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I-33170 Pordenone (IT)(54) **Hinge for refrigeration appliances, in particular built-in refrigerators and the like.**

(57) Hinge for a refrigeration appliance built into a cabinet (6), having doors (11, 12, 13, 14) for closing the food storage compartments (8, 9), said doors being covered by corresponding decorating panels (32). The hinge (15) is provided with arms (21, 22) that are fixed on the front side against the metal outer casing (7) of the appliance and on the back side against the decorating panel (32). Said hinge further comprises a protruding stud (29) that is inserted in a receptacle in the peripheral portion of each door (11, 12, 13, 14), thereby causing both the corresponding door (11,12,13,14) and the related decorating panel (32) to become pivotally hinged on to the cabinet (7). Said panel (32) is therefore able to slide freely with respect to the door (11,12,13,14) when the latter is opened or closed, thereby preventing the mutually opposing gaskets (17,20) of the doors (11,12,13,14) of the appliance from entering in contact with each other, so as to avoid possible wear-out and damages.

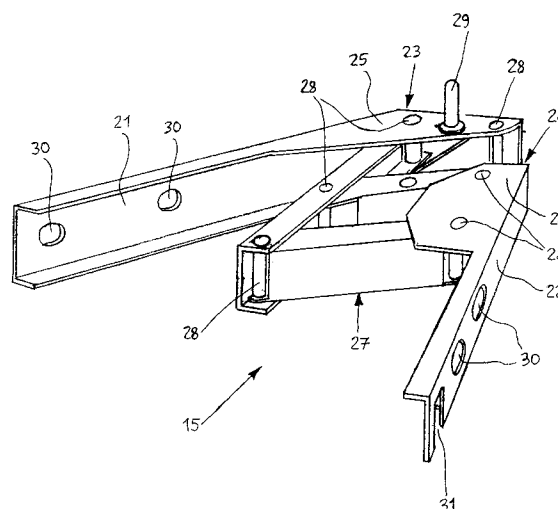


FIG. 2

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The present invention refers to a hinge for refrigeration appliances, in particular built-in refrigerators for installation within cabinets and similar appliances, said hinge being capable of ensuring the installation of decorating panels over the doors of the same appliances so as to enable them to be opened and closed without any mutual interference.

Refrigeration appliances, such as built-in refrigerators and the like, are known from the prior art to comprise four doors used to close the storage compartment that have the same width and are constituted by two pairs of doors adjacent to each other and hinged to the outer casing of said appliances in mutually superimposed positions. The doors in each one of said pairs of doors are provided in the usual way with a respective magnetic sealing gasket running all along the periphery of said doors and applied against the surface of the door facing the inner side of the storage compartment so as to interact with the opposite peripheral metal front edge of the same storage compartment, whereas an air-tight sealing effect of the storage compartment is further ensured, when said doors are brought into a mutually closed position, by the provision of a respective magnetic sealing gasket also along the mutually facing vertical edges of the doors themselves, said sealing gaskets being perfectly adhering one against the other when both doors are brought into their closed position.

In particular, each hinge is of the articulated parallelogram type, provided with two arms that are respectively fixed against the corresponding front edge delimiting the cold storage compartment and against the opposite peripheral rear edge of the corresponding metal door closing said cold storage compartment. Furthermore, each door is covered by a respective external decorating panel which is aesthetically compatible with the kitchen cabinet in which the appliance is built-in and is sized so as to adapt to said door over its full length and width, said panel being fixed with *per se* known means on the front side of the corresponding appliance door, to which it is therefore tied up rigidly.

Said hinge, furthermore, keeps the sealing gaskets on the opposing edges of the doors pressed against each other when said doors are in their closed position, and it tends to keep them still against each other even when the doors are in their first opening stage, ie. start to be opened, thereby determining a slight interference by said doors that tends to undesirably constrain also the opposite doors into opening, and furthermore causes also a rubbing action to occur against the opposite decorating panel with a resulting risk of damages and/or breakdown of the sealing gaskets, and as a consequence of imperfect shutting up of the same doors, during the reverse movement of said doors,

ie. when they are being closed.

Furthermore, owing to the rigid connection existing between each door and its decorating panel counterpart, it actually proves a quite difficult and toilsome task trying to gain access to the mutual adjustment and fastening means of said component parts of the appliance in view of completing the assembly or the removal of the decorating panel with respect to the pertaining door.

It is therefore an object of the present invention to eliminate the afore mentioned drawbacks through the use of a hinge that is shaped and formed so as to enable each pair of mutually adjacent doors of appliances of the afore specified type to be opened and closed in an effective, reliable way, and also to avoid any prolonged interference between the magnetic sealing gaskets of the doors as well as any interference between said sealing gaskets of the doors and the mutually adjacent decorating panels associated to said doors.

This hinge is made with the constructional characteristics that are substantially described with reference to the appended claims.

The invention will be further described by way of non-limiting example with reference to the accompanying drawings in which:

- Figure 1 is a perspective view of a built-in, four-door refrigeration appliance provided with the hinge according to the present invention;
- Figure 2 is a perspective view of a hinge according to the present invention;
- Figures 3 and 4 are views showing constructional details of the assembly of a hinge according to the present invention in the refrigeration appliance shown in Figure 1, and namely a perspective view with a door and the corresponding decorating panel moved into a first operational position and, respectively, a plan view with said door and decorating panel moved into a second operational position.

Figure 1 illustrates a refrigeration appliance, in particular a household refrigerator 5 built into a wooden furniture cabinet 6 and provided with an outer thermally insulated metal casing 7 extending vertically and provided with two separate storage compartments 8 and 9 to accommodate the food to be preserved by refrigeration, said compartments being arranged in a superimposed arrangement and separated from each other by means of a thermally insulated partition wall 10 extending horizontally, said compartments being further adapted to be closed on their front side by means of respective pairs of doors 11, 12, 13 and 14 having either the same or a different size, jointed with their vertical edge running along the side of said cabinet 6 by means of hinges 15 made according to the

present invention, said doors being furthermore provided with respective handles (not shown) on their front side to enable them to be opened and closed through a motion along the arc of a circle in either opposite directions A and B on the front side of said cabinet.

In order to ensure air-tight sealing of each food storage compartment in the closed position of said doors, the latter ones are further provided with a respective magnetic sealing gasket 16 of a traditional type, which is applied against the inner surface of each door along the periphery thereof so as to be facing the inner side of the corresponding food storage compartment of the appliance, said sealing gasket being adapted to abut and stay attracted against the opposite front metal edge of the appliance.

Finally, the doors are also provided with a further magnetic sealing gasket 17 applied all along the vertical side edge 18 of each door situated in the opposite position with respect to the corresponding vertical side edge 19 of the adjacent door which is also provided with a similar magnetic sealing gasket 20 of its own, so that said magnetic sealing gaskets 17 and 20 will mutually attract each other when both doors are in their closed position, thereby sealing the food storage compartments in the desired air-tight way.

The magnetic sealing gaskets are substantially of the same type as described in the Italian utility model application no. PN91U000013, filed on the 3rd May 1991 by the same Applicant, to which reference is therefore made for a better understanding of and a deeper insight into the constructional characteristics of said magnetic sealing gaskets.

By taking now a look to Figure 2, it can be noticed that each hinge 15 is of the traditional articulated-parallelogram type and, in this particular case, it is constituted by two rectilinear arms 21 and 22 formed by respective metal channel sections and provided with respective end portions 23 and 24 that are bent almost orthogonally so as to form corresponding plane surfaces 25 and 26, and by an articulated parallelogram 27, the free ends of which are restrained by pins 28 supported in the respective plane surfaces 25 and 26, so as to enable said arms to be displaced into different positions along the same sliding plane.

However, in contrast to the hinges known from the prior art, the hinge according to the present invention is further provided with at least a relatively short pin 29, which is formed in the lower or upper plane surface 25 of the arm 21 so as to project downwards or upwards from the same surface for the functional purpose that will be further described later on, as well as through-eyelets 30, in this case two through-eyelets, pierced in the side

surface of the channel sections of said arms and appropriately spaced from each other along the respective side surface.

At least one of said arms of the hinge, in this case the arm 22, is further provided, in correspondence of its side surface, with an indentation 31 which is cut in a position close to said eyelet 30 and is rectangular in its shape in the example being described here, but can of course be cut or formed also into any other desired shape, to perform the function that will be described later on.

Referring now to Figures 3 and 4, it can be noticed that these illustrate the assembly of a decorating panel 32 over one of the doors of the refrigeration appliance, in this case the door 11, through the use of hinges 15 according to the present invention, said decorating panel being matched and compatible in its size and aesthetics with the wooden furniture cabinet 6 in which said appliance is built-in.

As it emerges particularly from Figure 3, in which it can be noticed that the door 11 and the decorating panel 32 are moved into their opened position with respect to the food storage compartment 8 of the refrigeration appliance, whereas the decorating panel is made to a greater height than the door, the assembly of said items to the metal casing 7 of the appliance is performed by applying the arms 21 and 22 of the hinge 15 against the corresponding front metal edge 33 of said appliance and the rear surface 34 of the decorating panel 32, respectively, in the upper portion of said surface which raises above the upper edge of the door 11.

In both cases, the attachment of the arms is performed by means of screws or similar fastening means (not shown) inserted through the eyelets 30 of said arms, whereas this enables said fastening means to be fitted and set in the most appropriate way with respect to the corresponding eyelets and, therefore, the hinge 15 to be adjusted accurately in its position.

Furthermore, the presence of the indentation 31 also enables the hinge 15 to be correctly placed in position on an appropriate fastening screw or the like (not shown) which is previously screwed into the rear surface 34 of said decorating panel, by letting said screw into said indentation and then using it to fasten the arm 22 in such a position.

This makes it possible to provide a quick, simple and reliable fastening system for the hinge 15 by performing a limited number of operations directly on the visible and fully accessible rear upper surface portion of the decorating panel 32, while in this way eliminating the rather complex and difficult operations hitherto required. Furthermore, during this phase of the assembly of the hinge 15, the downwards or upwards protruding pin

29 of the same hinge is inserted in a corresponding recess (not shown) provided in the upper or lower edge 35 of the door 11 of the refrigeration appliance, so that the decorating panel 32 of the door is on its vertical side practically hinged directly to the cabinet 6 accomodating the built-in appliance, while effectively being tied-up to said door.

Furthermore, in order to enable each door to be pulled by the decorating panel associated therewith, a pulling system is provided which, in the example given here, is constituted by a bracket 36 installed in a *per se* known manner against the rear surface 34 of the panel, as well as by a corresponding sliding means 37 having an extended shape and attached to the door of the refrigeration appliance, in which said bracket 36 is caused to engage so as to freely slide therein during the opening and closing motions of the door.

Thanks to this actuating system, coupled to the indentation 31 in the hinge 15, it is possible to complete the assembly of each decorating panel in relation to the respective door in a quick, reliable way.

It therefore ensues that, during the opening and closing motions of said door 11 (as well as of each one of the remaining doors of the refrigeration appliance), as allowed for by the pin 29 of the hinge 15, even the respective decorating panel 32 thereover, which is connected with the door in the afore described manner, is moved in the same direction, while however rotating about vertical pivoting axes (constituted by the pivots used to hinge the articulated parallelogram 27 in correspondence of the plane surfaces 25 of the hinge 15) which are different from the ones used for said door and, at the same time, determining also a lengthwise relative sliding motion of said panel with respect to said door.

It is in this way possible to effectively separate both the opposing edges of the sealing gaskets of the adjacent doors and the edges of said gaskets from the corresponding edges of the decorating panels, during the opening and closing motions of each respective door, thanks to the described mutual motions occurring between said panels and the sealing gaskets of said doors under the action exerted by the hinge 15, thereby preventing even the slightest contact from occurring between said component parts and eliminating any risk of damages due to wear and tear and/or fortuitous or unintended breakdown of the sealing gaskets of said doors.

As it can further be noticed in Figure 3, during opening of the door 11, the panel 32 slides almost parallelly to and slightly separated from said door, while said door and said panel are set in a mutually parallel position, clearly separated from each other, when the door (and, therefore, also the panel) is in

its closed position, as illustrated in Figure 4.

Claims

1. Hinge for a refrigeration appliance, in particular a refrigerator to be built into a wooden furniture cabinet or the like, comprising a thermally insulated outer metal casing extending vertically and provided with a plurality of separate storage compartments in a mutually superimposed arrangement, each one of said compartments being adapted to be closed in an air-tight manner on its front side by means of at least two doors pivotally hinged to said outer casing by means of corresponding hinges provided each with two rectilinear arms that are jointed to each other through an articulated parallelogram, said doors being mounted on the casing in a mutually adjacent arrangement and being movable from an open to a closed position of the related storage compartment, and being also coverable by means of corresponding decorating panels associated to the respective cabinet accomodating the built-in appliance, said hinge being **characterized in that** it has at least a pin (29) co-operating with a corresponding door (11, 12, 13, 14) of the appliance and defining the vertical hinging axis thereof, and further **characterized in that** said arms (21, 22) are provided with relevant pierced-through eyelets (30) for their application, by means of *per se* known fastening means, against the front upper portion (33) of the appliance and the rear surface (34) of each decorating panel (32) protruding above the upper peripheral edge (35) of the corresponding door (11, 12, 13, 14), actuating means (36, 37) being further provided to determine displacement of each door (11, 12, 13, 14) by the associated decorating panel (32) during the opening and closing movements of the door.
2. Hinge according to claim 1, **characterized in that** said pin (29) is inserted in a corresponding recess of said peripheral edge (35) of said door (11, 12, 13, 14).
3. Hinge according to claim 1, **characterized in that** at least one of said arms (22) is provided with at least an indentation (31), enabling a corresponding fastening element provided on the rear surface (31) of said decorating panel (32) to be inserted therethrough, for a correct assembly into position of the same panel.
4. Hinge according to claim 1, **characterized in that** said actuating means comprise at least a bracket (36) mounted against the rear surface

(34) of said panel (32), and at least a corresponding elongated guide (37) mounted on said door (11, 12, 13, 14), arranged to engage said bracket (36) so as to enable it to freely slide therein.

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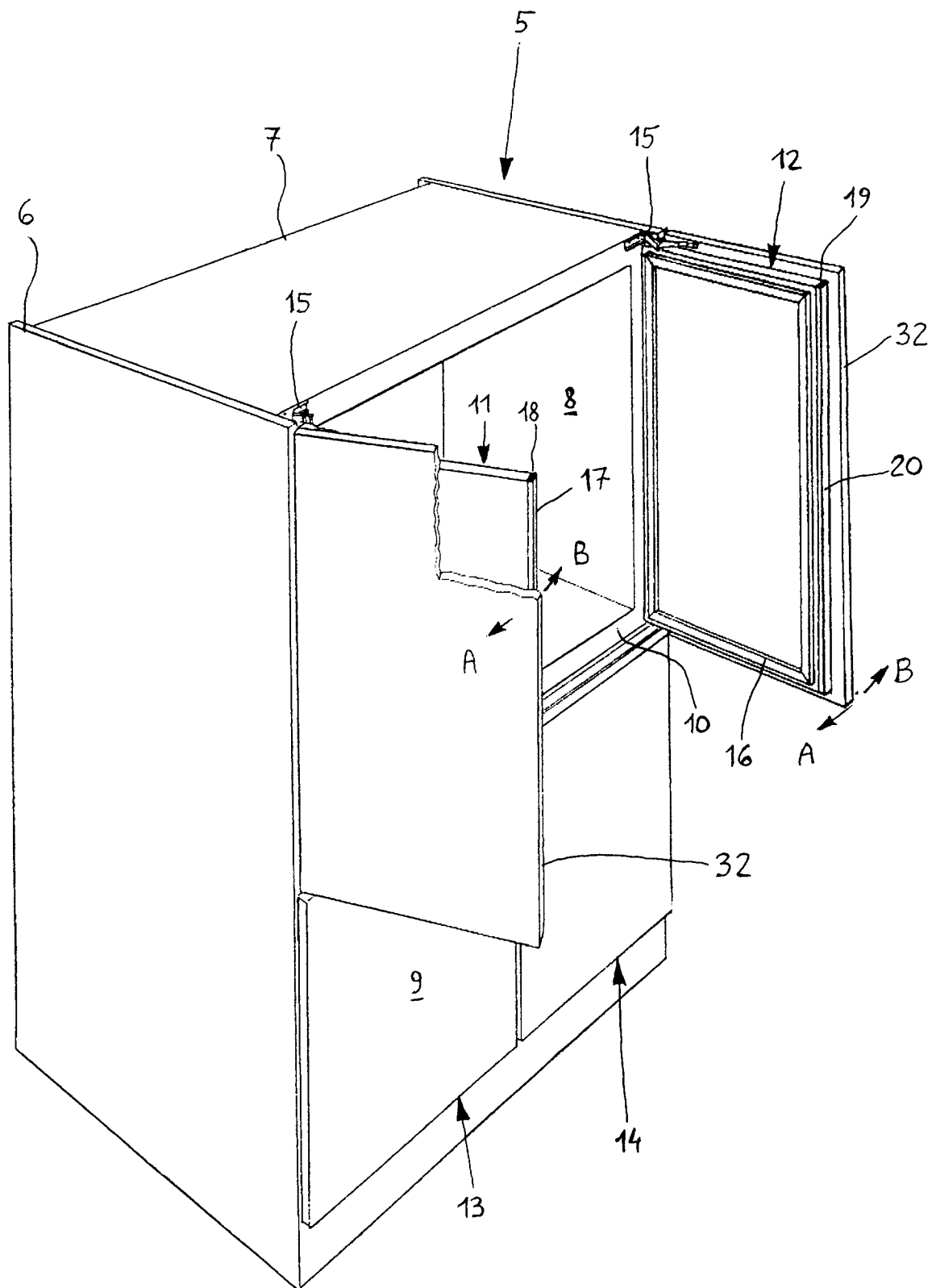


FIG.1

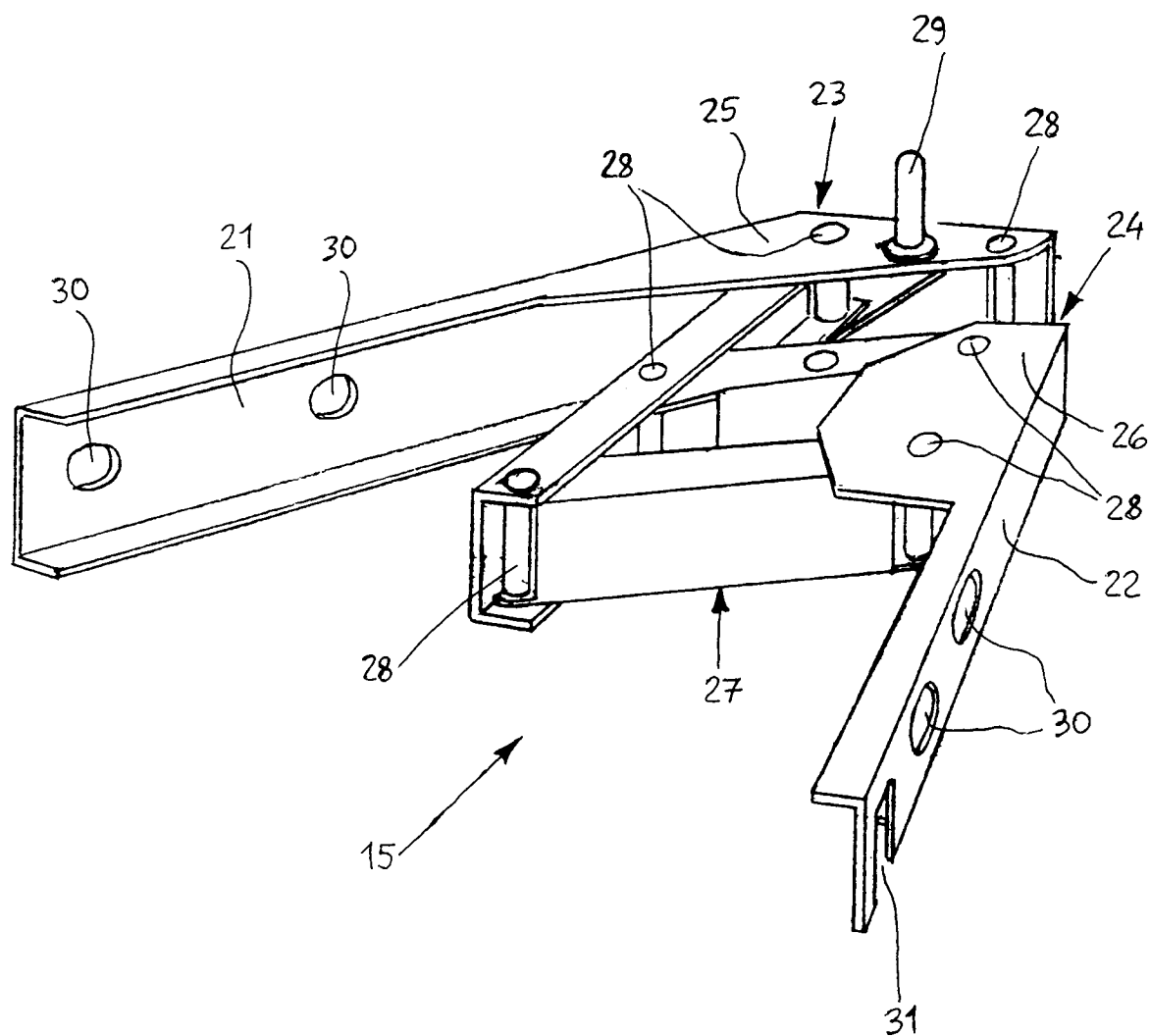


FIG. 2

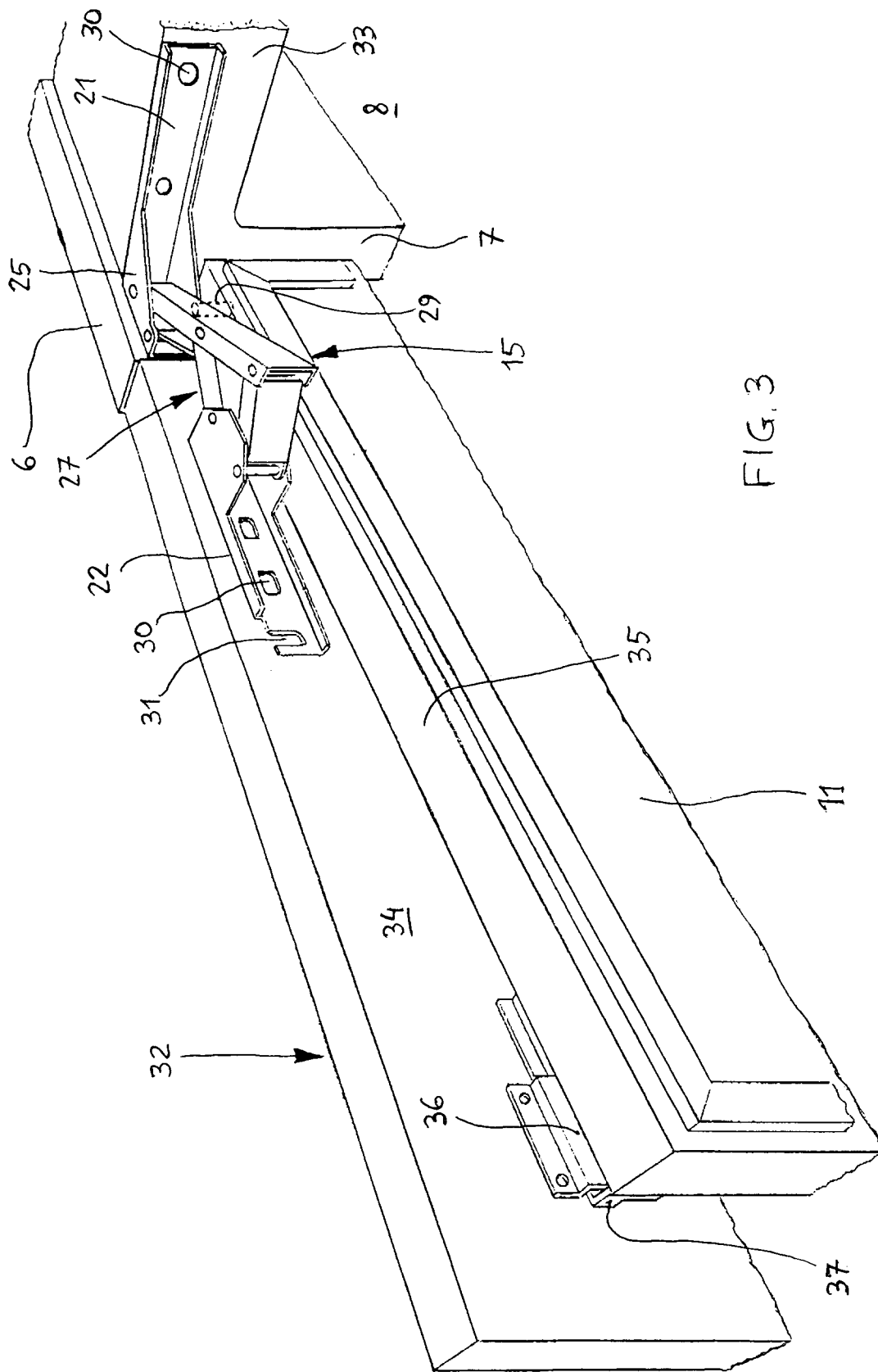


FIG. 3

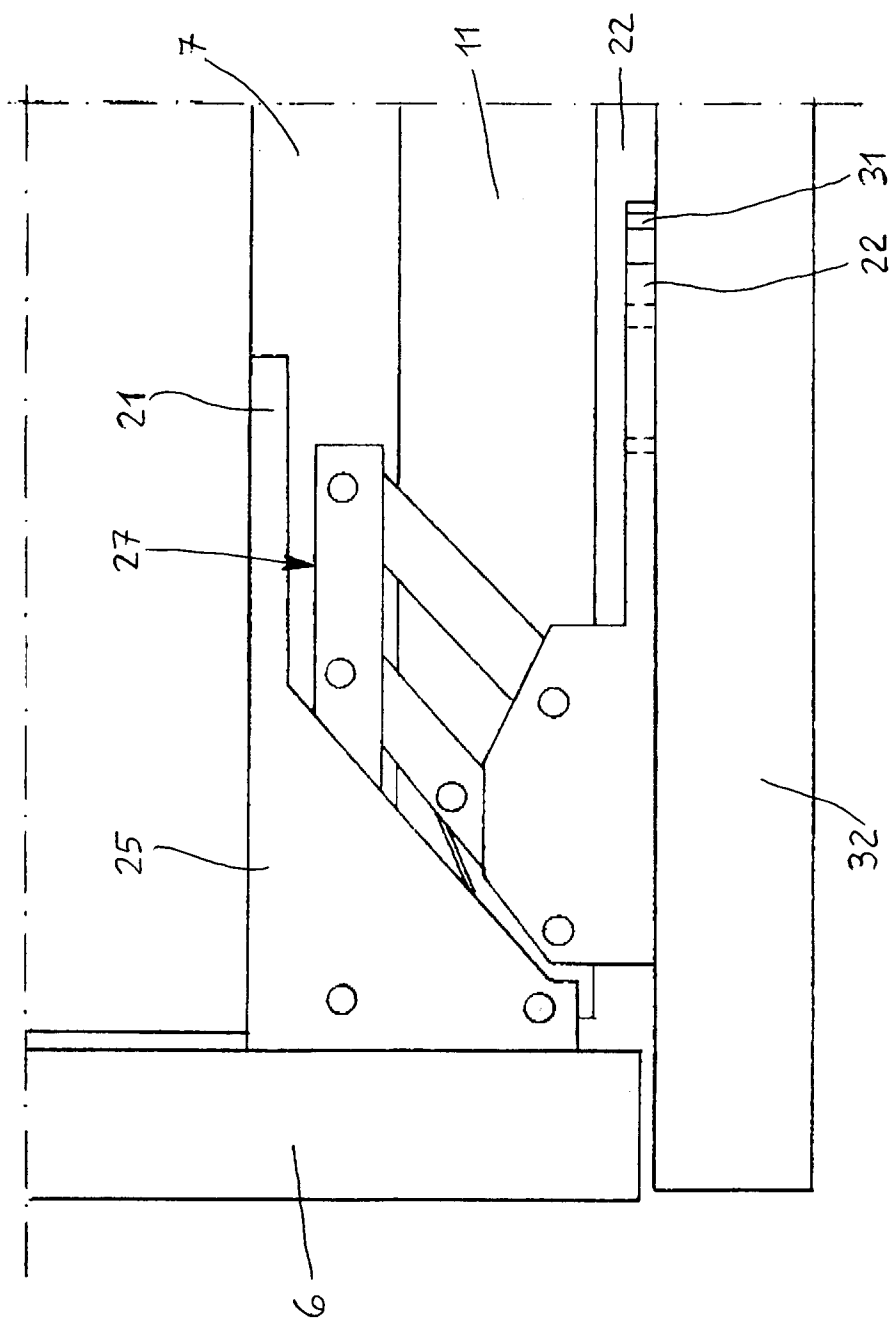


FIG. 4



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EUROPEAN SEARCH REPORT

Application Number

EP 93 10 4511

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	GB-A-2 119 435 (PAUL HETTICH AND CO.) * page 1, line 89 - page 2, line 35; figures 1-4 *	1	E05D3/06 E05D3/04

A	DE-A-3 150 305 (BOSCH-SIEMENS HAUSGERÄTE GMBH) * page 8, line 8 - page 10, line 34; figures *	1	

A	DE-U-7 339 379 (FORMAT-MÖBELWERK) * page 4, line 4 - line 15; figure 3 *	1	

A	DE-U-8 403 014 (BOSCH-SIEMENS HAUSGERÄTE) * page 4, line 14 - page 6, line 7; figures *	1	

			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			E05D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 16 JULY 1993	Examiner DELZOR F.N.M.
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			