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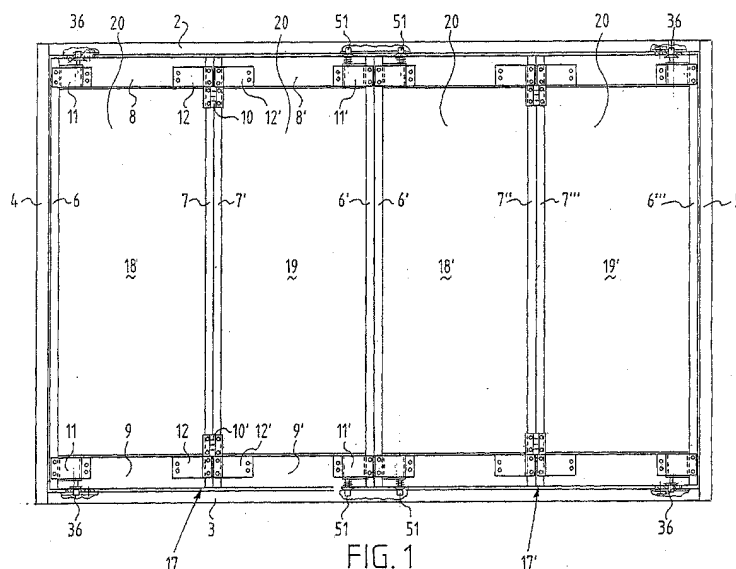
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(54) **Door system**

(57) Door system, in particular a folding and/or sliding door system, comprising:

- one or more girder profiles (9) of extruded material, wherein a girder profile is provided with a recess for receiving one or more door panels;
- one or more upright profiles (6) of extruded material, wherein an upright profile comprises at least one wall in which there is provided a longitudinal groove intended for attaching a fixing element (11);
- one or more fixing elements (11), wherein a fixing element is suitable for fixing a girder profile (9) at a random position on the upright profile, a fixing element comprising:

- a support surface (40);
- a protrusion which extends from the support surface and which is formed to be received in said longitudinal groove, wherein the protrusion has a first part (41) with a width which is at most equal to the longitudinal groove width, and has a connecting second part (42) with a width which is at least partly greater than the width of the longitudinal groove for the purpose of enclosing the protrusion in the longitudinal groove.



**FIG. 1**

## Description

**[0001]** The present invention relates to a door system. The invention relates particularly to a folding and/or sliding door system.

**[0002]** Door systems find application in a large number of fields. The door systems according to the present invention generally find application in the household domain, such as for instance in the form of doors of wardrobes, bathroom cabinets and so on.

**[0003]** Many types of folding or sliding walls are known. Systems are for instance known wherein the walls are arranged in wooden or steel profiles which are specially made to size and into which a number of door panels are screwed in one manner or other. In the case of sliding doors the profiles are provided with a number of wheels with which the sliding door can move over an upper and lower rail in a support construction (frame or the like). In the case of folding doors the profiles are usually provided with elements which are slidable over an upper and lower rail and relative to which the profiles can rotate.

**[0004]** The known door systems have the drawback however that they must be embodied specially for each application. The profiles for instance are thus made specially to size so as to fulfil the requirements made of the door system in a specific case. The manufacture of such a known door furthermore requires a relatively large number of quite complex operational steps, such as for instance riveting the different profiles, which makes the door system rather expensive.

**[0005]** It is an object of the present invention to provide a door system in which the above stated drawbacks are obviated.

**[0006]** According to the invention there is provided for this purpose a door system, comprising:

- one or more girder profiles of extruded material, wherein a girder profile is provided with a recess for receiving one or more door panels;
- one or more upright profiles of extruded material, wherein an upright profile comprises at least one wall in which there is provided a longitudinal groove intended for attaching a fixing element;
- one or more fixing elements, wherein a fixing element is suitable for fixing a girder profile at a random position to the upright profile, a fixing element comprising:
  - a support surface;
  - a protrusion which extends from the support surface and which is formed to be received in said longitudinal groove, wherein the protrusion has a first part with a width which is at most equal to the longitudinal groove width, and has a connecting second part with a width which is at least partly greater than the width of the longitudinal groove for the purpose of enclosing

the protrusion in the longitudinal groove.

**[0007]** The door can be manufactured in rapid and efficient manner by simply sliding the door panels into the recesses in the profiles and fixing the profiles to each other. It is after all no longer necessary to fix the separate door panels to each of the profiles.

**[0008]** The use of extruded profiles further makes it possible to supply the profiles in standard lengths and saw them precisely to size onsite. The particular embodiment of the upright profile and the fixing element moreover ensures that the girder profiles can be quickly and easily arranged at a random height on the upright profile (by merely sliding the protrusion of the fixing element in the longitudinal groove of the upright). This further enhances the general applicability of the door system to a variety of constructional situations.

**[0009]** In a preferred embodiment the longitudinal groove widens toward the inside from said (rear) wall and then narrows. The longitudinal groove hereby defines a form which substantially corresponds to the form of the second part of the protrusion of the fixing element. If for instance the outer end of said protrusion is cylindrical, the form of the longitudinal groove will be substantially circular. If for instance the outer end of said protrusion has a rectangular cross-section, the form of the longitudinal groove will be substantially rectangular.

**[0010]** In other preferred embodiments however, the form of the outer end of the protrusion can differ from the form of the longitudinal groove. In the case of a longitudinal groove of circular cross-section a protrusion of rectangular cross-section can for instance also be applied, provided at least the protrusion has the correct dimensions.

**[0011]** In a further preferred embodiment, the distance between the groove and connection of the rear wall to the side wall of the upright profile substantially corresponds to the length of the support surface. The freedom of movement of the fixing element is hereby limited as much as possible to a sliding movement along the upright profile.

**[0012]** In a further preferred embodiment, the angle between the rear wall and side wall of the upright profile and the angle between the support surface and the flange of the fixing element are substantially equal. The flange of the fixing element hereby comes to lie in the assembled situation against a side wall of the upright profile. This means a further protection of the fixing element against torsion. This moreover provides the option of fixing the fixing element in simple manner relative to the upright profile, this preferably with the fixing means to be discussed hereinbelow.

**[0013]** In a further preferred embodiment, the system comprises first fastening means for fastening the fixing element at a suitable position in the longitudinal groove as well as second fastening means for fastening the fixing element to the girder profile. The first fastening means are preferably formed by one or more screws

which can be arranged in associated openings in the first flange for the purpose of fastening the fixing element to the upright profile.

**[0014]** Provided for the purpose of fastening the fixing element to the girder profile are second fastening means which are formed by one or more screws which can be arranged through associated openings in the fixing element for fastening thereof to the girder profile. This enables a very simple fastening of the fixing element which can also be readily carried out by a layman. Many alternative fastening means can however also be envisaged. The fixing elements can thus also be arranged for instance by means of pop rivets or by glueing thereof.

**[0015]** In a further preferred embodiment, the fixing element is provided with a bracket for receiving an exchangeable carrier in which one or more wheels are rotatably mounted. In this embodiment the fixing element therefore has the dual function of mutually fixing the profiles and of fixing the wheels with which the doors can slide in rails of the support construction.

**[0016]** In a further preferred embodiment of the invention, the recess for receiving a door panel is provided with one or more lips with which the relevant door panel can be fixedly clamped. This reduces the chance of play between the door panel and the upright (and/or girder), and thereby the chance of rattling.

**[0017]** By providing a recess in the upright profile and possibly also in the girder profile, door panels of many different types can be arranged. In this embodiment glass door panels or mirrors are also easily accommodated in the door system without the usual fixed attachment (glueing) here having to be carried out

**[0018]** According to a further preferred embodiment, the upright profile, the fixing element and/or the girder profile are manufactured from extruded material, in particular extruded aluminium or extruded plastic. The profiles and fixing elements can therefore be provided in large quantities at relatively low cost. This in contrast to the usual wooden or steel profiles and elements made to size in the factory.

**[0019]** The invention also relates to the use of the above stated door system.

**[0020]** Further advantages, features and details of the present invention will be elucidated on the basis of the description of a preferred embodiment thereof. Reference is made in the description to the accompanying figures, in which:

Figure 1 shows a partly cut-away rear view of a preferred embodiment of a folding wall according to the invention;

Figure 2 shows a cross-section through the folding wall of figure 1;

Figure 3 shows a cross-section of a preferred embodiment of a girder of the system;

Figure 4 shows a cross-section of a preferred embodiment of an upright;

Figure 5 shows a view in perspective of a preferred

embodiment of a fixing element; and

Figures 6-8 show cross-sections of several alternative embodiments of the fixing element.

**[0021]** The invention is elucidated hereinbelow on the basis of a description of a folding wall, also referred to as an accordion wall. Folding wall 1 (figure 1) is arranged in the frame of a building construction or a separate cabinet. The frame consists of a number of frame parts, such as an upper beam 2, lower beam 3, left side part 4 and right side part 5. The frame parts form a rectangular framework inside which two folding doors 17, 17' are arranged. For clarity of description the construction and operation of one folding door will be discussed in the following description, and the description of the construction and operation of the second folding door is omitted.

**[0022]** A folding door 17 (or 17') consists of two door parts 18, 19 which are pivotable relative to each other. Door parts 18 and 19 are coupled to each other for this purpose using two hinges 10, 10'.

**[0023]** The door parts are slidable between a closed and opened position in recesses 35 in upper beam 2 and lower beam 3. Figure 1 shows door parts 18, 19 in closed position. In figure 2 however, door parts 18, 19 are drawn in half-open position, wherein door part 18 is displaced in the direction of arrow P<sub>1</sub>, with the result that door part 19 has been displaced in the direction of arrow P<sub>2</sub>.

**[0024]** Door part 18 is constructed from a left-hand upright 6, a right-hand upright 7, an upper girder 8 and a lower girder 9. Door part 19 is constructed from a left-hand upright 7' (identical to right-hand upright 7), a right-hand upright 6' (identical to upright 6) and an upper and lower girder 8, 9 (identical to the upper and lower girder of the left-hand door part 18).

**[0025]** Uprights 6, 6', 7, 7' are attached to respective lower girders 9, 9' and upper girders 8, 8' using fixing elements 11, 11', 12, 12'. Although the fixing elements are designated with different reference numerals 11 and 12, in a preferred embodiment of the invention these fixing elements can be identical. This means that in such an embodiment a fixing element can be employed at a random position, i.e. top left or right or bottom left or right.

**[0026]** Figure 4 shows a detail view of a preferred embodiment of an upright 6, 7. The upright is constructed in this case from an extruded aluminium profile which is assembled from, among other parts, a rear wall 23, a first side wall 25, a front wall 28 and a second side wall 29. A recess 22 and a longitudinal groove 32 are provided in rear wall 23.

**[0027]** As can be seen from figures 2 and 4, two types of upright are applied in the present embodiment. The upright shown in figure 4 has a front wall 28 of curved form. Other uprights however (for instance the left-hand upright 6 of figure 1) have a front wall 28 of straight form. In the case of sliding doors it is possible to suffice everywhere with uprights provided with a straight front wall.

In the present case of folding doors however, front walls 28 of the right-hand upright 6' of the right-hand door part 19 and the left-hand upright 6" of the left-hand door part 18' must take a curved form to allow the folding movement of the doors. With a straight front wall the uprights 6' and 6" would otherwise obstruct each other.

**[0028]** Recess 22 is provided to enable sliding therein of a door panel 20 (for instance a wooden panel or a glass panel). The door panel is herein enclosed in recess 22 and optionally clamped by a resilient lip 31. Because the door panel is arranged in a recess on both longitudinal sides (i.e. a recess in upright 7 and a corresponding recess in upright 6) and is enclosed at the top and bottom by girders 8 and 9, the door panel is sufficiently fixed between the profiles to be able to dispense with separate fixing, for instance by means of screws or nails in the case of wooden panels, or glue in the case of glass panels (mirrors).

**[0029]** Corresponding recesses 13 can also be provided in girders 8 and 9 (figure 3). In such a case the door panels 20 are also pushed into these recesses in order to also attach the door panels to the profiles at their top and bottom.

**[0030]** A preferred embodiment of fixing element 11 is shown in figures 1 and 2, and more particularly in figure 5. The fixing element is an extruded profile consisting of a support surface 40 and a first flange 43 provided transversely thereof. A flange 46 is also provided on the other side, while a bracket 44,45 is also arranged on flange 46 and support surface 40.

**[0031]** Flange 46 of fixing element 11 is provided with openings for receiving therein fastening means such as screws 38 with which the fixing element can be fastened to a girder 8,9. Support surface 40 of the fixing element is moreover provided with a protrusion which, from support surface 40, comprises a first part 41 which has an almost constant cross-section and, connecting thereto, a second part 42 which has a form which widens and then narrows. In the shown embodiment the second part 42 of the protrusion has a cylindrical form. Other forms are however equally possible, this being set forth below.

**[0032]** The form and dimensions of the first and second parts 41,42 of the protrusion correspond to a certain degree with those of respectively the first part 32 and second part 33 of longitudinal groove 24. Support surface 40, flange 43 and protrusion 41,42 on the one hand and rear wall 23, groove 32 and side wall 25 on the other of the upright are herein formed such that the protrusion is slidable into longitudinal groove 24 from above and from below, but remains enclosed in the groove in the inserted position. In the inserted situation the fixing element 11 is therefore fixed in all directions except the longitudinal direction.

**[0033]** The height of the sliding door can be modified by sliding the fixing element and the girder attached thereto upward or downward. Once fixing element 11 has been arranged at the correct position in longitudinal groove 24, the fixing element is fastened relative to up-

right 6,7. This fastening can for instance take place by arranging one or more screws 39 (figure 2) through openings in flange 43 of the fixing element and screwing flange 43 fixedly to the upright.

**[0034]** The bracket 44,45 of the fixing element not only has a structural function for strengthening the fixing element, but is also suitable for sliding a block 50 therein. Such a block can fulfil a number of functions.

**[0035]** In a first embodiment (for instance in the case of fixing element 11 in figure 1) a shaft 36 is provided in block 50, which shaft is rotatable in an element 37 arranged fixedly in the lower and upper recess or rail 35 in respectively lower beam 3 and upper beam 2. The left-hand door part 18 is hereby arranged rotatably in the frame.

**[0036]** In another embodiment (for instance in the case of fixing element 11' in figure 1), block 50 is provided with a support 52 on which can be mounted a wheel or slide element 51. Slide element 51 can be displaced freely in the above mentioned rail 35 in upper beam 2 and lower beam 3. When the left-hand door part 18 is pulled forward by a person (arrow P<sub>1</sub>), slide elements 51 of fixing elements 11', and therewith the right-hand door part 19, are displaced in the direction of arrow P<sub>2</sub> until door 18,19 is fully opened. When the door is closed, slide elements 51 are displaced in the opposite direction.

**[0037]** Figures 6-8 show alternative embodiments of the fixing element and upright. Figure 6 shows an embodiment in which the second part 42 of the protrusion takes a cylindrical form. The corresponding part 33 of recess 24 likewise has a cylindrical cross-section, whereby the protrusion can engage practically without play in the longitudinal groove.

**[0038]** Figure 7 shows an embodiment in which the second part 43 of the protrusion has a rectangular cross-section and the second part 33 of recess 24 likewise has a rectangular cross-section. In this embodiment also the protrusion will be slidable practically without play in the longitudinal groove.

**[0039]** Figure 8 shows yet another embodiment in which the second part 44 of the protrusion and the second part 33 of the longitudinal groove have a substantially triangular form. It is also the case for this embodiment that the protrusion is slidable in the longitudinal groove with negligible play.

**[0040]** It is noted that the form of second part 42 of the protrusion need not in all cases correspond exactly to the form of the second part 33 of the longitudinal groove. All that is important is that the second part 42 of the protrusion is wider than the first part 32 of the longitudinal groove, so that in the inserted position the protrusion always remains enclosed inside the longitudinal groove.

**[0041]** In a particular preferred embodiment, the upright is also provided with a further recess 26, in which an anti-dust barrier 27 can be attached. Dust brush 27 provides a dust-tight closure between the upright and

the frame parts 4,5 or another upright.

**[0042]** The upright is also provided with a further protrusion 30 which is intended for attaching thereto an optional handle 34 with which the door can be opened easily by the user.

**[0043]** It is noted that the terms "upright" and "girder" are not limited to vertical and horizontal parts respectively. An upright or girder can extend at a random angle. An upright can for instance extend horizontally, while the girders are disposed vertically.

**[0044]** The invention is not limited to one or more of the above stated preferred embodiments, but is defined by the content of the following claims, within the scope of which many modifications can be envisaged.

## Claims

1. Door system, in particular a folding and/or sliding door system, comprising:

- one or more girder profiles of extruded material,

wherein a girder profile is provided with a recess for receiving one or more door panels;

- one or more upright profiles of extruded material,

wherein an upright profile comprises at least one wall in which there is provided a longitudinal groove intended for attaching a fixing element;

- one or more fixing elements, wherein a fixing element is suitable for fixing a girder profile at a random position on the upright profile, a fixing element comprising:

- a support surface;
- a protrusion which extends from the support surface and which is formed to be received in said longitudinal groove, wherein the protrusion has a first part with a width which is at most equal to the longitudinal groove width, and has a connecting second part with a width which is at least partly greater than the width of the longitudinal groove for the purpose of enclosing the protrusion in the longitudinal groove.

2. Door system as claimed in claim 1, wherein an upright profile comprises a rear wall, a side wall and a front wall, wherein in the rear wall there is provided a recess intended for receiving the one or more door panels and a longitudinal groove intended for attaching a fixing element, and wherein the fixing element is manufactured from extruded material and is constructed from at least:

- a support surface;
- a protrusion which extends from the support surface and which is formed to be received in said longitudinal groove,
- a first flange extending from the support surface and a second flange extending from the support surface in opposite direction;

wherein the protrusion has a first part with a width which corresponds to the longitudinal groove width, and has a connecting second part which is given an at least partly wider form than the longitudinal groove for the purpose of enclosing the protrusion in the longitudinal groove.

3. Door system as claimed in claim 1 or 2, wherein the longitudinal groove widens toward the inside from the rear wall and then narrows, thereby defining a form which substantially corresponds to the form of the second part of the protrusion of the fixing element.

4. Door system as claimed in claim 3, wherein the distance between the groove and connection of the rear wall to the side wall of the upright profile substantially corresponds to the length of the support surface.

5. Door system as claimed in any of the foregoing claims, wherein the angle between the rear wall and side wall of the upright profile and the angle between the support surface and the flange of the fixing element are substantially equal.

6. Door system as claimed in claim 5, wherein the rear wall and side wall of the upright profile extend substantially transversely of each other and wherein the support surface and the flange of the fixing element extend substantially transversely of each other.

7. Door system as claimed in any of the foregoing claims, comprising first fastening means for fastening the fixing element at a suitable position in the longitudinal groove as well as second fastening means for fastening the fixing element to the girder profile.

8. Door system as claimed in claim 7, wherein the first fastening means are formed by one or more screws which can be arranged in associated openings in the flange for the purpose of fastening the fixing element to the upright profile.

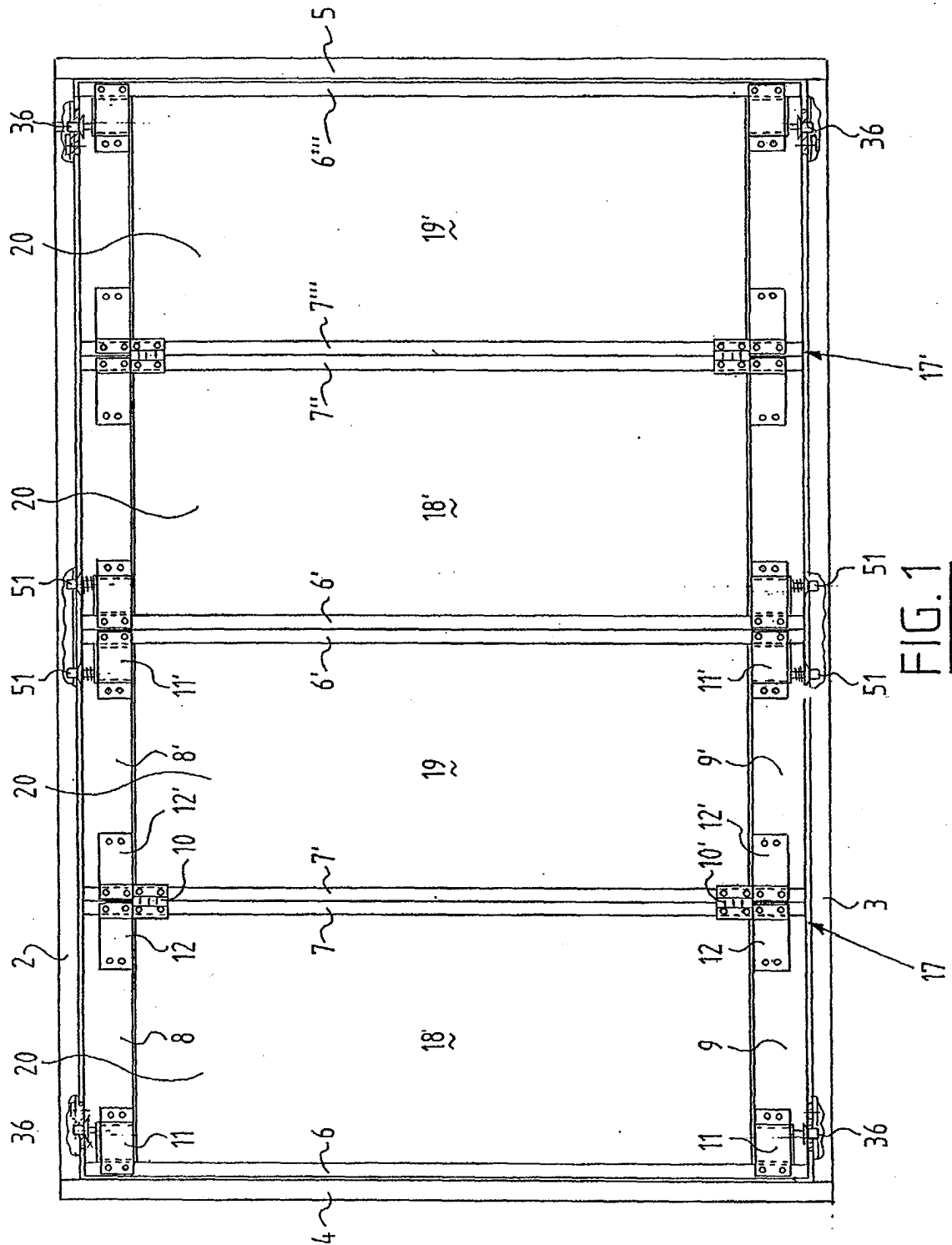
9. Door system as claimed in claim 7, wherein the second fastening means are formed by one or more screws which can be arranged through associated openings in the fixing element for fastening thereof

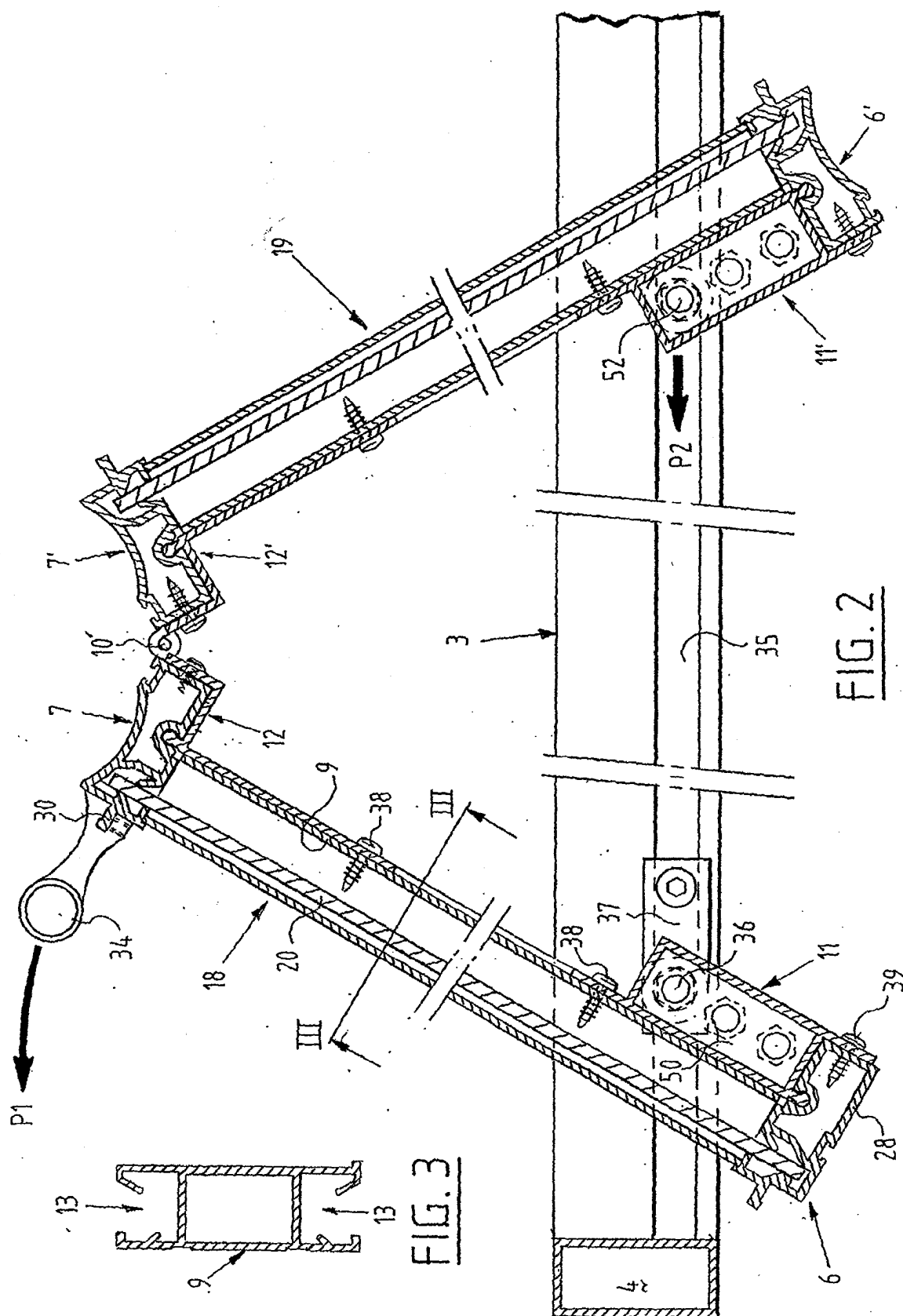
to the girder profile.

10. Door system as claimed in any of the foregoing claims, wherein the fixing element is provided with a bracket for receiving an exchangeable carrier in which one or more wheels are rotatably mounted. 5
11. Door system as claimed in any of the foregoing claims, comprising a left-hand upright profile, a right-hand upright profile, a lower and upper girder profile fixed using fixing elements, wherein one or more door panels are arranged between the profiles. 10
12. Door system as claimed in any of the foregoing claims, wherein the recess is provided with one or more lips with which the relevant door panel can be fixedly clamped. 15
13. Door system as claimed in any of the foregoing claims, wherein the door panel is manufactured from glass. 20
14. Door system as claimed in any of the foregoing claims, wherein the upright profile, the fixing element and/or the girder profile are manufactured from extruded aluminium. 25
15. Door system as claimed in any of the foregoing claims 1-14, wherein the upright profile, the fixing element and/or the girder profile are manufactured from plastic. 30
16. Folding and/or sliding door, comprising at least two doors which are movable in an upper rail and lower rail and which are embodied in the door system as claimed in any of the foregoing claims, wherein the upper wheels are mounted on the fixing element of the upper girder profile and the lower wheels are mounted on the fixing element of the lower girder profile. 35 40
17. Use of the door system or the door as claimed in any of the foregoing claims. 45

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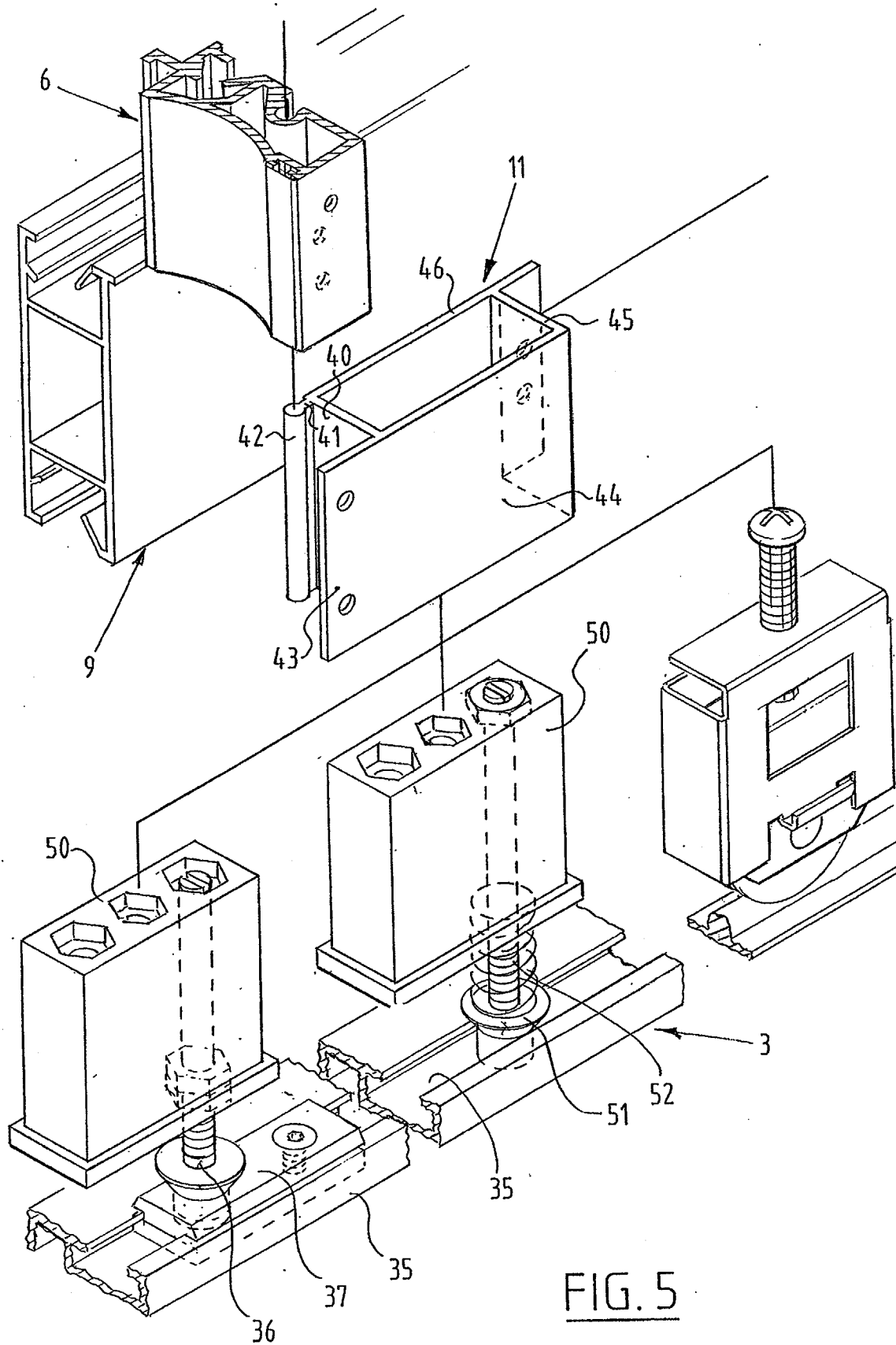


FIG. 5

FIG. 4

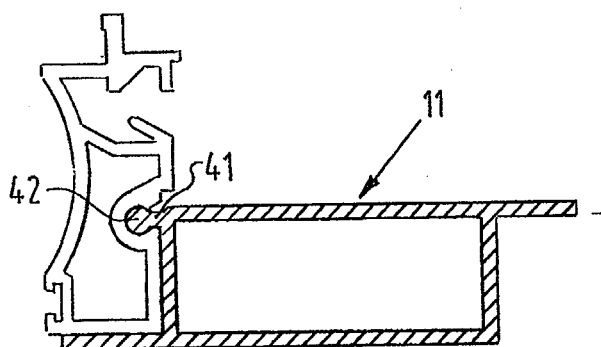
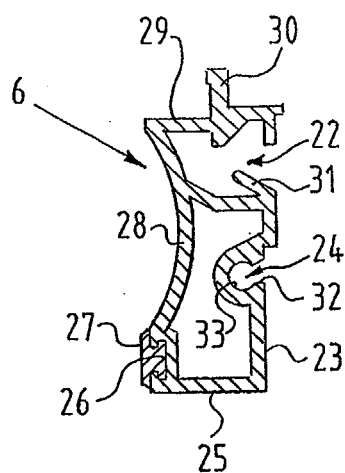


FIG. 6

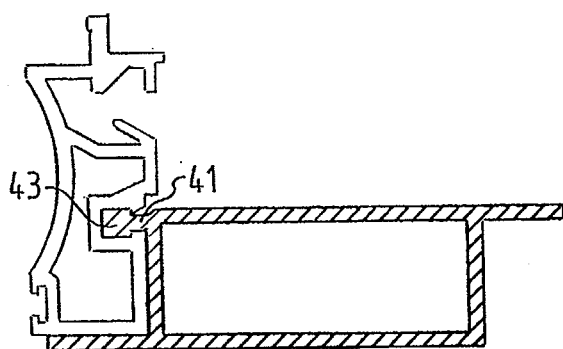


FIG. 7

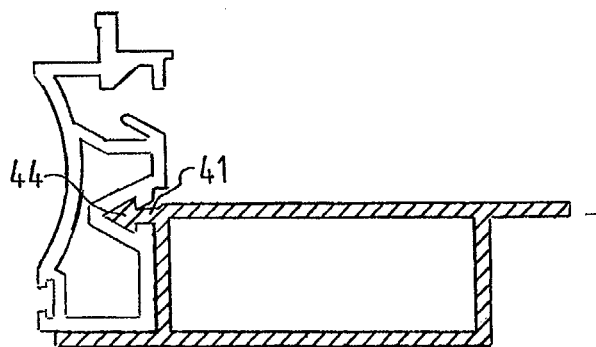


FIG. 8



European Patent  
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# EUROPEAN SEARCH REPORT

Application Number  
EP 04 07 7637

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 7 December 2004	Examiner Depoorter, F
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**ANNEX TO THE EUROPEAN SEARCH REPORT  
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EP 04 07 7637

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