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(54) **Fire-resistant sliding door construction.**

(57) Sliding door construction, comprising a door (1) being provided with at least two traversing wheels (5) at the top edge thereof, that are supported by a guide rail (31), such that on closing off an opening (28) in a wall (27), the door will move towards the wall and the floor (29). Sealing profiles (10) of flexible material have been mounted to the door. At least one hook-shaped element (25) has been mounted to the top edge of the door (1), which in closed condition of the door will be in engagement with a hook-shaped element (26) mounted to the wall. The hook-shaped elements (25, 26) are made of steel. Along the edges facing the wall (27) and the floor (29) the door (1) has been provided with strips (21) of a material that will foam on heating.

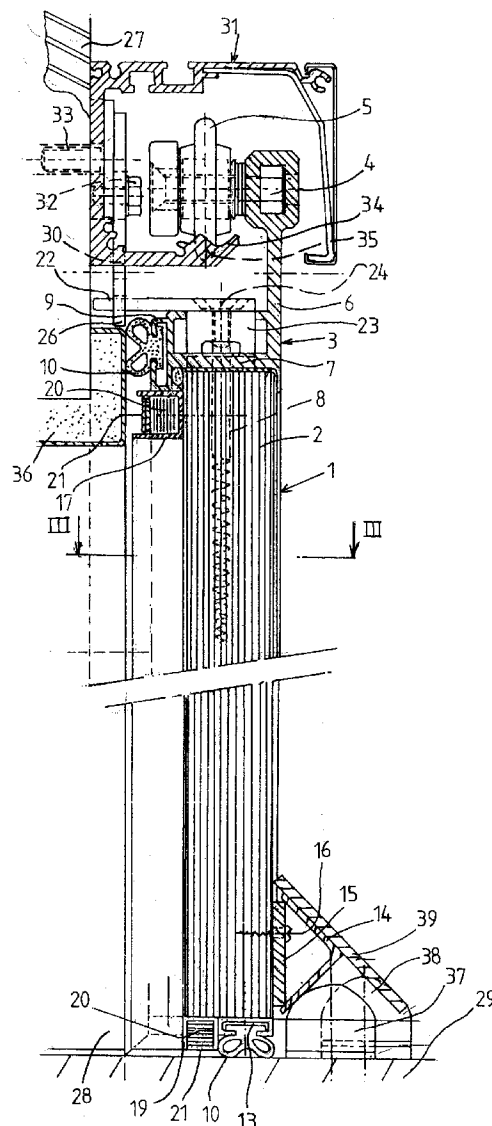


FIG. 1

The invention relates to a sliding door construction, comprising a door substantially consisting of wood or a similar material and being provided with at least two traversing wheels at the top edge thereof, which are guided across a guide rail, which has been designed such that the door, on reaching the position in which it closes off an opening in a wall, moves towards the wall and the floor on which the wall stands, for hermetically sealing the opening by sealing profiles from flexible material mounted to the door.

Such a door is known from GB-A-2 207 172 in the name of applicant and is employed in for example hospitals, for closing patient and operation rooms. Therein, the door substantially consists of multiply with an aluminium suspension profile at the top side, to which the traversing rollers have been mounted. The traversing rollers consist of plastic and the guide rail is made from aluminium.

Recently, more and more the requirement has come up, that such a door should be fire-resistant. This means that if there is fire in the room where the door is located, during a certain period of time, the fire should not spread to the space at the other side of the door, through this door.

Therein, it is desirable that the appearance of such a fire-resistant door distinguishes itself from the non-fire-resistant doors as little as possible, since the doors can be located in each other's proximity. Further, the costs of such a fire-resistant door must naturally be kept as low as possible. In order to achieve both of these aims, one should employ the same parts for both door constructions where possible.

According to the invention, this is achieved in that at least one first hook-shaped element has been mounted at the top edge of the door, which element, with the door in closed position, is in engagement with a second hook-shaped element mounted to the wall, said hook-shaped elements being made of steel or a similar material which can resist higher temperatures, in which along the edges facing the wall and the floor, the door has been provided with strips of a material that foams on heating, the door being designed such that the strips are located substantially on the wooden door panel.

By employing hook-shaped elements it is achieved, that in the known way the guide rail can consist of aluminium and the traversing wheels of plastic. These materials will, indeed after a relatively short time lose their strength and will not be able to keep the door in its place anymore, but the engaging hook-shaped elements will take over this task.

In case of fire, the sealing profiles from flexible material will not be able to perform their function anymore after a short time either. However, this task is taken over by the strips of the material which will then be in foamed condition. Due to this, a hermetic sealing between the wooden door panel and both the wall and the floor will be maintained, as a result of which

no spreading of fire can occur and at the same time a smoke-tight separation will remain existent.

In order to make sure that the lower edge of the door will also remain in its place in case of fire, it can be provided for, that both the guiding profile being obliquely to the plane of the door and the protections mounted on the floor, with which the profile is in contact when the door is in the closed position, are executed in steel or a similar material.

Since the strips of material that foams on heating will preferably be located near the sealing profiles of flexible material, it can be provided for, that the relevant strips have been received between the legs of the metal U-profiles, which in the closed position of the door will extend to close near the wall, or a door-case mounted on the wall, and the floor.

Since the strip of foaming material only needs to have a limited thickness, a filling of wood can be applied between the basis of the U-profile and the strip.

The known door has been provided with a U-shaped opener, which has been manufactured from metal and is supported by a metal bush in connection with the forces to be transmitted. In order to prevent the end of the opener turned away from the seat of the fire and from the bush from getting too hot, it can be provided for, that the opener consists of two parts, both connected to a pin, in such a way that both pins are in line with each other, the facing ends of the pins both having been provided with a flange and the flanges being pulled into contact with each other by a number of bolts, through a disc from a plastic material mounted between the flanges, while the bush also comprises two parts not being in contact with each other, each having been secured to the door panel individually.

Therein it can further be provided for, that between both parts of the bush, in the interior of the bore in the door panel in which the bush is located, a strip from material that foams on heating has been provided, being located almost at the position of the flanges of the pins connected to the parts of the opener.

Due to this, in case of fire, a separation between the spaces at both sides of the door will also be obtained at the location of the opener.

The invention is further explained by way of an embodiment, illustrated in the drawing, in which:

fig. 1 shows a vertical section across a door construction according to the present invention with the door in the closed position;

fig. 2 shows a plan view of the construction of fig. 1, but with certain parts omitted;

fig. 3 shows a partial section according to the line III-III of fig. 1; and

fig. 4 shows a substantially vertical section across a part of the door of fig. 1, at the location where the opener is situated.

The door construction shown in the drawing com-

prises the door 1 consisting of a panel 2, that can be made of multiply and has been connected to a suspension profile 3 along the top edge, to which profile traversing rollers 5 have been mounted by means of the bolts 4. To that end the suspension profile has the vertical leg 6 and the horizontal leg 7 through which the screws 8 extend, that establish the connection with the door panel 2.

The suspension profile 3 further comprises a U-shaped part 9, which is connected to the horizontal leg 7 and in which the sealing profile 10 has been mounted. As appears from fig. 3, the sealing profile 10 continues along the vertical side edges of the door where the profile has been received in the U-shaped part 11 of the edge profile 12, mounted on the panel 2.

The U-profile 13 has been mounted on the bottom edge of the panel 2, in which profile a part of the sealing profile 10 is situated. Near the bottom edge of the panel 2, on its vertical plane, the angled profile 14 has been mounted by means of the strip 15 connected therewith, through which screws 16 pass.

Next to the U-profiles 9, 11 and 13, in which the sealing profile 10 is situated, U-profiles 17, 18 and 19 have been mounted on the panel 2, in which a strip 21 of a material that foams on heating is located on a filling portion 20. Such a material is commercially available under the name "Palusol" or "Interdens".

A steel plate 22, as shown in particular in fig. 2, has been mounted on the top edge of the door 1. Mounting is effected by means of filling portions 23 and screws 24. The plate 22 comprises two hook-shaped elements 25, that can cooperate with two hook-shaped elements 26 being square thereto and also being made of steel, that have been mounted to the wall 27 in which the opening 28 is located, that can be closed off by the door 1. The wall 27 is on the floor 29.

The hook-shaped elements 26 extend upwards through openings 30 in the substantially U-shaped guide rail 31. The elements 26 and the guide rail 31 have been mounted to the wall 27 by means of bolts 32 and 33 respectively.

The guide rail 31, generally made of aluminium, comprises the guiding part 34 for the traversing wheels 5. At two positions on this guiding part 34, recesses 35 have been provided such that the traversing wheels 5 will fall into them when the door 1 is in closed position, as indicated in fig. 1.

In this closed position of the door 1, the hook-shaped elements 25 and 26 are in engagement. At the horizontal top edge and at the vertical edges of the door 1, the sealing profiles 10 abut the doorcase portions 36 provided on the wall 27. The sealing profile 10 on the bottom edge of the door 1 abuts the floor 29 while the profile 14 abuts the protections 37 mounted on the floor, which projections are made of steel.

The protections 38 mounted on the floor 29 serve for guiding the bottom edge of the door 1 during opening it, which protections can be made of plastic in a manner known and at the same time cooperate with the plate 39 which has been mounted on the profile 14.

If the door 1 is in closed position, as indicated in fig. 1 - 3, and a fire starts in the space at the right hand side of the door as seen in fig. 1, the traversing wheels 5, the suspension profile 3 and the guide rail 31 will lose their strength after a certain period of time and the sealing profiles 10 will no longer be operative. The engaging hook-shaped parts 25 and 26 will keep the top edge of the door in place so that the door will not fall inwards into the space. The steel profile 14 and the steel projections 37 will support the bottom edge of the door for a certain period of time. Due to the occurring heat, the strips 21 will foam and form a seal between the door panel 2 and the doorcase 36 and the floor 29 respectively. In this way, one obtains a sufficient degree of fire-resistance of the door.

In order to eliminate the adverse effect on the fire-resistance of the door by the presence of the opener 40, see fig. 4, the opener is designed in a special way.

Each of the legs 41 of the substantially U-shaped bracket has been connected to a pin 42, the other end of which being provided with a flange 43. Between the flanges 43 lies the disc 44 of plastic and the flanges are pulled towards each other by means of the bolts 45. The pin 42 is secured in the leg 41 by means of a clamping bolt 46. The legs 41 are rotatably supported by bushes 47, that have been secured to the door panel 2 by means of screws 48.

The facing ends of the bushes 47 are located at some distance from each other and therebetween, a strip 50 made of material that foams on heating is provided on the inner circumference of the bore 49 in the door panel 2. When this happens, the foamed material connects to the plastic disc 44 so that a sealing and heat-insulating effect is obtained.

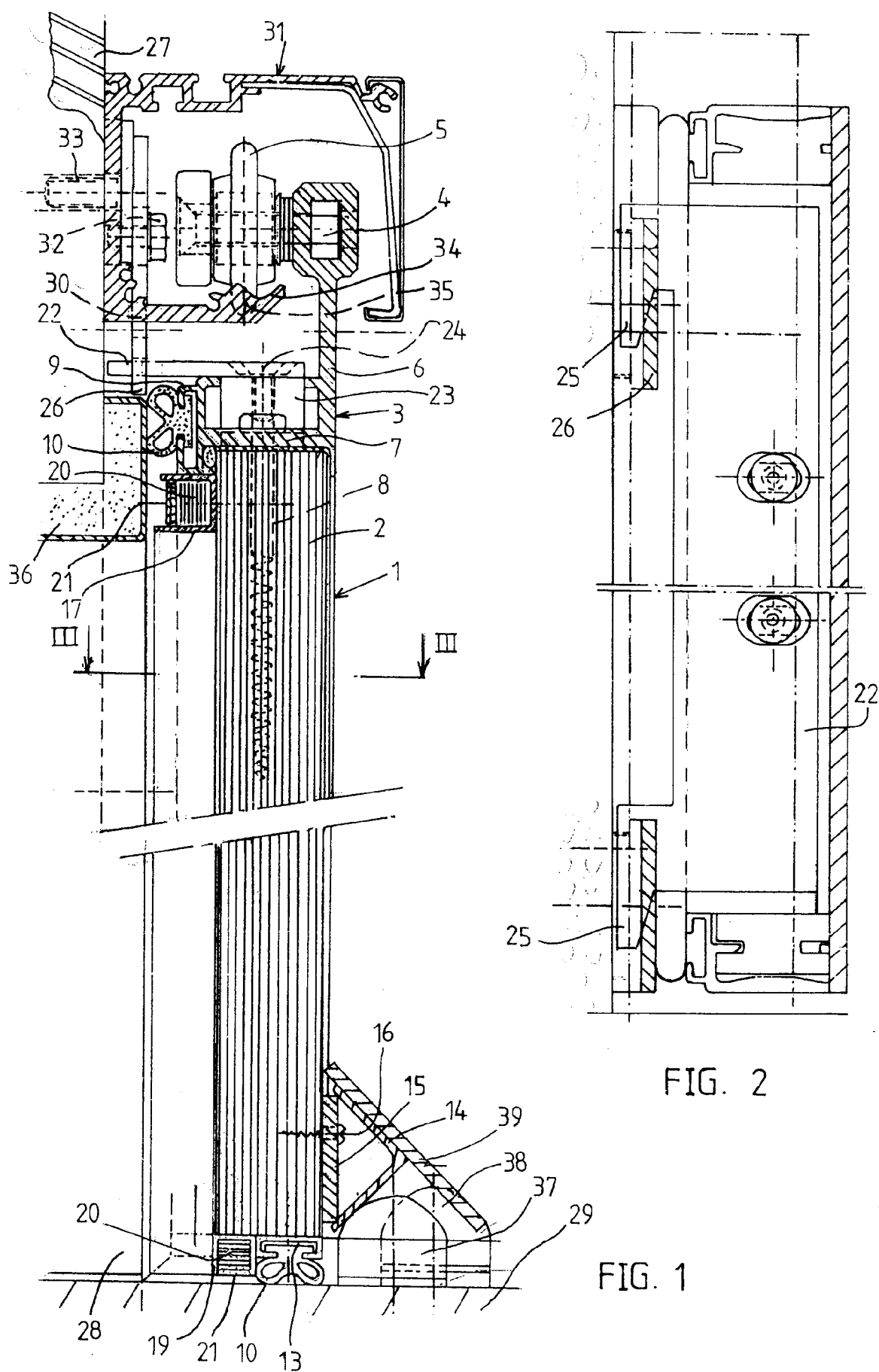
It will be obvious, that only one possible embodiment of a fire-resistant sliding door according to the invention has been illustrated in the drawing and described above and that many modifications can be made without being beyond the inventive idea.

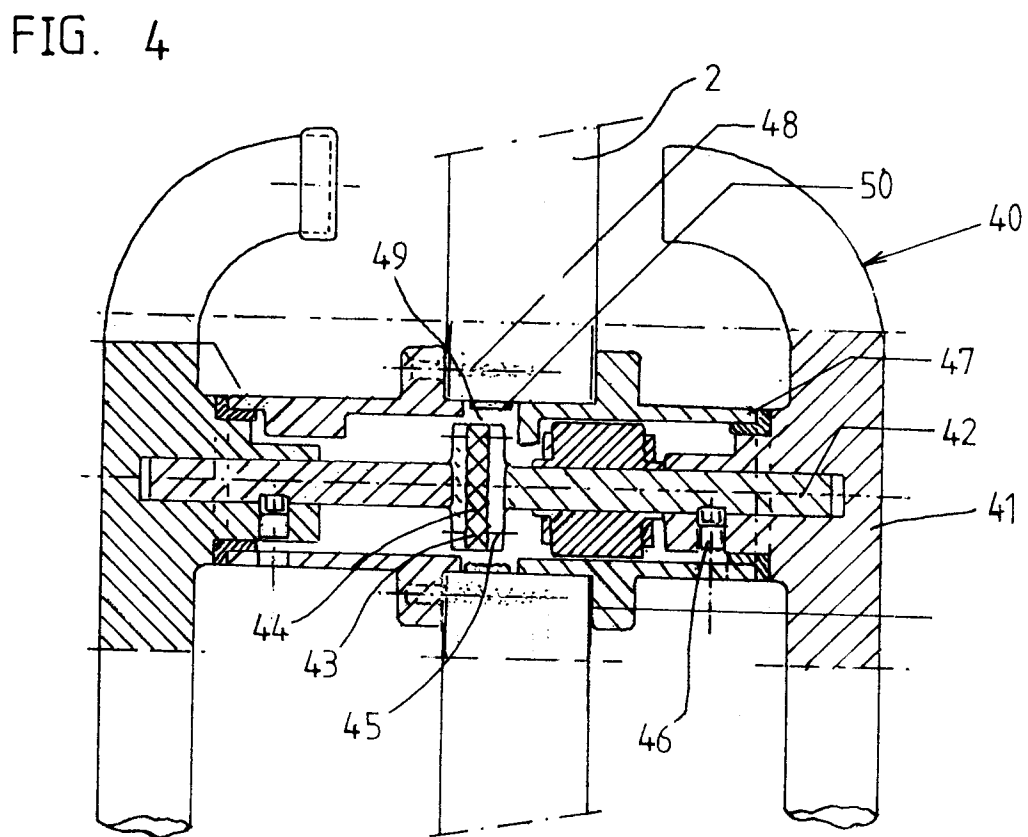
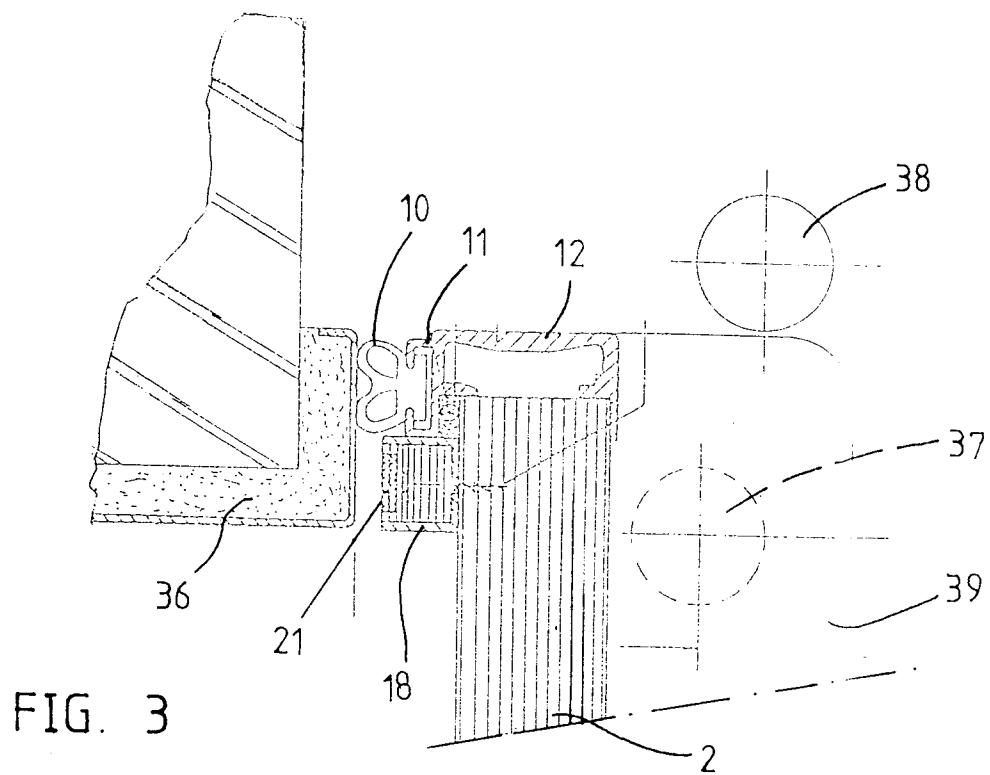
## Claims

1. Sliding door construction, comprising a door (1) substantially consisting of wood or a similar material and being provided with at least two traversing wheels (5) at the top edge thereof, which are guided across a guide rail (31), which has been designed such that the door, on reaching the position in which it closes off an opening (28) in a wall (27), moves towards the wall and the floor (29) on

which the wall stands, for hermetically sealing the opening by sealing profiles (10) from flexible material mounted to the door, characterized in that at least one first hook-shaped element (25) has been mounted to the top edge of the door (1), which element, with the door in closed position, is in engagement with a second hook-shaped element (26) mounted to the wall (27), said hook-shaped elements (25, 26) being made of steel or a similar material which can resist higher temperatures, in which along the edges facing the wall (27) and the floor (29), the door (1) has been provided with strips (21) of a material that foams on heating, in which the door has been designed such that the strips are located substantially on the wooden door panel (2).

2. Sliding door construction according to claim 1, characterized in that both the guiding profile (14) being obliquely to the plane of the door (1) and the projections (37) mounted on the floor (29), with which the profile is in contact when the door is in the closed position, are executed in steel or a similar material.
3. Sliding door construction according to claim 1 or 2, characterized in that the strips (21) of material that foams on heating have been received between the legs of the metal U-profiles (19), which in the closed position of the door (1) will extend to close near the wall (27), or a door-case (36) mounted on the wall, and the floor (29).
4. Sliding door construction according to one of the preceding claims, characterized in that the opener of the door (1) consists of two parts (41), together forming a U-shaped handle, both connected to a pin (42), in such a way that both pins are in line with each other, in which the facing ends of the pins both have been provided with a flange (43) and the flanges are pulled into contact with each other by a number of bolts (45), through a disc (44) from a plastic material mounted between the flanges, while the bush for supporting the handle (41) also comprises two parts (47) not being in contact with each other, each of them having been secured to the door panel (2) individually.
5. Sliding door construction according to claim 4, characterized in that between both parts (47) of the bush, in the interior of the bore (49) in the door panel (1) in which the bush is located, a strip (50) from material that foams on heating has been provided, which is located almost at the position of the flanges (45) of the pins (42) connected to the parts (41) of the opener (40).







European Patent  
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# EUROPEAN SEARCH REPORT

Application Number

EP 93 20 0115

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	NL-A-8 301 327 (GROENEVELD) * page 2, line 30 - page 3, line 24; figures *	1-4	E06B5/16 E06B3/46
A	US-A-3 039 153 (DUSING) * column 1, line 15 - line 34 * * column 2, line 1 - column 3, line 16 * * figures *	1	
A	DE-A-2 811 676 (MECHEL) * page 8, paragraph 3 - page 12, paragraph 2; figures *	1	
A	DE-A-3 502 032 (LINDPOINTNER TORE) * page 7, last paragraph * * page 9, paragraph 2 - paragraph 3 * * figure 1 *	1,3	
A	FR-A-2 364 321 (AUG. SCHWARZE) * page 1, line 35 - page 3, line 18; figures *	1,3	
D,A	GB-A-2 207 172 (MARKUS) * page 10, line 35 - page 14, line 12; figures 1,2,11 *	1	
A	DE-A-2 835 556 (WILKE) * page 8, paragraph 10 - page 10, paragraph 2 * * figures 1-4 *	4,5	
A	FR-A-2 253 907 (HEINEN) * page 4, line 19 - page 5, line 3; figure 3 *	4,5	
A	CH-A-529 906 (GRÜNERT)		
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 27 APRIL 1993	Examiner DEPOORTER F.
<p><b>CATEGORY OF CITED DOCUMENTS</b></p> <p>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</p> <p>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 &amp; : member of the same patent family, corresponding document</p>			

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