away for stowing. Accordingly, it becomes possible for the extended partition to follow trajectories deviating on either side from the median plane 4, with equal ease.

The hinge 3 used in the folding structure, which consists essentially in a pivot and a bushing, also comprises an interference element denoted 20. The interference element 20 is rigidly associated with one component of the hinge assembly (pivot or bushing) and stationed outside the dimensional compass normally allowing relative axial movement of the hinge components.

The interference element 20 is positioned so as to register with a given component of the partition structure and disallow its movement along the axis of rotation of the hinge 3.

More exactly, the interference element 20 can be embodied, as in the example illustrated, in such a way as to enter into contact with the intermediate section 2 by way of the element 9 interconnecting the section with the respective component of the hinge 3.

The function of the interference element 20 is linked to two particular positions: a first of non-interference, in which the intermediate section 2 is easily separated from the point of articulation, and a second of interference in which movement of the relative interconnecting element 9 in an axial direction is disallowed by reason of the fact that the interference element 20 is rigidly associated with the interconnecting element 10 of the sash stile section 7, hence with the remaining component of the hinge.

It will thus be clear how the dimensions and shape of the interference element 20 permit of selecting an angle of rotation of the panel 5 at which its movement in the axial direction will be either enabled or inhibited; moreover, the interference element 20 can be associated removably with the relative component of the hinge 3. Embodied thus, the folding structure is rendered significantly more stable and safe in the extended configuration, given that freedom of relative axial movement at the various points of articulation is entirely eliminated. At the same time, the intermediate sections 2 will become freely detachable from the sashes 5 at the respective hinge 3, automatically, when the panels are folded back.

The ease with which the intermediate section 2 can be dismantled also favours routine maintenance of the outsides of the sashes 5, which normally would be difficult, if not impossible to reach (in the case of balcony enclosures).

Claims

1) A folding partition structure consisting in a set of adjoining panels, slidable in tracks, alternated with intermediate hinge post sections and joined by concealed hinges,
characterized

in that the hinges (3) are positioned between the longitudinal median plane (4) of the panels (5) and one or other of the external faces (6) of the panel sashes, enabling location of the stile section (7) of each sash in close proximity to the adjacent intermediate section (2) when the panels (5) are extended to form a partition, in such a way as to enable the interposition of seals (8) possessing correspondingly compact dimensions.

2) A structure as in claim 1, wherein each hinge (3) is contained within the dimensional compass of the relative sash stile section (7) and associated with the adjacent intermediate section (2) by way of an interconnecting element (9) of which the contour allows the stile section (7) to rotate freely without encountering the interconnecting element (9), when the panel is folded away for stowing.

3) A structure as in claim 1, wherein the hinge (3) is interconnected with the intermediate section (2) and the panel sash stile section (7) by way of a removable first element (9) and a removable second element (10), respectively.

4) A structure as in claim 3, wherein the first and second interconnecting elements (9, 10) engage with the intermediate section (2) and the panel sash stile section (7) by way of corresponding positive sliding fittings (11, 12).

5) A structure as in claim 1, wherein the vertical edges (13) of the sash stile sections (7) adjacent to each intermediate section (2) offer a rounded profile in order to minimize the space necessary for rotation.

6) A structure as in claim 1, wherein each stile section (7) affords respective seatings (14) serving to accommodate the seals (8).

7) A structure as in claim 1, wherein each vertical edge of the intermediate section (2) directed toward the corresponding hinge (3) affords a respective seating (18) serving to accommodate a seal (8) that performs an additional cushioning function by virtue of its position between the intermediate section (2) and the panel (5), assumed when the panels are folded and stowed.

8) A structure as in claim 1, wherein the seals (8) are magnetic in embodiment and consist in two distinct parts (8a, 8b), accommodated in relative seatings (18, 14) afforded respectively and in corresponding positions by the inside vertical edges of the intermediate section (2) and the stile sections (7).

9) A structure as in claim 1, wherein each flank of the intermediate section (2) directed toward a sash stile section (7) affords a continuous longitudinal fin (15) positioned on the side of the longitudinal median plane (4) of the panel (5) opposite from that of the hinge (3), alongside and immediately behind the corresponding seal (8), which serves both to check inwardly directed flexural movement of the seal (8) and to create an internal labyrinth profile.

10) A structure as in claim 4, wherein the sliding fitting (12) relative to the intermediate section (2) consists in a slot (16), set in relief and located on the flank (17) of the intermediate section (2) offered to the corresponding hinge (3), of which the side face farthest from the hinge (3) is positioned immediately behind a corresponding seal (8) in such a manner as to check inwardly directed flexural movement of the seal and also to create an internal labyrinth profile.

11) A structure as in claim 1, comprising at least one interference element (20) rigidly associated with one of the components of each hinge (3), stationed outside the dimensional compass internally of which axial movement of the hinge is normally allowed, and of shape and dimensions such as to disallow movement of the components along their axis of rotation one in relation to the other on arrival at a selected angle of rotation.

12) A structure as in claim 11, wherein the interference element (20) is rigidly and removably associated with the relative component of the hinge (3).

13) A structure as in claims 2 and 11, wherein the interference element (20) registers with the intermediate section (2) by way of the element (9) interconnecting that section with the hinge (3).

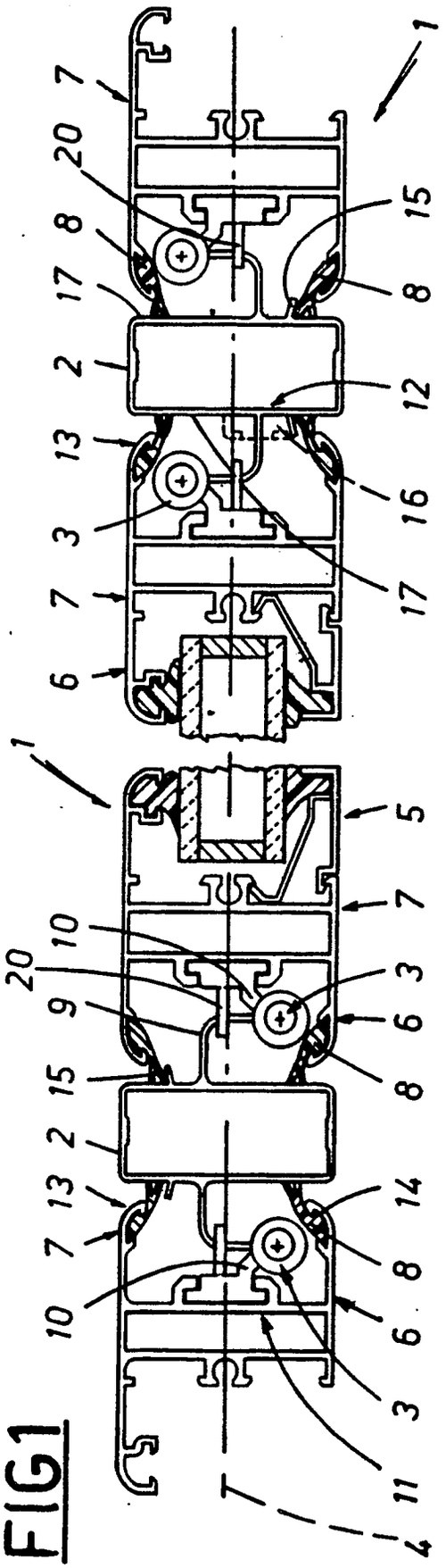

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FIG1

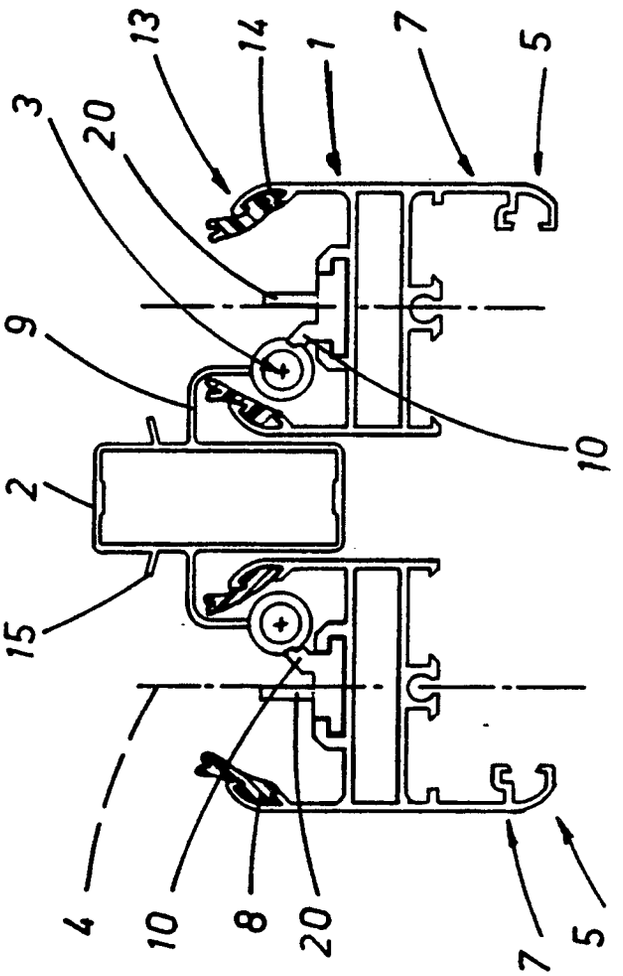
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FIG2

FIG 3

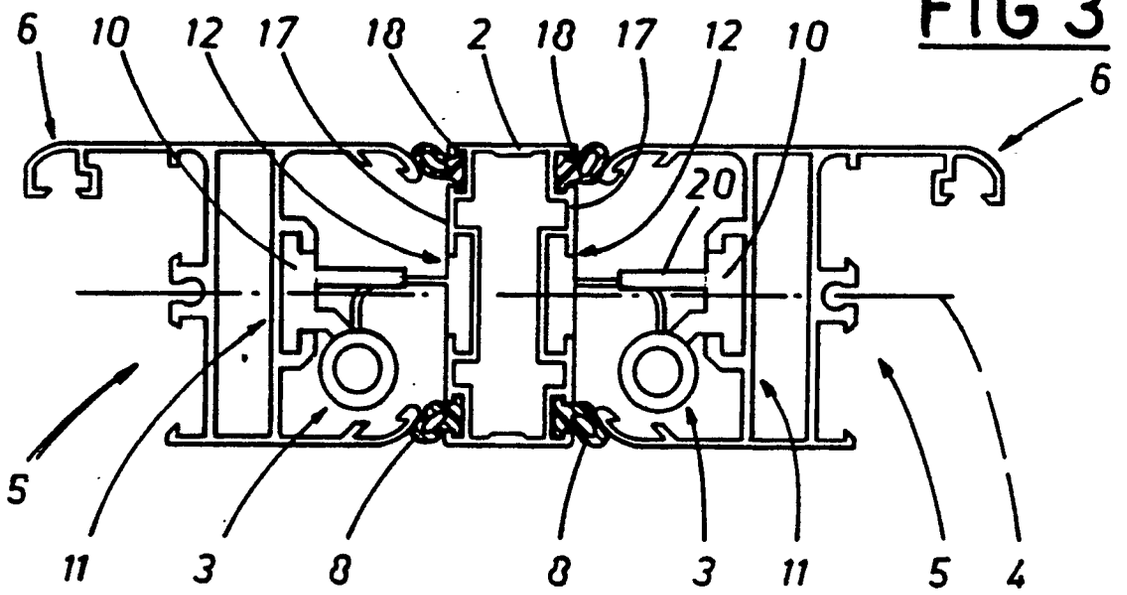
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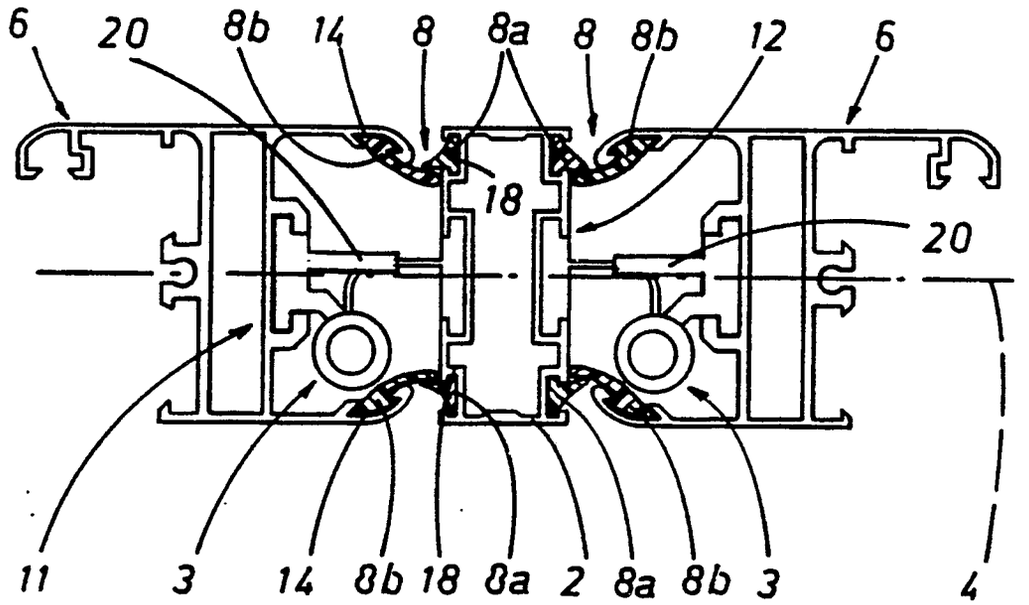
FIG 4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European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 90 83 0239

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	DE-A-2 602 206 (SAXI) * Page 2, line 6 - page 3, line 2; page 3, paragraph 4; page 6, paragraphs 3,4; figures 1,2,5,6 *	1,2,5	E 06 B 3/48 E 05 D 15/26
Y		3,4,8	
X	EP-A-0 014 361 (GREBAU) * Page 2, lines 3-10; page 2, line 23 - page 3, line 20; page 5, line 18 - page 7, line 33; figures 1-3 *	1,2,6	
Y	CH-A- 517 888 (SOC. MET. DE SAINT-LOUIS) * Column 3, lines 7-14; figures 1,2 *	3,4	
Y	EP-A-0 277 531 (SCHÜCO) * Column 5, lines 16-26; figures 4,5 *	8	
A	US-A-3 720 255 (UEDA) * Column 2, lines 19-46; figures 5,6,11 *	1,2,5	TECHNICAL FIELDS SEARCHED (Int. Cl.5)
A	DE-U-8 633 829 (KLAIBER) * Page 10, line 13 - page 12, line 2; figures 1-5 *	1,2,5	E 06 B
A	DE-A-3 505 267 (KINDLER) * Page 3, paragraph 5; page 4, paragraphs 5-7; figures 6-13 *	1,2	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	05-09-1990	DEPOORTER F.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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