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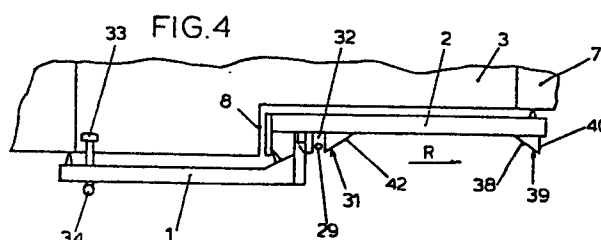
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54 Sliding door consisting of at least two sections.

57 Sliding door comprising at least two sections (1, 2) each suspending from rollers (10, 16) carried by a guide rail (11, 18) for each section, said rollers descending into recesses (12, 17) in the related guide rail (11, 18) when closing the door, said door sections (1, 2) being mutually coupled when the door is in its closed position such that said sections (1, 2) are moved together when opening the door and till a door section (2) has reached its final position after which the other section (1) can be moved along said first mentioned section (2) and can be brought into its fully opened position, in which position said two door sections (1, 2) are coupled again and will move together when closing the door till the first mentioned section (2) has reached its closed position and the coupling is released so that the other section (1) can be brought into its closed position too.



Sliding door consisting of at least two sections. 0211453

86201104.6

The invention relates to a sliding door of the type in which the rollers to which the door is suspended will descend into recesses in the guide rail before the door opening when closing the door, so that the door can rest
5 sealingly against the wall in which the door opening is present and against the floor.

When closing the door the latter moves towards the wall and the floor, so that a hermetic closing of the door opening can be achieved by flexible strips mounted on the
10 door.

So when the door is opened a certain force has to be exerted on the door to lift the rollers out of the recesses in the guide rail onto the running surface of this rail. As a considerable force has to be exerted in case of
15 somewhat large doors, a lever may be used to that end, which is provided with an operating handle at one end and with a press cam at the other end, which can be pressed against the door frame by means of the operating handle, so that the door can still be opened with a relatively
20 small force.

With such a door the disadvantage may occur, that adjacent to the door opening there is too little space for receiving the door in its slided-open position.

It has been attempted to remove this disadvantage by the
25 application of two doors, each having the width of about half the door opening and moving along the same rail to both sides of the door opening.

It is obvious that also in this case next to the door opening a space has to be present which is at least equal
30 to the width of the door opening, though this space may be divided over both sides of the door opening. An additional disadvantage of this solution, however, is that

when opening one door a force has to be exerted onto the other door, so that one will not be sure that the desired door is opened while after opening one door no point of support is available for the press cam of the lever of the other door, so that other opening devices, in particular motoric opening devices, will have to be applied.

The invention avoids these disadvantages by providing that the door is composed of at least two sections, each being provided with their own rollers moving over their own guide rail such that the sections may move along each other and may be moved to one side of the door opening when opening the door, means being provided by which in the closed position of the door sections these are mutually coupled in such a way that the rollers of all door sections may be simultaneously lifted out of the recesses of the related guide rail, while after a door section has reached its final position, the coupling between this section and the subsequent section lying beside it, is released and this subsequent section may be displaced to the completely opened position.

So this implies that when e.g. two sections are used the largest length of one of the sections will be only a little larger than half the width of the door opening, so that beside the door opening a much smaller space will suffice than if an undivided door is used.

Though the door is divided into sections one operating handle will suffice for opening the door, the press cam of which can be pushed against the frame, so that the rollers of all door sections are simultaneously lifted out of their recesses and the door is opened as one unit.

A simple construction is achieved if the door section, which is positioned at that side of the door opening towards which all door sections are displaced when opening the door, is located between the subsequent section and the wall in the opened position of the door, with which

for sealing the vertical edges of the door sections lying near each other in the closed position of the door, these are provided with opposite edge portions, one of which is supporting a flexible sealing element, applied such that when bringing the door sections in the closed position, the flexible element connected to the one section will abut against the edge portion of the other door section, the shape of the upper edge of the door opening and the position of the vertical edges thereof being adapted to the staggered positioned door sections.

In this way it may be achieved that a vertical edge of a door section is sealingly slid against a vertical edge of a door section which is positioned closer to the wall in the opened position of the door. For obtaining a sealing of the upper part of the vertical end edge of the door section positioned closer to the wall, the upper edge of the door opening has a stepped configuration such that said upper edge of the door section will sealingly abut the stepped part of the upper edge of the door opening, of course using a flexible sealing element.

Preferably the provision will be made that the flexible sealing element is attached to the edge portion of a door section in such a way, that when bringing the door sections to the closed position, it is bent in a direction opposed to the direction of movement of the door sections. In this way the flexible sealing element will be allowed to function optimally.

In order to guarantee that at the lower edges of the door sections a proper sealing is achieved as well, it may be provided that the lower edge of a door section is slidably coupled with an immediately adjacent door section by means of a guide element.

In this way the danger is avoided that the lower edges of the door sections are somewhat pressed away from each other by the flexible sealing element so that no proper

sealing by the door would be guaranteed any longer.

5 In this connection it is worth noting that dividing
a door into sections has the advantage that each section
in itself is more rigid than a long door out of one piece,
even if the latter is build-up in the same way as the
door sections individually.

10 According to the invention the means by which two door
sections are coupled in the closed position of the door,
is formed by a spring biased pivotable pin extending
substantially vertically upwards from its pivot, and
being mounted on that end face of the relevant door
section which is transverse to the plane of the door
section and which is directed towards that side of the
door opening to which all door sections are moved when
15 opening the door, said pin cooperating with a slot
provided in a locking plate in a direction perpendicular
to the plane of the door section, said plate being
positioned on the immediately adjacent door section
in which the cooperation between pin and locking plate
20 can be broken by an abutment plate, which is connected
to the upper edge of the door opening or to another
part fixed to the wall, and which extends obliquely
outward from the wall in the direction in which the
door sections are moved when opening the door.

25 In the closed position of the door the pin connected to
a door section is positioned in a slot of the locking
plate of the subsequent section, so that when opening
the door the sections are forming one unit. If now
the section being positioned at that side of the door
30 opening towards which the whole door is moved, reaches
its end position, the pin which is connected to the
subsequent section simultaneously is engaging the
slanting surface of the abutment plate, so that the
pin is brought out of the slot and the subsequent section
35 freely can move along the door section which has come
to rest. If more than two door sections are present,
the same takes place when the second door section has

reached its final position. It being obvious that then use is made of another abutment plate.

In order to assure that when bringing the door sections to the closed position a mutual coupling of the door sections takes place again, the locking plate may be provided with a slanting surface for bringing the pivoting pin of a section into the slot of the locking plate of the section adjacent thereto. Thus the coupling of the sections then automatically will take place.

10 Preferably it will be provided that in the completely opened position of the door all door sections are mutually coupled in such a way that when closing the door the door sections start to move simultaneously and are brought into the closed position one by one. Thus it is prevented that when closing the door the flexible element attached to the vertical end edge of it is pressed continuously against the end edge of the adjacent door section to take this door section along towards the closed position.

For coupling the door sections in the completely opened position of the door favourably use can be made again of the pivotable pin, which then may cooperate with a coupling plate mounted to the other vertical end edge of the adjacent section as the locking plate with which the pin cooperates when opening the door sections, said coupling plate having a slanted surface for the pin and an abutment edge perpendicular to the plane of the door behind which the pin will come to lie for the coupling of two door sections, while for interrupting the coupling an abutment plate is used which is connected to the upper edge of the door opening or to another part fixed to the wall and which extends obliquely outward from the wall in the direction in which the door sections are moved when closing the door.

In an advantage manner the locking plates being connected to the upper edge of the door opening or to another part fixed to the wall may be formed by a single element.

Because of this the costs of manufacturing are decreased and in particular the mounting of the two locking plates is simplified.

5 The invention will now be further elucidated by means of an embodiment, shown in the drawing, in which

Fig. 1 schematically shows a front view of a sliding door according to the invention, consisting of two sections, shown in the closed position;

10 Fig. 2 shows a cross-section at an enlarged scale over the line II-II of Fig. 1;

Fig. 3 shows an end view of the doors in the direction of the arrow III in Fig. 1, in which, however, certain parts are deleted for the sake of clearness;

15 Fig. 4 schematically shows a plan view of the doors only in their closed position; and Fig. 5 shows a part of Fig. 4 with some parts in another position.

20 The sliding door shown in the drawing consists of the two door sections 1, 2, serving for closing of an opening 3 in a wall 4, said opening being limited by the floor 5, the vertical posts 6 and 7 respectively and the horizontal upper beam 8, which has a stepped configuration.

25 The door section 1 is suspended from supports 9, which are provided with rollers 10, moveable over a rail 11, into which recesses 12 are present. The recesses are located such that the rollers 10 will come to lie in them when the door section 1 is in the closed position, as
30 this is shown in Fig. 1. On arrival of the rollers 10 in the recesses 12 they also move towards the wall 4, so that the whole door section comes to rest sealingly against the floor 5 and the wall 4 or the vertical post 6 limiting the door opening 3. As shown in Fig. 2 a flexible sealing
35 element 13 serves for sealing the door section 1 with respect to the post 6, to the horizontal beam 8 and to a

0211453

part of the door section 2, which part will be described more in detail hereafter. For sealing of the door section 1 with respect to the floor 5 the flexible sealing element 14 is serving, which is connected to the lower edge of the door as appears from Fig. 3.

In a similar manner the door section 2 is provided with supports 15 with rollers 16, which are received into recesses 17 of the rail 18 in the closed position of the door section. When the rollers 16 are present in the recesses 17 the door section 2 is abutting the post 17 and the horizontal beam 8 by means of a flexible sealing element 19, said sealing element 19 extending along the stepped part of said beam as shown in Fig. 2 with dash-dot-lines. The door section 2 is sealed with respect to the floor by means of a sealing element 20. To obtain sealing between the door sections 1 and 2 the door section 2 is provided with the edge portion 21 which is engaged by the sealing means 13, connected to the door section 2, in the closed position of the door sections.

As appears in particular from Fig. 2 the sealing element 13 of the door section 1 is attached to an edge portion 22, which is connected to the door section 1 at the position of the edge portion 21. By this a proper engagement of the sealing element 13 against the edge portion 21 is obtained in the closed position of the door sections.

As appears in particular from Fig. 5, the door section 2 will come to rest completely behind the wall 4 in the opened position of the door. In connection with this the door section 2 is supported by three rollers 16, which are received in three recesses 17 in the closed position of the door section 2. When sliding the door section 2 towards the opened position the central roller 16 will now move over the most right hand recess 17, as seen in Fig. 1, as the most left hand roller 16 is not present above a recess 17. In similar manner the most left hand roller will move across the most right hand

recess 17 when moving the door section 2 towards the right. For the door section 1 two rollers suffice because as seen in Fig. 1 the most left hand roller 10 does not move beyond the recess 12 when opening the door section 1.

For guiding the lower edge of the door section 2 guides 23 are mounted on the floor, see Figs. 1 and 3. These guides, however, should not be positioned in the door opening, so that they cannot serve as guidance for the door section 1. In connection with this the door section 1 is provided with the guide plate 24, see Fig. 3, into which a slot 25 is present in which a strip 26, connected to the door section 2, can slide. The slot 25 and the strip 26 are slanted, the oblique angle corresponding with the one one door section 1 is following when the rollers 10 are received in the recesses 12.

The means for mutually coupling and decoupling the door sections 1 and 2 are shown in particular in the Fig. 3-5. They have been deleted from Figs. 1 and 2 for the sake of clearness.

The door section 1 is provided with a mounting plate 27, to which in the point 28 a pin 29 is pivotally connected in such a way that the pin will assume the position as shown in Fig. 3, while the pin can be rotated in the direction of the arrow P against the action of a spring, not shown, present in the hinging-point 28. In the mounting plate 27 a slot 30 is present through which a locking plate 31 may move connected to the door section 2.

As appears in particular from Fig. 4 the locking plate 31 is provided with a slot 32 in which the pin 29 is present when the door sections 1 and 2 are coupled.

The coupled position is shown in Fig. 4, in which position the door sections 1 and 2 are closed as well. If now the rollers 10 and 16 of the door sections 1 and 2 are lifted out of their recesses by means of the press cam 33

of lever 34, the door sections 1 and 2 will move together towards the open position in the direction as indicated with the arrow R.

5 If now the door section 2 approaches its extreme right hand position, as this is shown in Fig. 5, the pin 29 will come to rest against a slanting surface 35 of the abutment plate 36, which in a manner not shown is connected to the rail 18 and which is thus present at a fixed position with respect to the wall 4.

10 By this the pin 29 is pivoted till outside the slot 32 of the locking plate 31 so that the door section 1 can be displaced further on its own. It will be obvious that the door section 2 in the final position will come to rest against an abutment, not shown.

15 When the door section 1 is further moved towards the right the pin 29, which has returned to its starting position, will come to rest against a slanting surface 38 of a coupling plate 39 connected to the door section 2, when the door section 1 has also nearly reached its final
20 position. In the completely opened position of the door section 1 the pin 29 is coming to lie behind the abutment edge 40 so that the door sections 1 and 2 are coupled again in this position.

If now the door has to be closed again, the door section 1
25 is pulled towards the closed position by means of the lever 34, while it takes along the section 2 with it. When the door section 2 approaches the position shown in Fig. 4, the pin 29 engages a slanting surface 41 of the abutment plate 36, so that the pin 29 is pushed away behind
30 the abutment edge 40 of the coupling plate 39 and the door section 1 separately can move further towards the left until it achieves the closed position. Just before this happens the pin 29 is engaging the slanting surface 42 of the locking plate 31 so that the pin will come to lie
35 again in the groove 32 of the locking plate 31 and the door sections 1 and 2 again are coupled as this is shown in Fig. 4.

It will be obvious that also more than two door sections may be applied. As seen in Fig. 2 the left hand side of the section 1 then may be provided with an edge portion corresponding to the edge portion 21 of section 2, while
5 the section 1 then is provided with the locking plate 31 and with the coupling plate 39 and the subsequent, additional section with a pin 29.

Further it will be obvious that only a possible embodiment of the invention is shown in the drawing and has been
10 described above and that many modifications may be made without departing from the inventive concept.

- C l a i m s -

1. Sliding door of the type in which the rollers (10,16)
to which the door is suspended will descend into
recesses (12,17) in the guide rail (11,18) before the
door opening (3) when closing the door, so that the
5 door can rest sealingly against the wall (4) in which
the door opening (3) is present and against the floor (5),
characterized in
that the door is composed of at least two sections (1,2),
each being provided with their own rollers (10,16)
10 moving over their own guide rail (11,18) such that
the sections (1,2) may move along each other and may
be moved to one side of the door opening (3) when
opening the door, means being provided by which in the
closed position of the door sections (1,2) these are
15 mutually coupled in such a way that the rollers of all
door sections may be simultaneously lifted out of
the recesses (12,17) of the related guide rail (11,18)
while after a door section (2) has reached its final
position, the coupling between this section (2) and
20 the subsequent section (1) lying beside it, is released
and this subsequent section (1) may be displaced to
the completely opened position.

2. Sliding door according to claim 1,
characterized in

25 that the door section (2) which is positioned at
that side of the door opening (3) towards which
all door sections (1,2) are displaced when opening
the door, is located between the subsequent section
(1) and the wall (4) in the opened position of the
30 door, with which for sealing the vertical edges of
the door sections (1,2) lying near each other in
the closed position of the door, these are provided
with opposite edge portions (21,22) one (22) of which
is supporting a flexible sealing element (13) applied
35 such that when bringing the door sections (1,2) in
the closed position, the flexible element (13) connec-
ted to the one section (1) will abut against the edge

portion (21) of the other door section, the shape of the upper edge (8) of the door opening (3) and the position of the vertical edges (6,7) thereof are adapted to the staggered positioned door sections (1,2).

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3. Sliding door according to claim 2, characterized in that the flexible sealing element (13) is attached to the edge portion (22) of a door section (1) in such a way, that when bringing the door section (1,2) to the closed position, it is bent in a direction opposed to the direction of movement of the door sections.

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4. Sliding door according to one of the preceding claims, characterized in that the lower edge of a door section (1) is slidably coupled with an immediately adjacent door section (2) by means of a guide element (24,25).

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5. Sliding door according to one of the preceding claims, characterized in that the means by which two door sections (1,2) are coupled in the closed position of the door, is formed by a spring biased pivotable pin (29) extending substantially vertically upwards from its pivot (28), and being mounted on that end face of the relevant door section (1) which is transverse to the plane of the door section and which is directed towards that side of the door opening (3) to which all door sections (1,2) are moved when opening the door, said pin (29) cooperating with a slot (32) provided in a locking plate (31) in a direction perpendicular to the plane of the door section, said plate (31) being positioned on the immediately adjacent door section (2) in which the cooperation between pin (29) and locking

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0211453

plate (31) can be broken by an abutment plate (36), which is connected to the upper edge (8) of the door opening (3) or to another part fixed to the wall (4), and which extends obliquely outward from the wall (4) in the direction (R) in which the door sections are moved when opening the door.

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6. Sliding door according to claim 5, characterized in

10 that for bringing the door sections (1,2) in the coupled position when closing the door the locking plate (31) is provided with a slanting surface (42) for bringing the pivoting pin (29) of a section (1) into the slot (32) of the locking plate (31) of the section (2) adjacent thereto.

15 7. Sliding door according to one of the claims 4 - 6, characterized in

20 that in the completely opening position of the door all door sections (1,2) are mutually coupled in such a way that when closing the door the door sections (1,2) start to move simultaneously and are brought into the closed position one by one.

8. Sliding door according to claim 7, characterized in

25 that for coupling the door sections (1,2) in the completely opened position of the door the pivotable pin (29) cooperates with a coupling plate (39) mounted to the other vertical end edge of the adjacent section (2) as the locking plate (31) with which the pin (29) cooperates when opening the door sections
30 (1,2), said coupling plate (39) having a slanted surface (38) for the pin (29) and an abutment edge (40) perpendicular to the plane of the door behind which the pin (29) will come to lie when totally opening the door, while for interrupting the
35 coupling an abutment plate (36) is used which is connected to the upper edge (8) of the door opening (3) or to another part fixed to the wall (4) and

0211453

which extends obliquely outward from the wall in
the direction in which the door sections (1,2) are
moved when closing the door.

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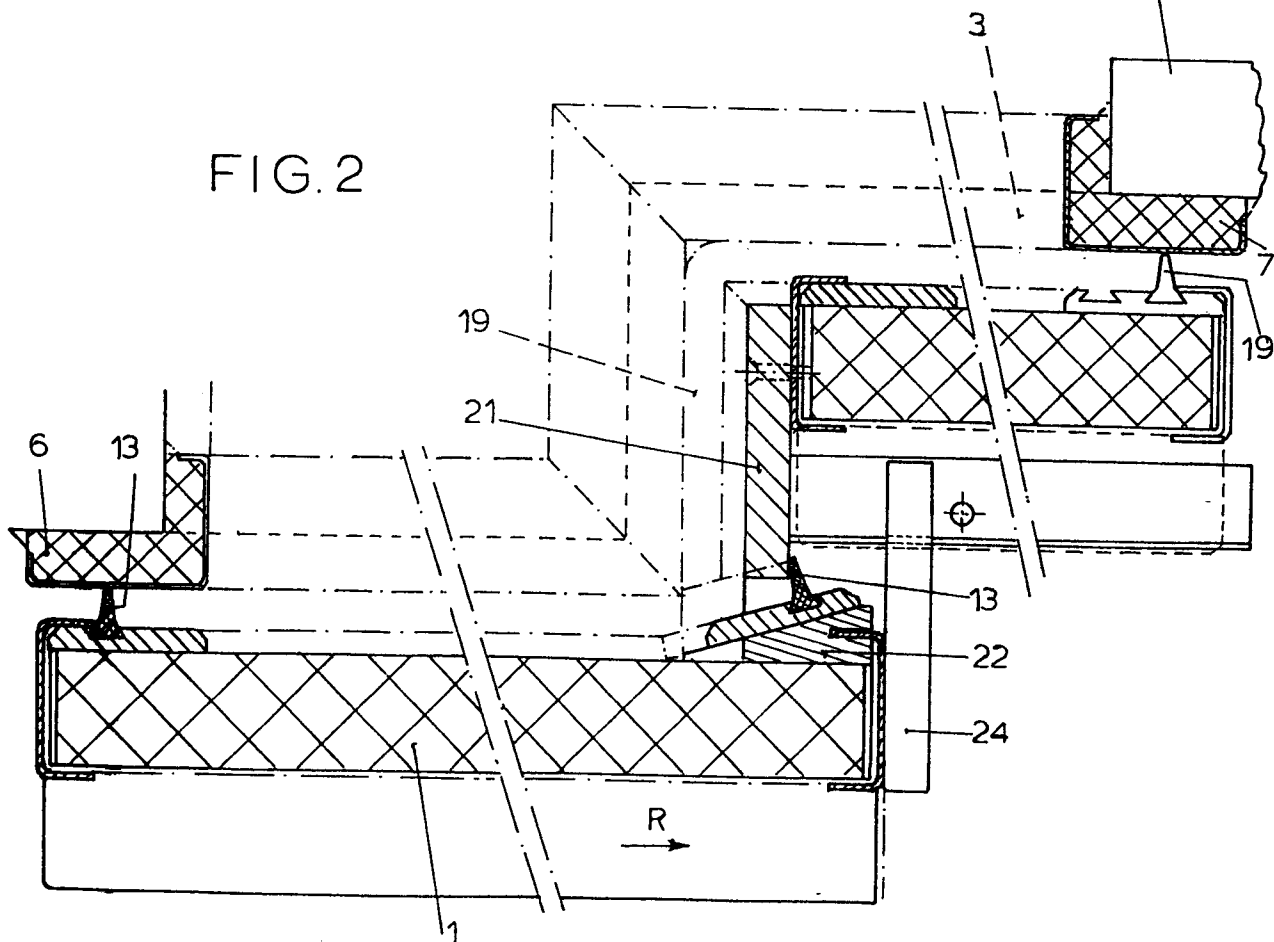
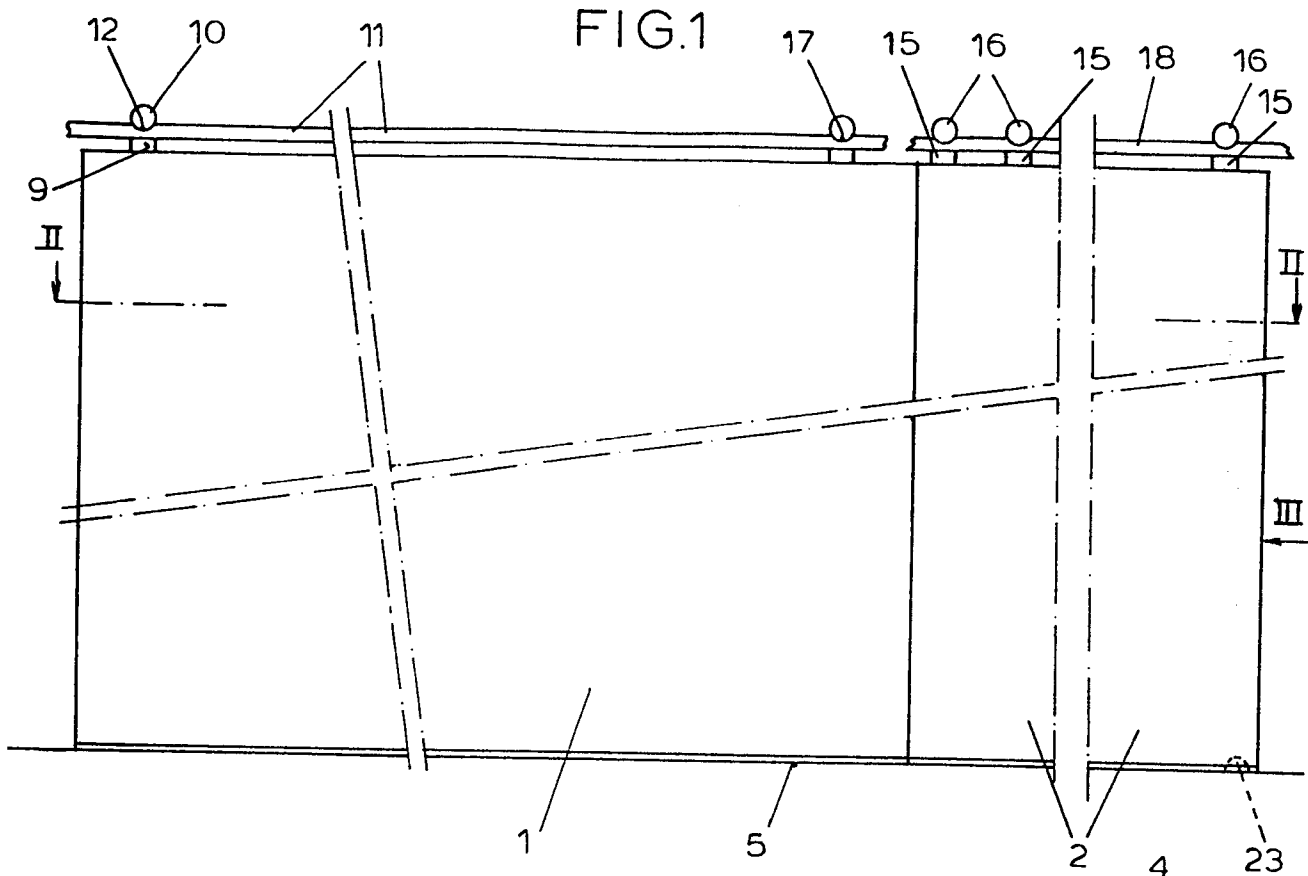


FIG. 3

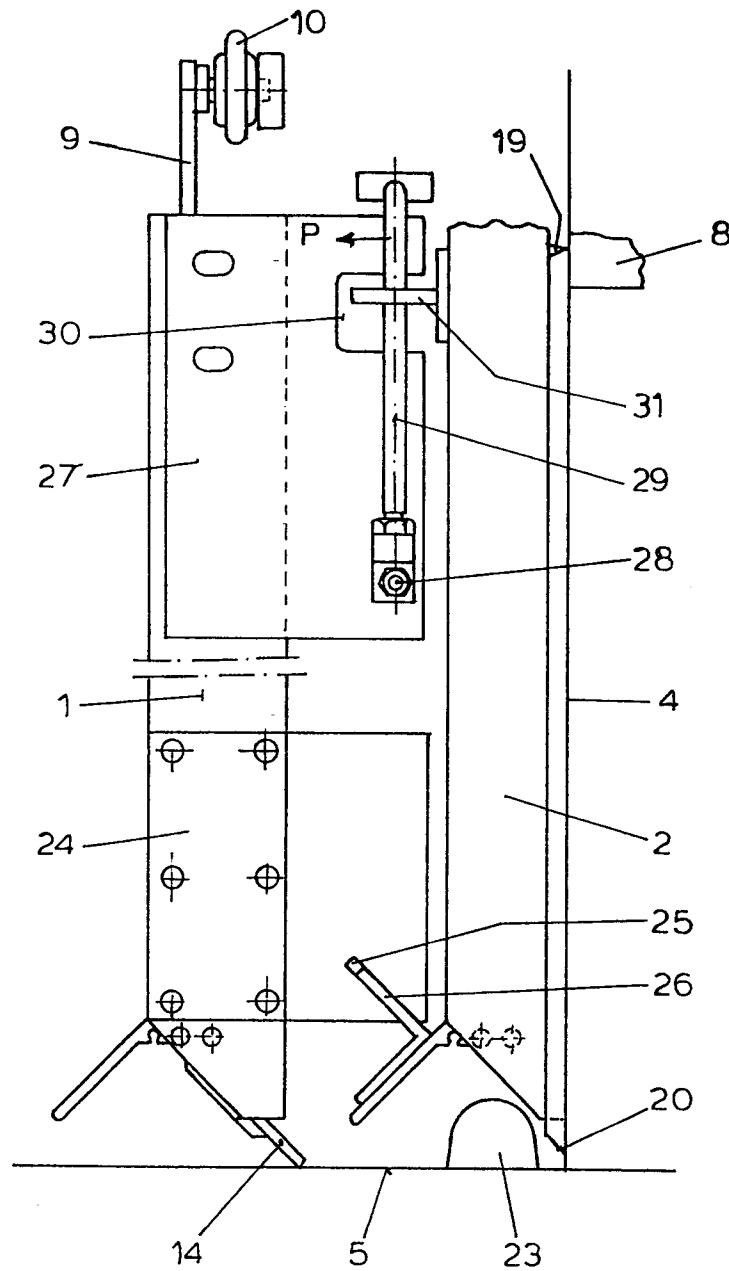


FIG. 4

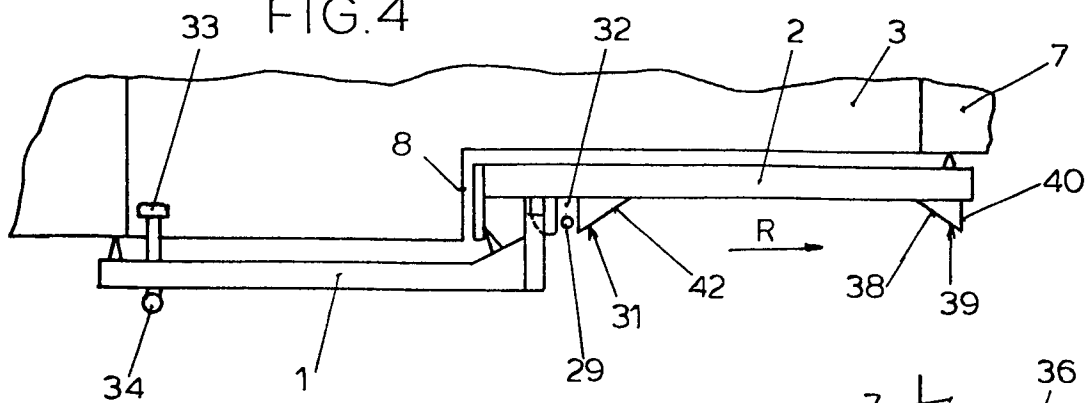
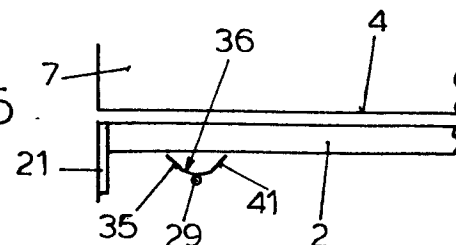


FIG. 5





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EUROPEAN SEARCH REPORT

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Application number

EP 86 20 1104

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)
A	BE-A- 861 374 (DESOER ACIOR) * Page 3, line 20 - page 5, line 11; figures 1-3 *	1,5	E 06 B 3/46 E 05 D 15/08
A	DE-C- 581 286 (RIEMERSCHMID) * Page 1, line 61 - page 2, line 76; figures 1-9 *	1	
A	US-A-4 192 100 (KLEMA) * Column 2, line 53 - column 4, line 10; figures 1-4 *	1,2	
A	FR-A-2 487 903 (OTIS ELEVATOR) * Page 4, line 1 - page 6, line 17; figures 1-8 *	1,2	
A	US-A-3 100 916 (McKINNEY) * Column 2, lines 22-40; figures 1-6 *	4	TECHNICAL FIELDS SEARCHED (Int. Cl. 4) E 06 B E 05 D
A	FR-A-1 529 651 (FOUGASSE) * Page 1, column 2, paragraphs 4,5; figures 1,4 *	4	
A	GB-A-2 134 167 (ONI-METALLWARENFABRIKEN) * Page 1, line 102 - page 2, line 14; figures 1-6 *	5	
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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 03-10-1986	Examiner DEPOORTER F.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

0211453



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EUROPEAN SEARCH REPORT

Application number

EP 86 20 1104

Page 2

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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	NL-A-7 115 047 (VAN KLEEF) -----		
			TECHNICAL FIELDS SEARCHED (Int. Cl. 4)
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 03-10-1986	Examiner DEPOORTER F.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			