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(54) **Structure of piece of furniture and components thereof**

(57) The invention relates to the structure of a piece of furniture wherein a door (2) comprising a frame formed by sections (8, 9, 10) joined together, is connected to a part (3) of the structure by means of hinges (1) which are secured to one of the sections.

Advantageously, the supports (6) of the hinges and

the corresponding section (8) are formed in a mutually matching manner so that the former are slidably guided by the latter. Furthermore, the screws for securing the hinges fit into threaded holes passing through the supports (6) so that, when they are tightened, they act against the wall of the section (8) and push the supports (6) towards it, locking them in the desired position.

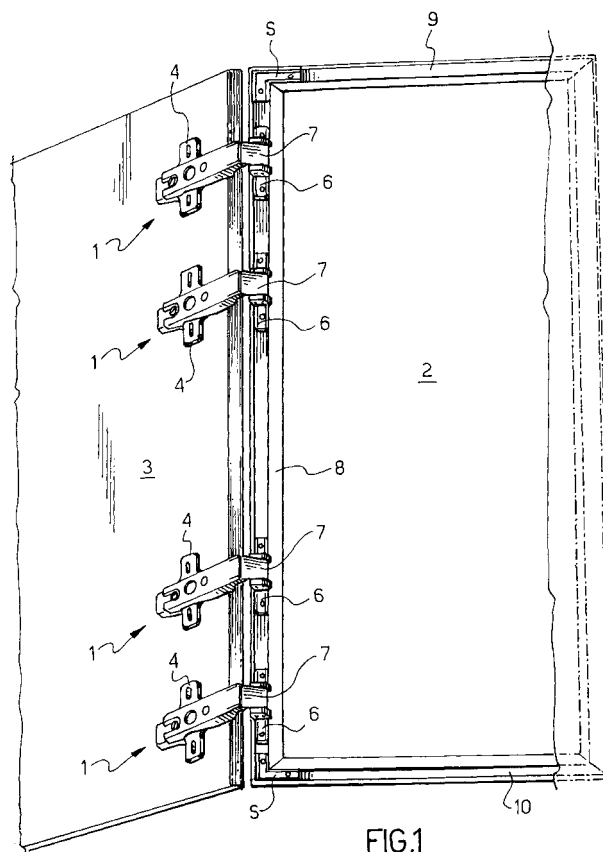


FIG.1

EP 1 046 773 A1

Description

[0001] The present invention relates to a structure of a piece of furniture wherein a door comprising a frame formed by sections joined together, is applied to a wall by means of hinges secured to one of these sections.

[0002] In the industrial production of this type of structure it is known to manufacture the frames of the doors using box-shaped sections, namely sections with a cross-section essentially closed and thus not accessible externally, which therefore have a good structural rigidity; usually these sections are made of metal, plastics or similar materials.

[0003] In order to fix the hinges to the door, openings are formed on one of the sections of the frame by means of mechanical machining operations (for example milling) at selected points, depending on the type and the dimensions of the leaf; the supports of the hinges are then positioned inside these openings and fastened to the sections by means of screws or other systems.

[0004] In this connection it must be pointed out that the present invention is intended in particular, but not exclusively, for hinges of furniture with a combined rotary and translational closing/opening movement.

[0005] As is known, this type of hinges is widely used nowadays and consists of a base plate with a cross-shaped configuration, which is screwed onto the wall of a piece of furniture and onto which a hinge arm is applied: the latter is provided in one of its ends with a pair of hinged levers that engage a concave support (referred to as "cage" by persons skilled in the art), roughly forming a four-bar linkage which confers to the hinge its particular rotary and translational operating movement.

[0006] It is precisely these concave supports that are inserted into the openings formed in the sections and referred to above.

[0007] There are however limitations in this manufacturing method, that hinder the industrial production of furniture structures made in accordance with the explanation given above.

[0008] In order to better appreciate this fact, it is necessary to point out first that the sections used for the frames of the doors, are generally obtained by cutting long metallic bars which are a few metres long: it is only after this cutting operation that the openings for the hinge concave supports are formed therein.

[0009] This is due to the fact that the position of the openings along the sections depends on various factors, such as the shape and dimensions of the door, which change from case to case; as a consequence, when the furniture doors are made, first of all the sections must be cut to size and then the abovementioned openings must be formed therein at the desired points.

[0010] In other words, it may be stated that the industrial production of furniture doors with frames formed by sections of the box shape type, at present requires ad hoc machining for the hinge fixing openings that must be carried out on small series of sections, already re-

duced to the final length required.

[0011] It can therefore be understood how this situation results in a certain increase of the production costs.

[0012] For example it is sufficient to consider that, having to perform machining operations on lots of parts which are small in number, it is not possible to achieve advantageous scale economies.

[0013] Indeed, it should be appreciated that in order to form openings in sections of predetermined length it is necessary to adjust the apparatus in a certain manner: therefore, when it is required to switch over to the machining of sections with a different length, this adjustment must be changed with a consequent loss of time and reduction in productivity.

[0014] In other words, when the type of door to be manufactured changes, it is required to set up again the machinery for processing the sections, thereby resulting in an inevitable slowing down of the working cycle.

[0015] Furthermore, it should be pointed out that in the case of errors during formation of the openings, it is required to discard sections which have already been cut to size, i.e. parts whose added value is increased by the cost of the operations necessary to obtain them from the initial semi-machined bar.

[0016] In order to improve this situation, it has been recently provided a system of sections which can be joined together so as to form the door frames, disclosed in European patent application No. 864721 in the name of Terno Scorrevoli.

[0017] According to this system, the section to which the hinges are secured (indicated by "Y" in the aforementioned patent application) is no longer of the box type, i.e. with a cross-section substantially closed as before.

[0018] In short, it may be said that this section comprises two seats (indicated by 3 and 4) extending longitudinally thereto, in the first of which the edge of the door panel is inserted, while the second one houses a part of the right-angled insert which serves to connect together the ends of two adjacent sections in the frame.

[0019] The two aforementioned seats are formed in such a way as to delimit, together with a side wall of the section, a sort of channel along which the supports (or cages) of the hinges mentioned above may be freely mounted in any desired position.

[0020] For this reason, the bottom of the channel is provided with a recess (indicated by 22) to be engaged by self-tapping screws used to fix the aforesaid supports in their mounting position.

[0021] With the solution disclosed in European patent application No. 864721, it is possible to overcome the drawbacks previously referred to and relating to the box-shaped sections.

[0022] Indeed, owing to the new type of section used (which has no more a closed configuration such as the box-shaped one) now it is not required to carry out machining operations in order to mount the hinges, since the latter may be positioned at any point along the sec-

tion and simply locked in place by means of the self-tapping screws.

[0023] In other words, with this new solution which is based on the use of sections with a substantially "open" cross-sections, machining is no longer required in order to apply the hinges because the sections are provided with a channel accessible from the exterior, wherein the hinge supports may be freely fixed at the desired points by simply tightening the associated screws.

[0024] However, the coupling sections described in the abovementioned European patent application, do not appear to be fully satisfactory.

[0025] First of all, it may be said that the manner in which the supports of the hinges are fixed to the section, does not seem quite reliable.

[0026] Indeed, such a fixing is ensured only by the self-tapping screws, either as regards the forces acting in the longitudinal direction of the section (i.e. the weight of the door), either as regards the forces acting transversely thereto (i.e. those which arise when the door is opened or closed).

[0027] It can therefore be expected that with the time, i.e. after numerous door opening and closing operations, the action of the self-tapping screws may diminish with a consequent slackening in the locking of the hinges.

[0028] This appears all the more possible if reference is made to the fact that the action of the screws, which depends on their position relative to the section and therefore is determined by that of the recess wherein they engage, is not centred with respect to the channel for receiving the supports (cages) of the hinges and thus with respect to the latter.

[0029] In other words, the use of the self-tapping screws as in the patent application considered above, necessarily requires a recess wherein said screws engage; however, the presence of the seat (indicated by "4" in the above European application) for the right-angled insert which connect the sections, requires that the recess must be formed alongside this seat and therefore in a position which is offset with respect to the channel.

[0030] Consequently the supports are secured to the channel with screws whose action is not barycentric and which therefore inevitably gives rise to unbalanced forces, with bending moments that may adversely affect the screws and the engagement thereof into the recess.

[0031] In order to remedy this situation, it would be possible to imagine providing a section such as that shown in the abovementioned European patent application, having a second recess in a position symmetrical to the first one with respect to the seat 4. However, this would require the use of other screws in order to fix the hinge supports and would result in a more complex and bulky configuration of the section.

[0032] The technical problem underlying the present invention is therefore that of providing a structure of a piece of furniture, able to overcome the drawbacks mentioned in connection with the above European patent ap-

plication.

[0033] In other words, it may be said that the invention aims at providing a structure of a piece of furniture wherein the hinges are secured to the corresponding section of the door frame in a stable and reliable manner, using simple screws and without the additional machining operations referred to in the beginning.

[0034] Such a problem is solved by a furniture structure, whose characterizing features are set out in the claims accompanying the present description.

[0035] The structural and functional features of the invention together with the advantageous effects arising therefrom, may be better understood from the following detailed description of two preferred and non exclusive embodiments illustrated in the accompanying drawings, wherein:

- Fig. 1 shows a perspective view of a furniture structure in accordance with the invention;
- Fig. 2 shows a detail of one of the hinges of the structure according to Fig. 1;
- Figs. 3 and 4 show the hinge of Fig. 2 in respective operating conditions;
- Fig. 5 shows a sectioned view of a detail of the hinge according to the preceding figures;
- Figures 6, 7 and 8 show in detail a second embodiment of the hinge according to the invention;
- Fig. 9 shows schematically the pattern of the forces applied during mounting of the second embodiment of the hinge.

[0036] As can be seen from the first of the abovementioned figures, there it is shown a structure of a piece of furniture (wardrobe, sideboard or the like) according to the invention, wherein numeral 1 indicates the hinges for mounting a door 2 on a wall 3.

[0037] Each of these hinges comprises a base plate 4 having the usual cross shape, onto which an arm 5 is applied; the base plate 4 is mounted on the wall 3 of the furniture by means of screws, while the fore end of the arm 5 is connected to a fixing support 6 by means of a pair of hinged levers 7, of the type normally used in conventional hinges.

[0038] The support 6 consists of a body made of metal or other suitable material, shaped so as to engage slidably in a section 8, as will be stated in more detail below; the section 8 forms part, together with other sections 9 and 10, of the frame of the door 2 (in the drawings and in this description only these two sections 9 and 10 will be referred to for sake of simplicity, since they are adjacent to the section 8; obviously also the fourth side of the frame consists of another section which is not numbered in Fig. 1).

[0039] The arm 5 is fastened at the rear to the base plate 4 by means of a screw (not shown in the drawings), which engages in a notch 11 open towards the tail end and formed with a U-shape likewise known per se.

[0040] As can be seen from the drawings and in par-

ticular from Fig. 2 (where, for the sake of clarity, only the arm 5 of the hinge has been shown and the section 8 has been illustrated without the rest of the door), the section 8 has a cross-section which is open and substantially L-shaped.

[0041] The inside of the section is provided with lugs 12, 13 and 14 that guide the sliding of the hinge support 6, preventing it from becoming detached from the section; for this purpose, the support is provided with an external profile matching the internal surface of the section 8 and having locating teeth 15 and 16 which engage with the aforementioned lugs, so as to keep the support stably seated. Basically, it may be stated that the support 6 forms together with the section 8, a linear sliding pair.

[0042] As a result of the shape of the section 8, it is also possible to use the zone comprised between the lugs 12 and 13 (i.e. the zone where the support 6 slides) for mounting the right-angled insert S which serves as a connection for the section 8 itself to the adjacent ones in the door frame; in this manner a configuration advantageously compact that occupies a small amount of space is obtained, as will also be seen below.

[0043] The support 6 has threaded holes 17 for fixing screws 18 that are tightened once the support has been placed along the section 8, in the desired position.

[0044] Finally, in accordance with a preferred embodiment of the invention, the section 8 has a seat 19 for mounting the edge of a buffer panel 20 of the door 2.

[0045] In the light of what has been stated above, it is possible to understand the mode of operation of the invention, described hereafter.

[0046] Before fitting the door 2 onto the wall 3 of the furniture, the hinges are mounted; the number of said hinges depends on each particular case and therefore it may be other than the four shown in Fig. 1.

[0047] This operation is performed by sliding the supports 6 of the hinges along the section 8 of the door until they are arranged as required; once the chosen position has been reached, the screws 18 are tightened in the holes 17 of the supports 6, locking the hinges in their stable position.

[0048] It should be pointed out that in this case the screws 18 operate in a manner which is somewhat different from what has been described in European patent application 864721.

[0049] Indeed, in the present case the screws 18 pass through the holes 17 and press against the inner wall of the section 8, so that the support 6 is forced against the opposite inner part of the section, thereby remaining firmly locked in the chosen position.

[0050] More particularly, in the example shown here, the action of the screws 18 forces the support 6 against the lugs 12, 13 and 14 which also have the function of guiding it during its sliding movement along the section 8.

[0051] Consequently, it may be easily appreciated that the support 6 is not fixed to the section as a result

of the engagement of the screws inside a recess likewise it occurs in the known art, but on the contrary it is locked by the thrust which arises when the screws are tightened.

[0052] From what has been stated above, it is therefore possible to understand how the invention solves the technical problem underlying it.

[0053] Indeed, as can be seen it is not required any machining operation of the section 8 (likewise instead occurs in the case of box-shaped sections) for mounting the hinges, since this is performed by simply tightening the screws 18.

[0054] Furthermore, owing to the support 6 and the particular method of locking it in position along the section 8, now it is no longer necessary to provide any recess for engagement with the screws in order to secure the hinges: this allows stable and reliable mounting of the hinges, in addition to some important advantageous effects which will be explained hereinbelow.

[0055] At first it must be pointed out that the weight of the door is now supported by the locking action of the support 6; in other words, in the structure according to the invention the weight of the door does not rest wholly only on the threads of the screws engaged in corresponding recesses, but is also borne by the support 6 locked against the inner walls and the lugs 12-14 of the section 8.

[0056] Likewise, the forces which are transverse with respect to the section 8, such as those resulting from opening and closing of the door, are no longer transmitted only to the screws engaged in the recess, but are also upheld by the support 6 locked inside the section 8.

[0057] As can be seen, therefore, in the present invention the screws are less stressed compared to the known art and practically operate only in the axial direction, i.e. they are not subject to bending forces.

[0058] Furthermore, it should be noted that the holes 17 in the support 6 may be arranged in a centred position with respect to the longitudinal axis thereof, since no bound arise from any recess present in the section as explained above; this fact allows an efficient locking action of the support 6 in the section 8 when the screws 18 are tightened, with a more balanced distribution of the stresses.

[0059] Among the other advantages achieved by the invention it must be emphasized that in the section 8, the inner part which accommodates the support 6 of the hinges, also has the function of receiving the right-angled inserts S connecting said section to the adjacent ones 9 and 10 in the door frame; this implies that the shape of the section 8 is simplified and more compact so as to ensure also a better mechanical strength.

[0060] In other words, it may be stated that in the prior European patent application considered above, the seat (indicated by 4 in said application) for mounting the right-angled inserts serves solely for this purpose since the hinge supports are arranged outside it, along the channel defined between this seat and the other seat where

the edge of the door panel is inserted.

[0061] On the contrary, in the present invention the seat for the right-angled inserts S and the channel where the hinge supports 6 are positioned, coincide with each other so as to produce an advantageous structural simplification of the entire section 8.

[0062] Finally it must be emphasized that in the present invention, the system for fixing the supports 6 along the section 8 is of the reversible type, i.e. it allows a support fixed beforehand to be removed and locked in position again, without being less effective in the next locking operation.

[0063] This aspect is particularly advantageous because it allows the correction of any errors in the positioning of the hinges when they are mounted on the doors.

[0064] This operation, indeed, is usually performed manually by operators who are provided with suitable instruments such as templates or the like; consequently, it may happen that owing to a human error the support of a hinge is not precisely positioned (errors are usually in the order of 1-2 mm), thereby making it necessary to remove such a support so as to mount it subsequently at the correct point.

[0065] In the furniture structure according to the present invention, all these phases may be performed without any particular difficulty because the screws 18 which lock the supports 6 in position, operate against the internal surface of the section 8 deforming it only locally, without damaging the neighbouring zones that may thus be used in the event of error, for repositioning the support.

[0066] In the case of the self-tapping screws engaged in the recess, this is not possible.

[0067] Indeed, when one of these screws is tightened in its recess, the latter inevitably widens around the screwing point in an irreversible manner; consequently, in the case of error, any removal of the hinge support and its subsequent re-mounting in a close correct position is not effective, because local widening of the recess results in an unstable new mounting position of the screws which tend to reassume the incorrect position of the first screwing operation.

[0068] Obviously, variations in the invention compared to what has been described hitherto are also possible.

[0069] One of such variations is explained below with reference to Figures 6, 7 and 8, wherein the first two figures show respectively a perspective view and a side view of a modified hinge support, while the third figure shows a side view of the section associated to this support.

[0070] For the sake of simplicity, the parts of this second embodiment structurally or functionally corresponding to those already considered above, have been indicated with the same numbers and therefore will not be further described in detail.

[0071] Basically, the difference between this second

embodiment of the invention and the first one consists in the presence of four inclined surfaces 30a, 30b and 31a, 31b, formed on the locating teeth 15 and 16 in connection with the side of the support 6 where the arm 5 of the hinge is attached.

[0072] In other words, these surfaces are oriented towards the side of the support 6 where the fixing screws 18 are introduced into the holes 17 (as shown in Figure 2); in this way, indeed, when the screws are tightened to lock the support 6 inside the section 8, the surfaces push against matching undercuts 12a, 13b formed along the lugs 12 and 13 of the section itself (see Figure 8).

[0073] Advantageously, the orientation of the inclined surfaces 30a, 30b, 31a, 31b is such that the thrust exerted by them on the undercuts 12a, 13b, has a component which is directed towards the inside of the section 8.

[0074] This fact may be understood better by considering Figure 9 which schematically shows the surfaces 30a, 30b (the same comments are applicable to the surfaces 31a, 31b) and wherein the broken line indicates partially the profile of the shape of the support 6, as can also be seen in Fig. 7.

[0075] The forces F_1 , F_2 respectively applied by these surfaces onto the undercuts 12a, 13b are, assuming here ideal theoretical conditions for the sake of simplicity of explanation, perpendicular to said undercuts and surfaces themselves.

[0076] Consequently, breaking down each force into the associated vertical and horizontal components (with reference to Fig. 9) F_{1x} , F_{1y} and F_{2x} , F_{2y} , it can be seen that the two horizontal forces F_{1x} and F_{2y} are opposite to each other and directed towards the inside of the section 8.

[0077] The latter therefore tends to "close" itself, i.e. to clasp the support 6 thereby providing a further degree of steadiness to its locking inside the section 8.

[0078] It is obvious, however, that this second embodiment of the invention may also be subject to modifications; more generally, it may be stated that within the teaching provided by the invention and which can be obtained from the examples shown herein, several variants are possible.

[0079] For example, the shapes of the section 8 and of the supports 6 may also differ considerably from those illustrated in the drawings, provided that, of course, they allow the sliding engagement of said parts as explained above.

[0080] By way of example, it is possible to contemplate sections having an H-shaped or I-shaped cross-section or having a generally curved, either convex or concave, cross-section which may be more or less complex.

[0081] These different shapes can also depend on the type of hinge used to carry out the invention.

[0082] Indeed, although in this description reference has been made mainly to the hinges with a rotary and

translational closing/opening movement, namely those having articulated levers as in the example shown, it is possible to apply the teaching arising from the invention also to other types of hinges.

[0083] Furthermore it is also possible to envisage accessories for the completion of the furniture structure according to the present invention, such as for example seals or plastics strips and the like intended to close the open cross-section of the sections between one hinge and another, in order to prevent the possible deposition of dust or dirt.

[0084] Also as regards the frame of the door, changes may be made with respect to its configuration (for example number and shape of the sections) and to the way in which it is incorporated in the door; generally speaking, it should be recommended only that the frame have at least one useful section for the sliding engagement with the hinge supports, in accordance with what explained herein.

[0085] These and other possible variations fall however within the scope of the following claims.

Claims

1. Structure of a piece of furniture comprising:

a door (2) with a reinforcing frame formed by sections (8, 9, 10) joined together;
a plurality of hinges (1) for applying the door to a wall (5) of the piece of furniture, each of said hinges having a support (6) to be secured to a section (8) of the door frame using screws (18);

characterized in that:

the supports (6) of the hinges and the section (8) are formed in a mutually matching manner so that the former are slidably guided by the latter; and in that:
the fixing screws (18) fit into threaded holes (17) passing through the respective supports, so that when they are tightened they act against the inner wall of the section (8) and force the supports against it, thereby locking them in the desired position.

2. Structure according to Claim 1, wherein the section (8) has a substantially open cross-section which is provided internally with lugs (12, 13, 14) that engage with corresponding locating teeth (15, 16) of the supports (6), thereby guiding the sliding movement of the latter along the section.

3. Structure according to Claim 2, wherein the locating teeth (15, 16) of the supports (6) are provided with inclined surfaces (30a, 30b; 31a, 31b) so that, when the screws (18) are tightened, they rest against

matching undercuts (12a, 13b) formed on the lugs (12, 13) of the section (8), thereby applying onto the latter a force (F_1 , F_2) with a component (F_{1x} , F_{2x}) which tends to clasp the section around the supports.

4. Structure according to any one of Claims 1 to 3, wherein the section (8) to which the supports (6) of the hinges (1) are secured is joined to the adjacent sections (9, 10) of the door frame (2), by means of inserts (S) arranged in the same inner part of the section (8) where the aforementioned supports (6) are slidable.

5. Structure according to any one of Claims 1 to 4, wherein the hinges (1) are of the type comprising articulated levers (7) connecting the support (6) to a hinge arm (5), providing the door (2) with a rotary and translational closing and opening movement.

6. Structure according to any one of Claims 2 to 5, wherein the section (8) has a substantially L-shaped cross-section.

7. Structure according to any one of the preceding claims, wherein the section (8) is provided with a seat (19) for receiving the edge of a buffer panel (20) of the door (2).

8. Structure according to any one of the preceding claims, wherein the supports (6) of the hinges and the section (8) are made of metal and/or plastic material.

9. Door of a structure according to Claims 1 to 8, comprising a frame formed by sections (8, 9, 10) joined together, characterized in that at least one of these sections (8) has a substantially open cross-section wherein lugs (12, 13, 14) extend and wherein one or more hinge supports (6) having a shape matching that of the cross-section are mounted, thereby resulting slidably guided by the section (8) and being fixed thereto by passing screws (18) which exert a thrust action against the inner wall of the section (8).

10. Door according to Claim 9, wherein the section (8) where the supports (6) of the hinges (1) are mounted, is joined to the adjacent sections (9, 10) in the frame by means of right-angled inserts (S) arranged in the same part of the section where said supports are slidable.

11. Hinge of a structure according to Claims 1 to 8, comprising an arm (5), a support (6) for securing the hinge to a door (2) of the furniture, articulated levers (7) connecting the support to the arm and providing the door (2) with a rotary and translational closing and opening movement, characterized in that said

support is in the form of a body provided with locating teeth (15, 16), designed to slide along a guiding section (8) having a substantially open matching cross-section, and with screwed holes (17) passing through it.

5

12. Section of a structure according to any one of Claims 1 to 8, characterized in that it has a substantially L-shaped cross-section wherein a seat (19) for insertion of the edge of a panel (20) and lugs (12, 13, 14) projecting towards the inside of the cross-section are defined, and wherein one or more of these lugs have undercuts (12a, 13b) oriented so that a force (F_1 , F_2) applied perpendicularly with respect thereto produces a component (F_{1x} , F_{2x}) which tends to narrow the cross-section of the section.

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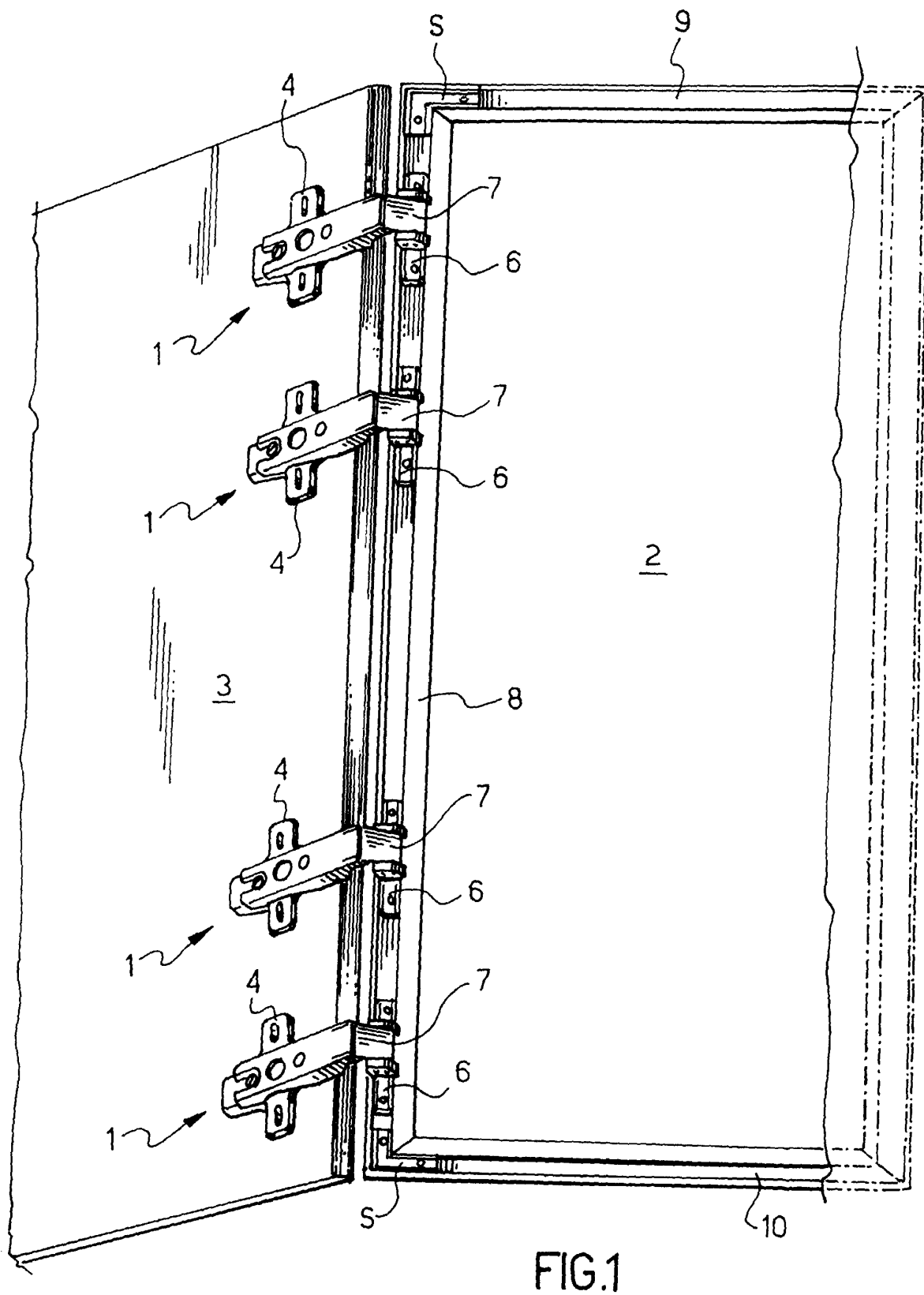
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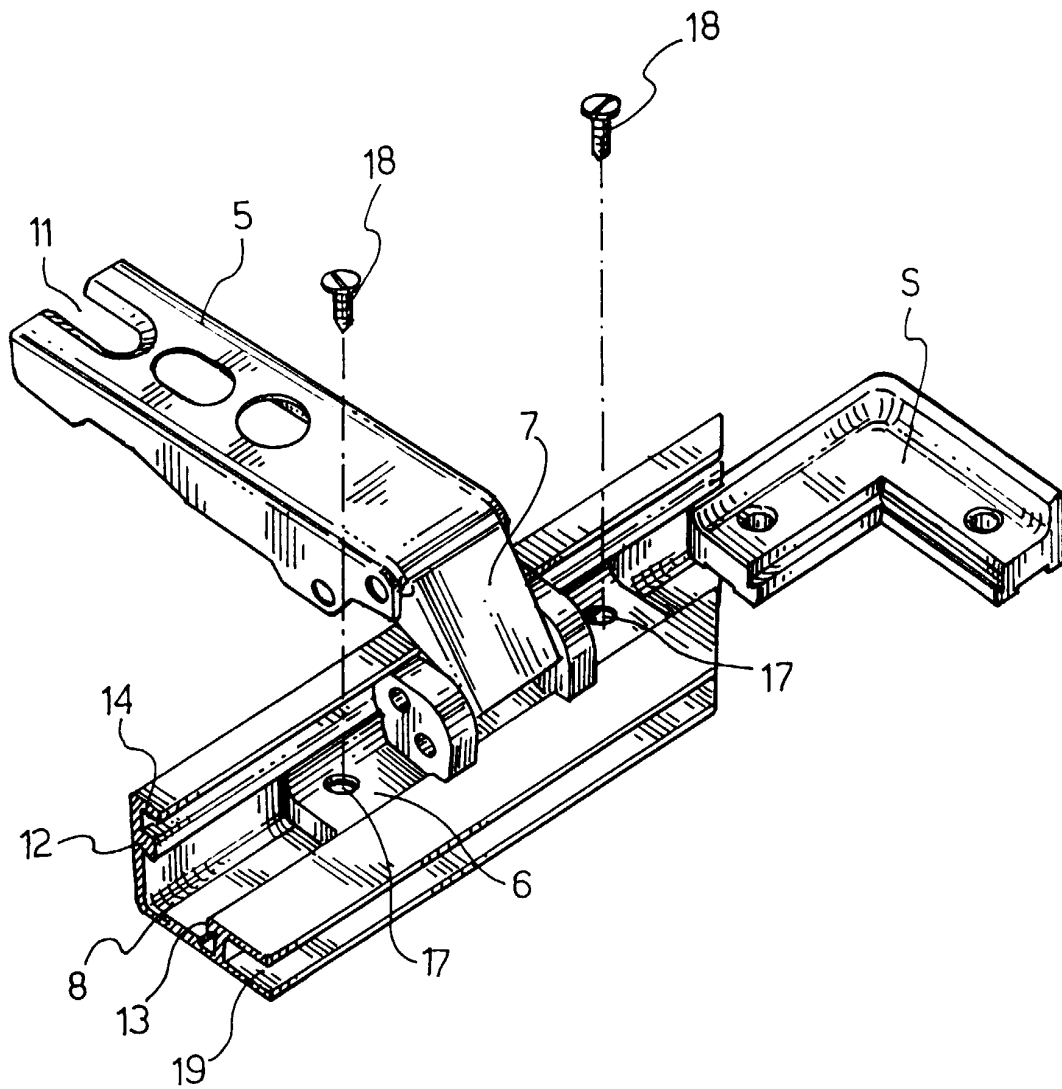


FIG.2

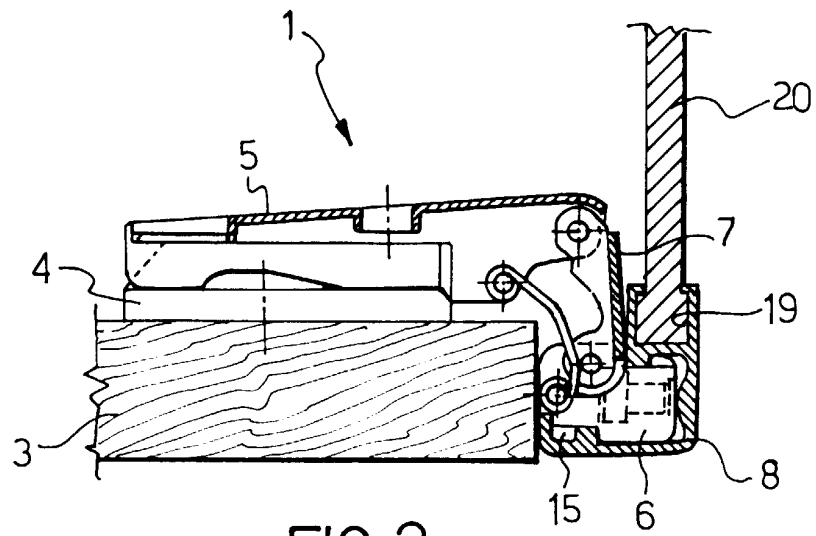


FIG. 3

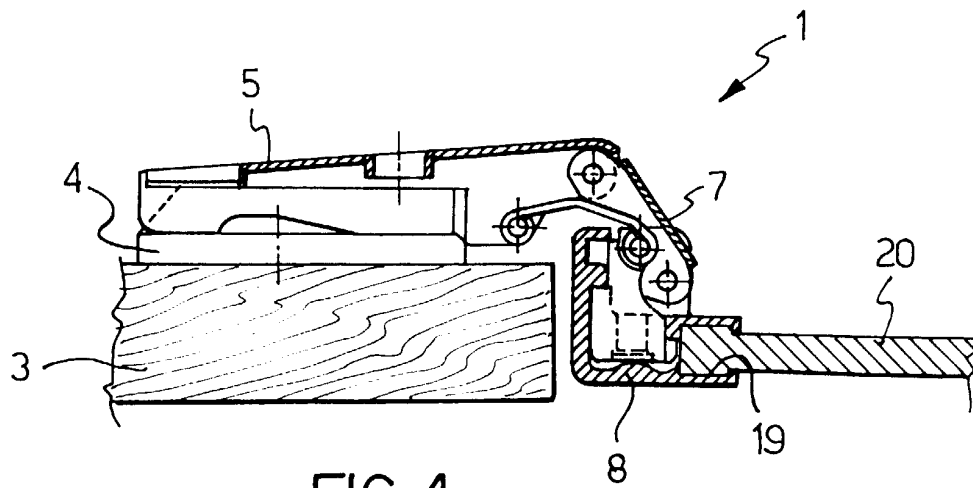


FIG. 4

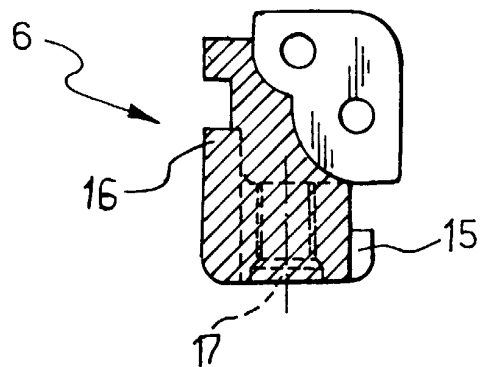


FIG. 5

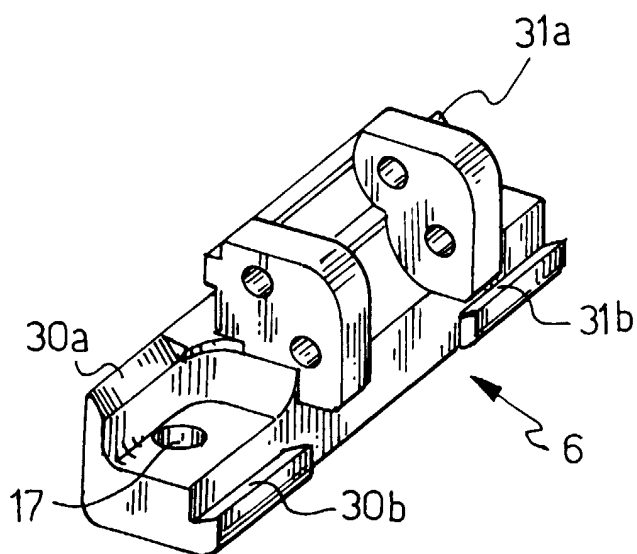


FIG. 6

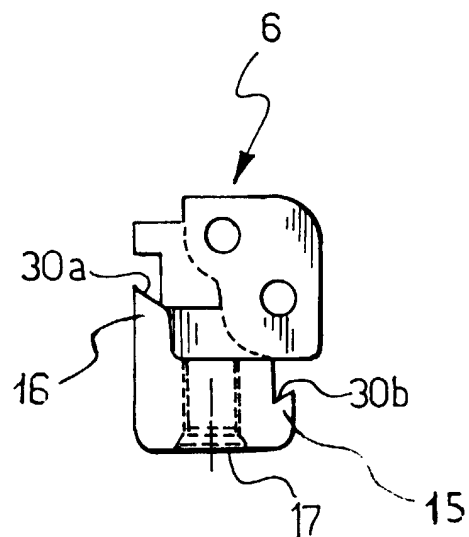


FIG. 7

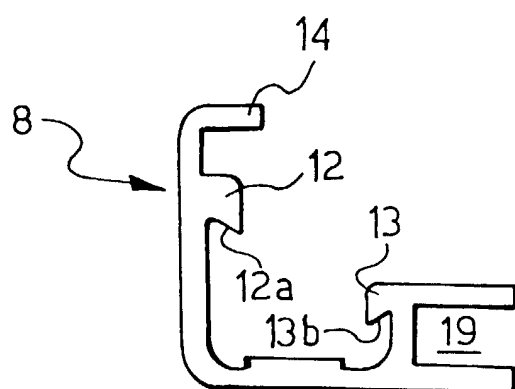


FIG. 8

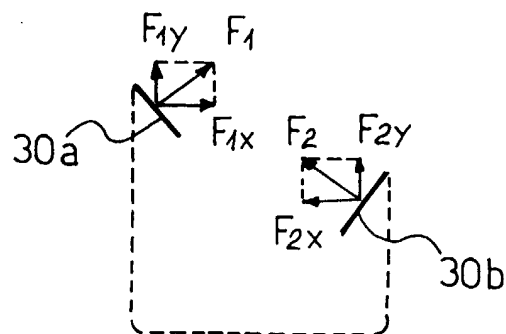


FIG. 9



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 99 83 0231

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION
X	DE 195 18 450 A (BEL AIR ART BILDERRAHMEN GMBH) 21 November 1996 (1996-11-21)	1,2,4-11	E05D5/02
Y	* column 2, line 35 - column 3, line 42; figures *	3,12	
Y	---		
Y	DE 26 24 278 A (SYCO PROD ENTWICKLUNGS GMBH) 8 December 1977 (1977-12-08)	3,12	
A	* page 6, last paragraph - page 7, paragraph 1; figures *	1,2,9,11	
A	---		
A	CH 524 750 A (HAWA AG) 30 June 1972 (1972-06-30)	1,2,9,11	
	* column 1, line 40 - column 2, line 24; figures *		
A	---		
A	FR 2 129 405 A (VAW VER ALUMINIUM WERKE AG) 27 October 1972 (1972-10-27)	3,12	
	* page 2, line 21 - line 33; figures *		
D,A	---		
	EP 0 864 721 A (TERNO SCORREVOLI S N C DI TERN) 16 September 1998 (1998-09-16)	1	
	* abstract *		

The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		7 September 1999	Van Kessel, J
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