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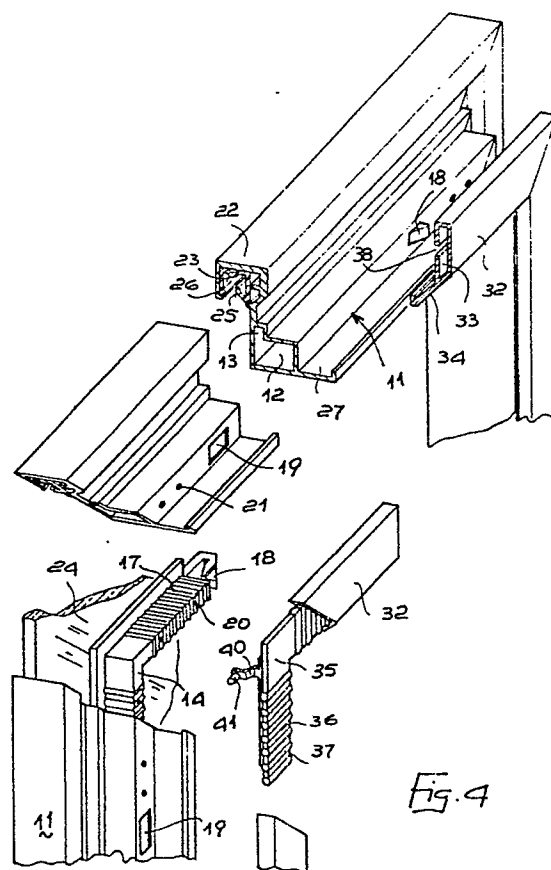
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54 **Load-bearing frame for closure elements in internal dividing walls and the like.**

57 The load-bearing frame for closure elements (24), for example transparent elements, in internal dividing walls and the like according to this invention is constituted of metal profiles (11) having at least one tubular portion (12) and one throat portion (22), adapted for seating a gasket (23) for securing a transparent plate (24), in which a plurality of profile segments (11) are secured together to form the frame by means of shaped joints (14) having portions which can be inserted into the tubular portions (12) of the metal profiles (11), at their corresponding ends to be connected at a corner, and capable of being blocked by friction and fixity in them, there being present members for securing the frame to the structure of the wall and elements (32) for concealing said members, the whole assembly being adapted to be mounted by fixity and friction.



EP 0 307 033 A1

## LOAD-BEARING FRAME FOR CLOSURE ELEMENTS IN INTERNAL DIVIDING WALLS AND THE LIKE

The subject of the present invention is a load-bearing frame for closure elements, for example transparent elements, in internal dividing walls and the like.

In many building applications, especially in the case of offices and the like, an enormous number of applications can be found for internal dividing or partition walls, adapted for permitting the subdividing of a single room, of huge dimensions, into smaller parts, for example for the purpose of separating several offices, or internal rooms intended for various purposes, and so on.

Such internal dividing walls are usually constructed of a unit-composed structure, for the purpose of enabling them to be brought into use at any time after construction of the fixed walling of the room in which they are placed and easy dismantling if the internal subdivision is to be shifted or modified.

Walls of this class must have particular characteristics, among these to provide effective insulation against noise, dust and so on, and they must be capable of accommodating doors, transparent elements, openings or other features, as well as carrying brackets or possessing a sufficient thickness to receive shelves and the like, constituting not only a wall but also a container.

It is also required of dividing walls that they shall offer special aesthetic requirements, both in the obscured zones and in the zones equipped with transparent elements, doors and the like, thereby matching the equipment of the spaces defined by them.

One element of particular importance in internal dividing walls is provided by the support frames for the transparent elements or elements of other type, either opaque or translucent, adapted for closing the bays formed by the load-bearing grid of the wall, which require a frame for their support, both for functional reasons and for reasons of peripheral finishing or trimming; said frames make up the main frame, to which is secured the closure element, for example composed of a plate of transparent material such as glass.

These frames are hereinafter termed, for short, "pane-holding" or "pane-fixing" frames, independently of the nature of the plate element carried by them. Said frames must possess adequate stiffness and therefore must be dimensioned with that objective and, at the same time, for aesthetic reasons must be scarcely visible from the outside, so that they do not give the partition a heavy appearance.

The pane-holding frames, moreover, in general have the characteristic of being composed of a

plurality of rectilinear segments, mounted at angles to one another, equipped with joint elements at the corners and with sealing profiles or gaskets for securing the plate of glass or similar material: the preparation and assembly of such components proves to be a complex operation, difficult to carry out automatically, which therefore influences the overall cost of the product.

The need therefore arises for providing a pane-holding frame which shall offer the best possible characteristics of rigidity, combined with the aesthetic requirements of small bulk of the parts that are externally visible, which shall moreover be especially rapid to assemble, with a reduced number of operations and limited tools necessary for the manual operations, thus offering a reduced cost of production.

Said results are achieved by the present invention, which provides a load-bearing frame for closure elements in internal dividing walls and the like, which is composed of metal profiles having at least one tubular portion and one throat portion, adapted for seating a seal or gasket for securing a closure plate, for example transparent plate, in which a plurality of profile segments are secured to one another, forming the frame, by means of shaped joints having parts that can be inserted into the tubular portions of the metal profiles, at their corresponding ends to be connected at an angle, and are capable of being blocked by friction and fixity inside them, there being present members for securing the frame to the structure of the wall and elements for concealing said members and the load-bearing structure of the wall, the whole assembly being adapted to be mounted by fixity and friction.

The metal profiles are constituted of a tubular portion, having a principal part with a substantially square cross-section and a secondary part, oriented towards the outside of the frame formed of the profiles, having a quadrangular form contiguous to the principal part, from which secondary part there departs, also towards the outside of the frame in its front zone, a throat-shaped limb having associated retaining projections, forming the fixing seating for a gasket for securing the closure plate, there being also present a flat limb extending towards the rear part of the frame, this limb being adapted for concealing the members for securing the frame to the wall and/or the structure of the wall itself.

The securing gasket for the closure plate is inserted fixedly into the corresponding throat of the metal profile before said profile is cut to length for forming the frame, the gasket being cut together

with the metal profile in a single operation.

The gasket has a portion of U-section in rigid plastics material, and at least one flexible lip, facing towards the inside of the U-section and adapted for gripping elastically a plate inserted into the gasket, it being possible for said plate to be of lesser or greater thickness but still remaining uniformly gripped with the same gasket.

The shaped joints that can be inserted into the tubular parts of the metal profiles for securing the profiles at an angle to form the frame, are composed of an L-shaped body having equal, perpendicular arms, with a substantially square cross-section, the arms being adapted to be inserted into the part of square cross-section of the tubular portion of the profile, from which there projects outwards a peripheral limb, adapted to be inserted into the secondary part of the tubular portion of the metal profile, for the purpose of increasing the flexural rigidity of the joint, transverse projections being present on the arms of the body of the joint, adapted to be inserted into the tubular part of the profile with elastic deformation, securing the joint by friction to the metal profiles pushed onto it, there being also present curved elastic hook elements, projecting beyond the profile of the body of the joint, in correspondence with which there are present recesses in the metal profiles, into which the elastic elements are inserted, when the joint is inserted into position in the corresponding tubular part of the metal profiles.

The recesses of the metal profiles are in a position that determines the insertion into them of the elastic hook elements in conditions of clamping, the one onto the other, of the converging metal profiles fitted onto the arms of the joint.

In the load-bearing frame for closure elements in internal dividing walls and the like, there are provided, in the metal profiles and in the arms of the joints, corresponding holes for coupling together if desired, by means of screws, especially in the case of frames of large dimensions or plates of considerable weight.

The elements for concealing the members for securing the frame to the structure of the wall, and/or the load-bearing structure itself of the wall, comprise a metal frame composed of a shaped profile having a tubular portion and a limb for connecting to the structure, there being present corner joints, adapted for connecting the profiles of the frame, which can be inserted into the tubular portions of the profiles.

The corner joints are formed of an L-shaped element of shaped plastics material, having arms that can be inserted by force into the seatings of two converging, mutually perpendicular profiles, the arms being secured by friction in them, the L-shaped member being equipped, in addition, on

the arm that is orientated vertically, with a tongue carrying a projecting pin, adapted for engaging into a corresponding hole of the uprights and cross-members of the structure, thus carrying the weight of the concealing frame.

Further details will become apparent from the following description, given with reference to the attached drawings, in which there are shown:

in Figure 1, a front view of a dividing wall, equipped with a pane-holding frame according to this invention;

in Figure 2, a section on the plane II-II of Figure 1;

in Figure 3, the frame of Figure 2, applied to an alternative form of dividing wall;

in Figure 4, an exploded view of the frame according to this invention, at a right-angled connection;

in Figure 5, a right-angled connecting bracket for the pane-holding frame, in front view;

in Figure 6, a section on the plane VI-VI of Figure 5;

in Figure 7, a right-angled connecting bracket for the concealing and connecting frame, in front view;

in Figure 8, a section on the plane VIII-VIII of Figure 7;

in Figure 9, the bracket of Figure 7 in lateral view.

As Figure 1 shows, a dividing wall or partition extends between a pair of mutually facing walls 1, a floor 2 and a ceiling 3, for the purpose of separating two parts of a room of larger dimensions.

The dividing wall substantially comprises a peripheral frame 4, secured to said walls 1, floor 2 and ceiling 3, to which there are connected a plurality of uprights 5 carrying respective cross-members 6, defining bays of various dimensions, in which there are disposed wall panels 7, of the opaque type and closure elements 8, for example transparent, doors 9 and the like.

The closure elements 8 are composed of a "pane-holding" frame 10, constructed of an extruded light alloy profile 11, the shape of which can be seen more clearly in section in Figures 2, 3, and in the exploded view of Figure 4.

The profile 11 possesses a central tubular portion, comprising a zone of substantially square section 12 and a rectangular zone 13, of smaller thickness, facing outwardly from the quadrilateral formed of the four profile segments making up the frame adapted for carrying a closure plate, for example of glass or the like; into said tubular portion, as shown in Fig. 4, at the ends of the profiles 11 cut to length with a 45° mitre to form the corners of the frame, there is inserted an angle joint 14, of moulded plastics material, by means of

which the connection of the mutually perpendicular profiles of said frame is effected.

Said joint, more clearly illustrated in Figures 5, 6, comprises an angled body having a substantially square section 15, adapted to be inserted into the zone 12 of the profile 11, and a peripheral limb 16, adapted to be inserted into the zone 13 of the tubular part of the profile 11; the extension of the limb 16 assures to the joint the bending stiffness necessary for guaranteeing perpendicularity between the contiguous profiles 11 connected by it.

The surface of the body 15 of the joint possesses projections 17, adapted for permitting the joint to be inserted with friction into the zone 12 of the profile 11, thus facilitating the holding of this joint in its seating; the securing of the profile 11 to the joint 14 is furthermore assured by the end portions of the arms of the joint itself, possessing at their ends a raised elastic tooth 18, projecting, as shown in Figure 6, from the surface of the body 15, in correspondence with which tooth a recess 19 is formed in the profile 11; in this manner, the profiles 11 can be fitted onto the joint with an elastic force fit, until blockage is obtained by the emergence of the tooth 18 from the recess 19, as can be seen in Figure 4; this assures rigidity of the connection, by keeping the coupling surfaces, mitred at  $45^\circ$ , of the profiles 11 clamped elastically onto each other, and assembly may be carried out in an especially rapid manner without the use of special equipment, in particular without the use of screws.

In the case of closure elements with plates of glass of large dimensions, however, it is also possible to arrange, if necessary, for the profiles 11, especially for the vertical profiles that carry the weight of the associated plate, to be secured to the joint, by reinforcement with a pair of screws inserted into the holes 20, 21, provided for this purpose on the joints 14 and profiles 11 respectively.

As the Figures show, the profiles 11 have a seating 22, adapted for housing a gasket or seal 23, substantially of U-section, into which there is inserted a closure plate 24, for example a transparent plate, of glass or the like.

The gasket 23 possesses a flexible lip 25 and a corresponding raised flange 26, appropriately formed of a material that is elastically more deformable than the remaining part of the gasket; said lip 25, and partly also the raised flange 26, as shown in Figure 2 in its right-hand and left-hand parts respectively, can deflect to a lesser or greater extent towards the interior of the profile of the gasket, so that it is possible to receive, without change of gasket, either plates 24a of small thickness, for example 3 mm, or plates 24b of greater thickness, for example 7 mm.

The gasket 23 is designed to be inserted into the respective seating 22 before the profiles 11 are cut to length, by using automatic machines to operate on entire bars comprising profiles 11 and gaskets 23; during assembly, the cutting to size of the profiles 11 and of the associated pane-fixing gaskets takes place in one single operation, thus providing a considerable saving in time, both as a result of the possibility of automating the fitting of the gasket to the profile, and as a result of the simultaneous cutting to dimensions of the profile and the gasket, thereby achieving higher accuracy in execution.

The arrangement of the seating 22 and of the gasket 23, the flexible lip of which is disposed, as shown in the Figures, towards the inside, also enables the external surface of the closure plate to be kept substantially flush with the remaining part of the surface of the wall, with associated advantages in respect of aesthetics and cleaning, thereby avoiding the presence of re-entrant angles at the support frame for the transparent plates, where dust and the like could accumulate.

Furthermore, the shape of the profile 11 allows the closure plate to be secured in the vicinity of the perimeter of the frame which supports it, keeping the remaining part of the frame, the size of which is determined by the requirements for providing adequate stiffness to the whole assembly, in a position that is more internal and set back with respect to the closure plate, with consequent aesthetic improvements.

The profile 11, finally, possesses a limb 27 projecting towards the median plane of the wall for which it is intended, having in the case of a wall of small thickness serving solely for partitioning functions, an end near to that of the corresponding limb of the profile of the opposite face of the same partition, as shown in Figure 2: said limbs enable the members for supporting and assembling the frame and the load-bearing structure of the wall to be concealed from sight, thereby assuring the aesthetic appearance of the whole.

Said support and assembly members are, for example, constituted of respective hooks 28, secured by means of screws or the like to the profiles 11 forming the vertical faces of the frame 10, by means of which said frame is secured to bolts 29 projecting from the uprights; as Figure 2 shows, after the frame has been mounted in position, said hook elements or other similar elements are no longer visible, being entirely obscured by the limbs 27.

In the case of a partition of great thickness, as illustrated in Figure 3, adapted for constituting not only a partition means but also a container element, the dimension of uprights and cross-members transversely to the wall being larger for this

purpose, the pane-holding frame is equipped with corresponding members for fixing to the uprights, for example in the form of angles 30 resting on associated pins 31 of said uprights; in such a case, for the purpose of concealing the fixing members from view, an auxiliary covering frame 32 is provided, extending from the limb 27 of the profile 11 of the pane-holding frame opposite the surface of cross-beams and uprights.

Said covering frame 32 is composed of profiles of light alloy or similar material, the form of which in cross-section is shown in Figures 3 and 4 and is composed of a quadrilateral portion 33, having its larger dimension in the plane of the frame, which extends towards the limb 27 with an associated connecting limb 34.

For the purpose of achieving, in an especially rapid manner, the connection of the profile segments constituting the frame, the use is provided of a corner joint 35, of moulded plastics material, by means of which the connection together of the mutually perpendicular profiles of said frame is achieved.

Said joint, shown more clearly in Figures 7, 8 and 9, has an angled body having a substantially rectangular section 36, adapted to be inserted into the quadrilateral portion 33 of the profile of the frame; the surface of the body 36 of the joint possesses projections 37, adapted for allowing it to be inserted with friction into the portion 33, thereby ensuring holding by friction; in this manner, assembly may be carried out in an especially rapid manner and without the use of special tools, in particular without the use of screws or other retaining elements.

The quadrilateral portion 33 of the profile of the frame 32 possesses an aperture 38, and in correspondence therewith the joint 35 possesses a longitudinal projection 39; from this projection 39 there extends a shaped tongue 40, equipped with a projecting pin 41, which moreover projects outside the frame 32.

As Figures 7, 8, 9 show, the tongue 40 is present on only one of the two mutually perpendicular arms of the body of the joint 35, in particular on the arm intended to be mounted vertically in the frame.

The pins 41 are provided for insertion into corresponding holes of the adjacent uprights, in this manner supporting the self-weight of the frame 32; said holes may be formed for this purpose on the uprights or, preferably, they are constituted of the same holes provided along the edges of the uprights for seating support pins and the like for the cross-members, for the pane-holding frames, for shelves and the like, as illustrated in Figure 3, or they may be constituted of analogous fixing members, to which the tongues 40 and pins 41 are

shaped to correspond.

Numerous variants may be introduced, without thereby departing from the scope of the invention in its general characteristics.

## Claims

1. Load-bearing frame for closure elements in internal dividing walls and the like, characterized by the fact that it is constituted of metal profiles having at least one tubular portion and one throat portion, adapted for seating a gasket for securing a closure plate, in which a plurality of profile segments are secured to one another, forming the frame, by means of shaped joints having portions that can be inserted into the tubular portions of the metal profiles, at their corresponding ends to be secured at an angle, the inserted portions being able to be blocked by friction and fixity inside them, there being present members for securing the frame to the structure of the wall and elements for concealing said members and the supporting structure for the wall, the whole assembly being adapted to be assembled by fixity and friction.

2. Load-bearing frame for closure elements in internal dividing walls and the like according to Claim 1, characterized by the fact that the metal profiles are composed of a tubular portion, having a principal part of substantially square cross-section and a secondary part, orientated towards the outside of the frame formed of the profiles, having a quadrangular shape contiguous to the principal part, from which secondary part there projects, also outwardly from the frame and in its part facing towards the front, a throat-shaped limb, possessing associated retaining projections, forming the fixity seating for a gasket for securing the closure plate, there being also present a flat limb, extending towards the rear part of the frame, and adapted for concealing the members for securing the frame to the wall.

3. Load-bearing frame for closure elements in internal dividing walls and the like according to Claim 2, characterized by the fact that the gasket for securing the closure plate is fixidly inserted into the corresponding throat of the metal profile before said profile is cut to shape for forming the frame, the gasket being cut together with the metal profile in one single operation.

4. Load-bearing frame for closure elements in internal dividing walls and the like according to Claim 3, characterized by the fact that the gasket possesses a portion of U-section of rigid plastics material and at least one flexible lip, facing towards the interior of the U-section, the lip being adapted for elastically pressing a plate inserted into the

gasket, it being possible for said plate to be of small or large thickness, but still being secured by the same gasket.

5. Load-bearing frame for closure elements in internal dividing walls and the like according to Claim 1, characterized by the fact that the shaped joints which can be inserted into the tubular portions of the metal profiles for securing said profiles at a corner for the formation of the frame, are constituted of an L-shaped body, having mutually perpendicular, equal arms, of substantially square cross-section, the arms being adapted to be inserted into the part of square cross-section of the tubular portion of the profile, from which arms there projects outwardly a peripheral limb, adapted to be inserted into the secondary part of the tubular portion of the metal profile, increasing the flexural rigidity of the joint, transverse projections being present on the arms of the joint body, adapted to be inserted into the tubular part of the profile with elastic deformation, thereby fixing the joint by friction to the metal profiles fitted onto it, there being also present curved elastic hook means, projecting beyond the profile of the body of the joint, in correspondence with which recesses are present in the metal profiles, into which recesses the elastic elements engage when the joint is inserted into position in the corresponding tubular portion of the metal profiles.

6. Load-bearing frame for closure elements in internal dividing walls and the like according to Claim 5, characterized by the fact that the recesses of the metal profiles are in a position that determines the engagement into them of the elastic hook elements in conditions of clamping, the one onto the other, of the converging metal profiles fitted onto the arms of the joint.

7. Load-bearing frame for closure elements in internal dividing walls and the like according to Claim 5, characterized by the fact that corresponding holes for coupling, if necessary, by means of screws are provided in the metal profiles and in the arms of the joints.

8. Load-bearing frame for closure elements in internal dividing walls and the like according to Claim 1, characterized by the fact that the concealing elements for the members for securing the frame to the structure of the wall and/or the load-bearing structure itself to the wall, comprise a metal frame, formed of a shaped profile having a tubular portion and a limb for connection to the structure, corner joints being present, adapted for connecting together the profiles of the frame, these joints being able to be inserted into the tubular portions of the profiles.

9. Load-bearing frame for closure elements in internal dividing walls and the like according to Claim 8, characterized by the fact that the corner

joints are formed of an L-shaped element of moulded plastics material, having arms that can be inserted with force into the seatings of two mutually perpendicular, converging profiles, being secured by friction in them, the L-shaped element being furthermore equipped, on that one of its arms that is disposed vertically, with a tongue carrying a projecting pin, adapted for engaging into a corresponding hole of uprights and cross-beams of the structure, thus supporting the weight of the concealing frame.

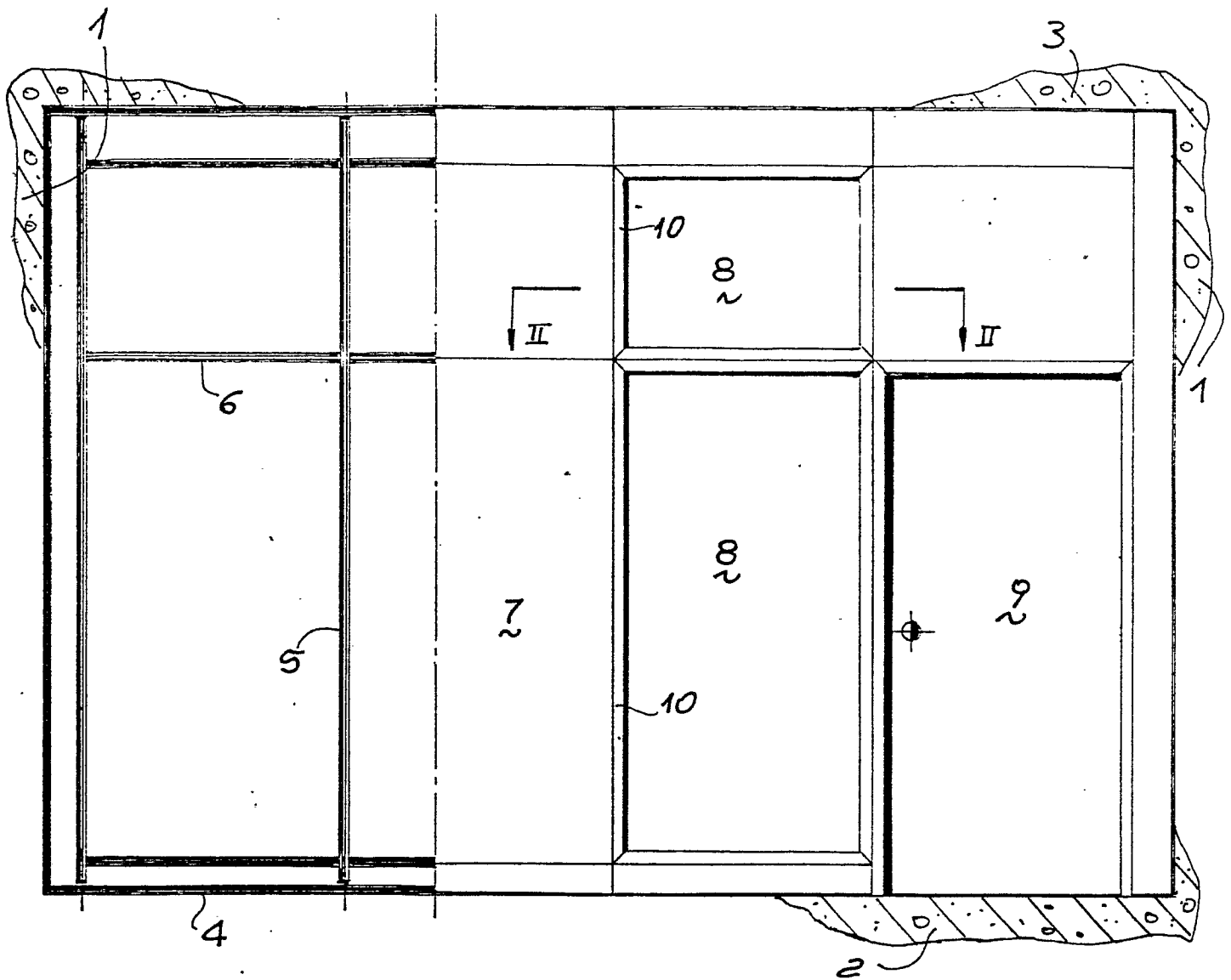


Fig. 1

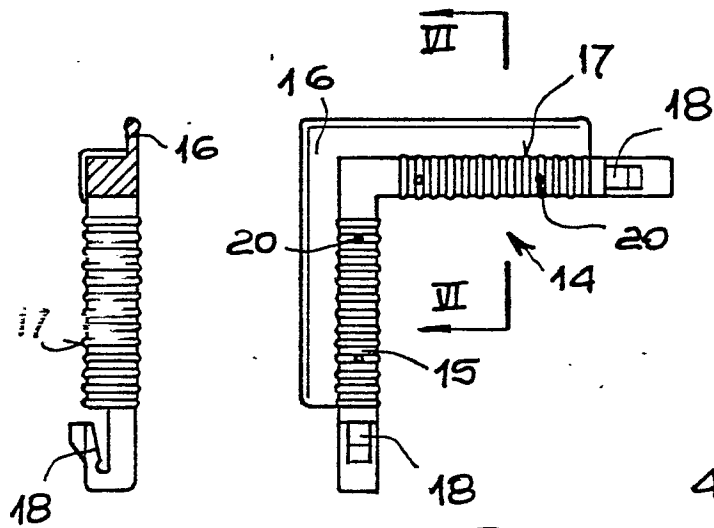


Fig. 5

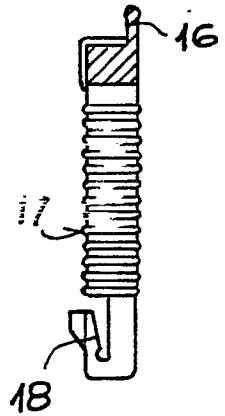


Fig. 6

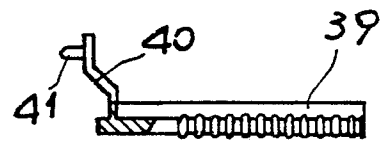


Fig. 8

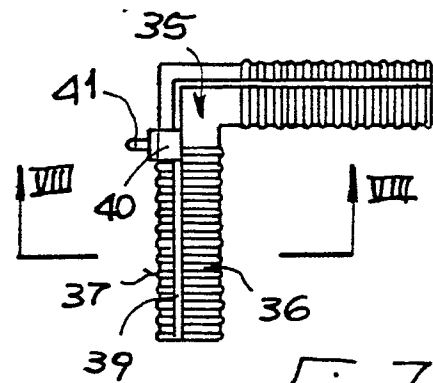


Fig. 7

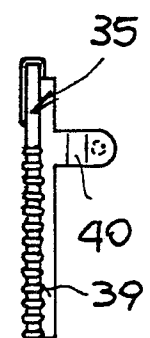


Fig. 9

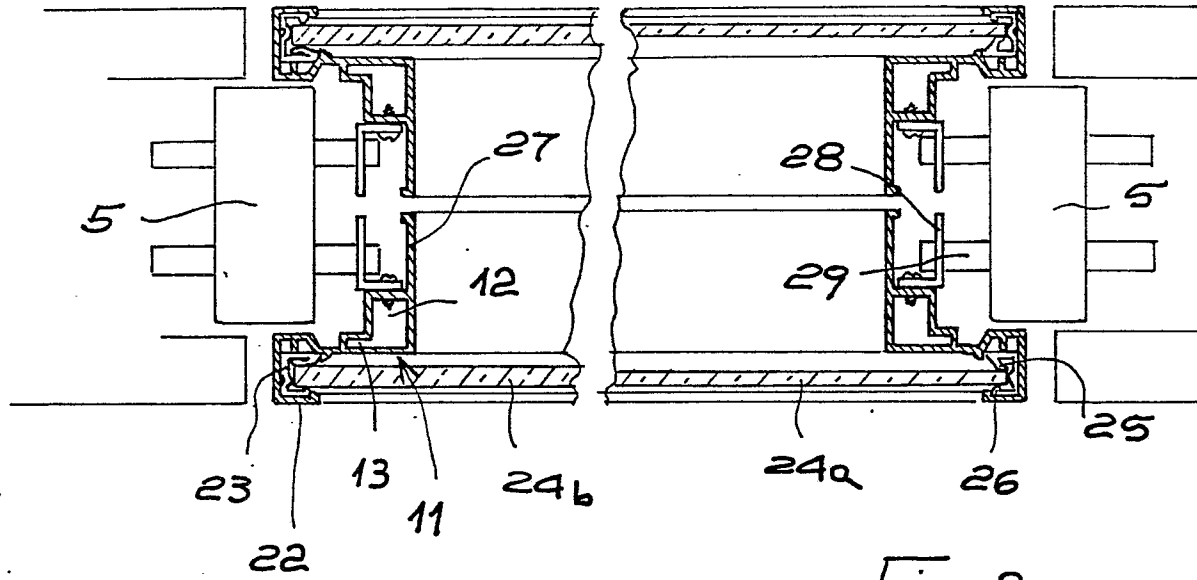


Fig. 2

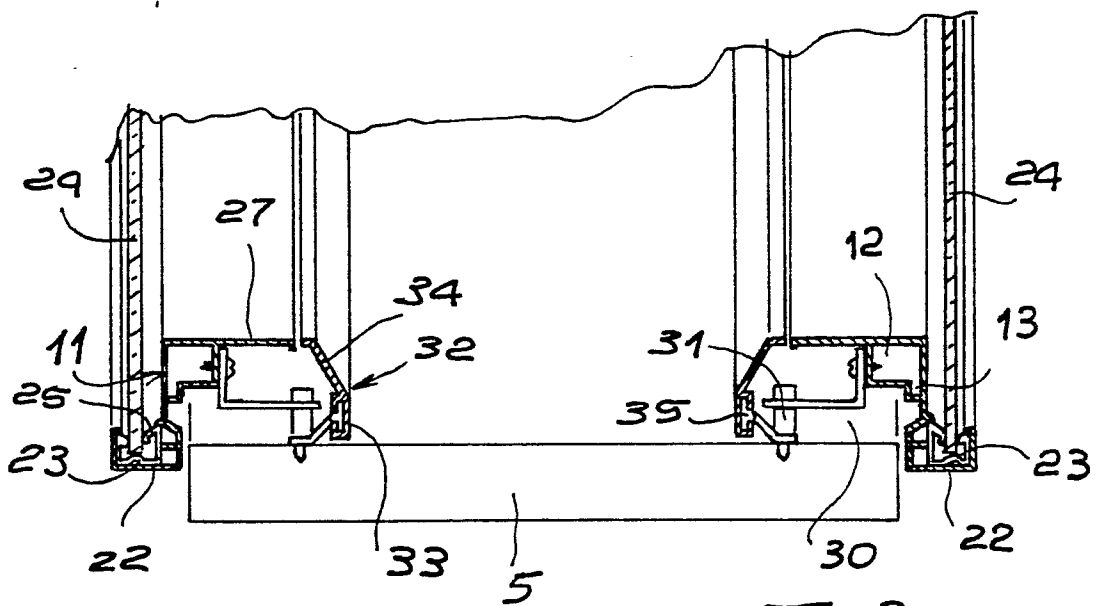
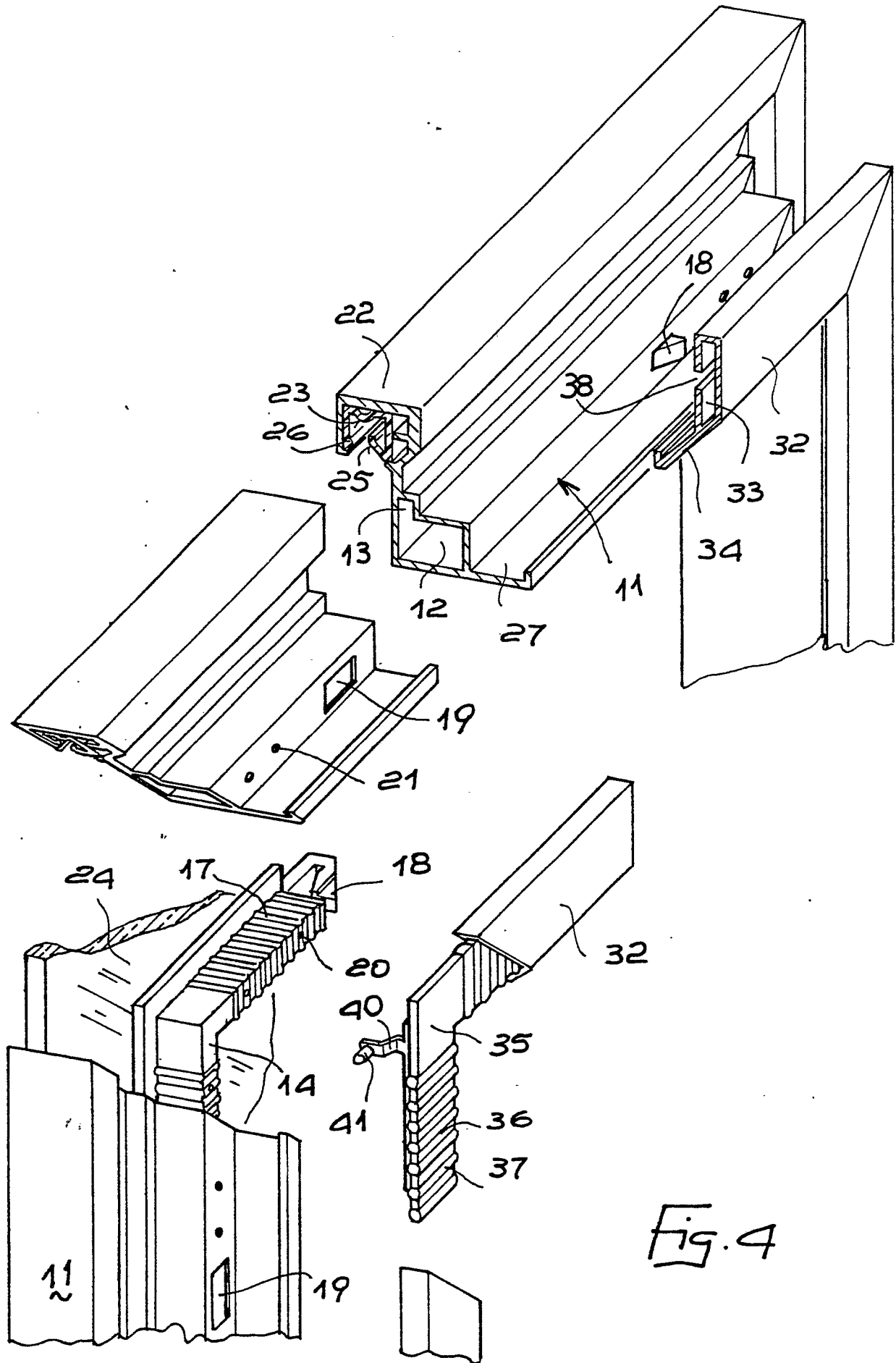


Fig. 3







| 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. 4) |
| Y                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | BE-A- 735 446 (GRISARD)<br>* Page 8, line 20 - page 10, line 1;<br>figures 18-21 *                                                   | 1                                              | E 04 B 2/74<br>E 06 B 3/96                     |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | ---                                                                                                                                  | 2                                              |                                                |
| Y                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | US-A-2 989 788 (KESSLER)<br>* Claim 1; figures 1-4 *                                                                                 | 1                                              |                                                |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | ---                                                                                                                                  | 5                                              |                                                |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | DE-A-3 308 233 (WEINMANN)<br>* Page 18, paragraph 1; figure 5 *                                                                      | 1,2                                            |                                                |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | FR-A-1 594 183 (LUST)<br>* Page 7, line 39 - page 8, line 20;<br>figures 3a,4,5 *                                                    | 1,2                                            |                                                |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | FR-A-1 309 059 (DA RU)<br>* Page 1, column 2, line 33 - page 2,<br>column 1, line 54; page 3, column 2,<br>lines 7-18; figures 1-7 * | 2,5,7                                          |                                                |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | CH-A- 386 663 (LÜTHI)<br>* Page 2, lines 63-79; figure 6 *                                                                           | 4                                              | TECHNICAL FIELDS<br>SEARCHED (Int. Cl.4)       |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | WO-A-8 402 559 (JAPAN ART)<br>* Abstract; figures 1-15 *                                                                             | 5,6                                            | E 04 B<br>E 06 B                               |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | FR-A-2 422 020 (DAMAS)<br>* Page 7, line 37 - page 8, line 19;<br>figure 5 *                                                         | 8                                              |                                                |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | US-A-3 162 282 (MENDELSON)<br>* Column 5, lines 6-75; figures 5,10 *                                                                 | 9                                              |                                                |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | DE-A-2 900 693 (TOP-ELEMENT)<br>-----<br>-/-                                                                                         |                                                |                                                |
| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                      |                                                |                                                |
| Place of search<br>THE HAGUE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                      | Date of completion of the search<br>13-12-1988 | Examiner<br>DEPOORTER F.                       |
| <b>CATEGORY OF CITED DOCUMENTS</b><br>X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document<br>T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>-----<br>& : member of the same patent family, corresponding document |                                                                                                                                      |                                                |                                                |



| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                               |                                                |                                               |
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| Category                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim                              | CLASSIFICATION OF THE APPLICATION (Int. Cl.4) |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | US-A-2 966 967 (LEVY)<br>-----                                                |                                                |                                               |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                               |                                                | TECHNICAL FIELDS SEARCHED (Int. Cl.4)         |
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| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                               |                                                |                                               |
| Place of search<br>THE HAGUE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                               | Date of completion of the search<br>13-12-1988 | Examiner<br>DEPOORTER F.                      |
| <b>CATEGORY OF CITED DOCUMENTS</b><br>X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document<br>T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>.....<br>& : member of the same patent family, corresponding document |                                                                               |                                                |                                               |