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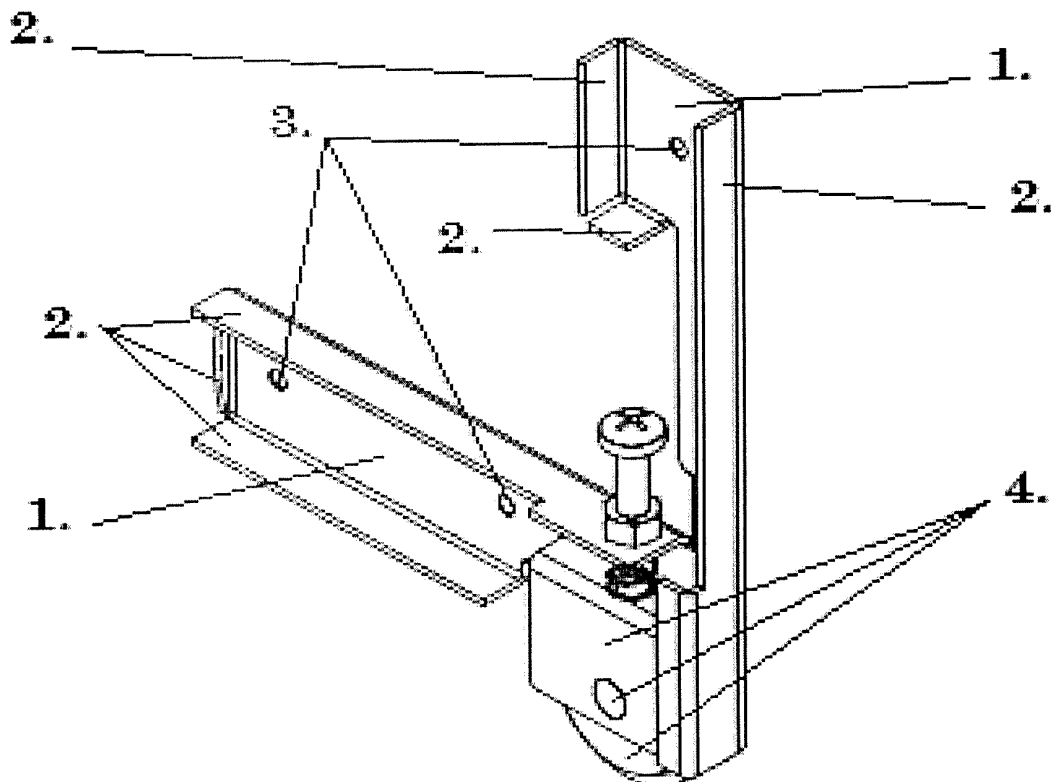
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(54) **FURNITURE SLIDING DOOR BOTTOM TROLLEY**

(57) Owing to an appropriate structure of the bottom trolley casing and top guide, those elements perform the functions of both structural hardware for the door frame and of the tracking/guiding element for the sliding door

frame with the structure made of wood, modified wood, MDF board or another furniture board (i.e. solid materials).

FIG. 1



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Description

II. Technical field:

[0001] The subject matter of this invention is the furniture sliding door top guide as well as the structural and carrying bottom element of the furniture sliding doors. That element occurs in options as left and right trolleys.

[0002] Use: Furniture making. Manufacture of furniture sliding doors.

III. State of the art:

[0003] The so-called bottom trolleys and top guides are one of the key elements in making furniture, especially sliding door wardrobes and walk-in closets. Most often, those elements are bearing armed guide carrying rollers. The classical sliding door leaf is fitted on two or more such rollers. There are also hanging sliding doors, in which the top trolleys are the carrying rollers. The inventions to which this single patent application pertains are as follows: the furniture sliding door bottom trolley and furniture sliding door top guide. Classical sliding doors are such doors where the leaf weight is carried by bottom trolleys (the non-hanging door).

[0004] There are many types of furniture sliding doors equipped with bottom rollers. These are, in particular:

1. Doors with a closed frame structure made of extruded aluminium sections. The bottom trolley has only the carrying function and is not a structural element of the door leaf frame. The top guide has a guiding function only and also does not have any contribution to the structural properties of the frame itself.

2. Doors with a closed frame made of cold-rolled steel sections, where the bottom trolley has a structural function, too, which means that the trolley is an element joining the various door leaf frame profiles together. In turn, the top guide has both a structural and guiding function (the top trolley casing joins the door frame profiles together).

3. Doors with a closed frame hybrid structure, i.e. made of extruded aluminium profile sections and of sections made of cold-rolled steel profiles. The bottom trolley has only the carrying function and it is not an element joining the sliding door frame. The top guide has the guiding role only.

4. Doors with a closed frame structure made of wood (or MDF profiles/sections, or another solid/cast material), where the bottom trolley has only the track functions even though that trolley may be hidden in the pockets in the bottom part of the door frame. The top guide has the guiding function only. The elements joining the door frame are independent of the

bottom trolley and top guide. Most often, those joining elements are classical carpenter's wood joining plugs or other pieces of furniture hardware which, in view of their structure, enable furniture door frame joining.

5. Doors without a structural frame, where the carrying element is a carrying panel also performing the function of the door leaf filling. In that case, bottom trolleys are fitted on the back surface of the door, close to the lower door edge, or close to the bottom edge in the pockets grooved in to the panel. The top guide has only the guiding function and is not a structural element of the sliding door frame. That structure is debatable because the door leaf becomes deformed into a vertical curve in many cases. To avoid that problem, various stiffening elements are fitted vertically in the dedicated channels grooved at the production stage in to the back of the doors. If a furniture door leaf becomes deformed after installation, components which can be fitted on the door in the case of a complaint are available at the market.

[0005] Sliding door framed systems with a frame made of wood or MDF profiles, painted or coated with PVC film, as mentioned in item 4 above, have the following limitation. Those systems assume the need for the carrying frame to be assembled with conventional carpenter's joints used in the furniture industry such as plugs, bolts, glue, or other hardware which, because of their structure, enable furniture door frame joining. In relation to the above, both the sliding door bottom trolley and the top guide are not structural elements of the frame, but only roll/carry the door along the specified track and determine the door leaf rolling route. In the current state of technology, the above-mentioned classical trolleys and guides are mounted:

a. in pocket grooved in the bottom part of the frame, or

b. outside the frame (outside the furniture door bottom frame contour), or

c. in pockets in a part of the furniture door carrying panel, or

d. outside the frame (outside the contour of the furniture door carrying panel),

e. on the top of the frame, as in the case of top guides.

[0006] Such an assembly method is time-consuming, firstly because of the need to perform separate actions of putting the furniture door carrying frame together during the production process and, secondly, due to the need to make pockets and fit carrying bottom rollers in those pockets (see the furniture doors mentioned in items 4

and 5 above). On the part of the furniture sliding door manufacturer, this is linked to a longer production process than proposed by the applicant, even in terms of the need to use carpenter's glues, clamps etc. (see the furniture door mentioned in item 4). It should be noted that although there are also sliding doors at the market, which are not glued but bolted, the door leaf production process is significantly time-consuming (see the furniture door in item 1 above). This is because it is necessary to drill bolt holes. None of the existing solutions for the frame door leaf with the solid frame (i.e. not hollow) made of wood, modified wood, MDF boards or another kind of furniture panels has trolleys and guides which are both the carrying and guiding elements and a door leaf frame structural element, which elements additionally, after the application of specific directional forces during sliding door frame assembly, force the final position of the sliding door frame profiles against each another.

IV. Invention disclosure

[0007] The solution of the issue described above is offered by the bottom trolleys and top guides of the furniture sliding door, which are, at the same time, the structural elements of the furniture sliding door frame (those elements are the hardware of the frame made of wood, modified wood, MDF board or another frame made of furniture panels). Such trolleys and guides are distinguished by the high rigidity of the casing (the skeleton element of the trolley built from arms and tongues) obtained through the use a steel sheet of appropriate thickness and a relevant configuration of bends and embossment. Casings are moulded in such a way that they match the longitudinal channel cuts in the vertical profiles of the sliding door frame, in the top or bottom horizontal profiles of the sliding door frame, the pockets in the bottom ends of the sliding door vertical profiles and the channel grooves in the horizontal top and bottom profiles.

Furniture sliding door bottom trolley

[0008] The main structural element (in addition to the carrying system) of the bottom trolley is the casing made of tongued arms. The bottom trolley casing arms are extended thus ensuring the stability of the structural connection of the sliding door frame. The tongued elements of the (left and right) bottom trolleys match the longitudinal cuts in the door leaf frame profiles. It is possible to make cuts in sliding door frame profiles dedicated for that sliding door system because the profiles are made of a solid material (there are no hollows inside the profiles, as is the case with profiles used in steel and aluminium framed systems) which is subject to carpenter's treatment consisting in grooving. In its extended arms, the bottom trolley casing has holes for fixing the trolley to the profiles with screws. Those holes have a shape enabling the screw head to be concealed so that the screw head plane is flush with the hardware surface plane.

[0009] The trolley shape is designed in such a way that, owing to the appropriate pocket shape, the tongues of the casing fill the sliding door frame thus creating, jointly with that door frame, a compact and rigid structure. During the assembly of the door leaf, by putting the trolley in the pocket in the bottom part of the door frame vertical profile and by applying specific directional forces, the position of the profiles in relation to each other is fixed. This means that the trolley self-positions the profiles in relation to one another. By self-positioning, the applicant understands that the final position of the profiles making the frame is forced upon the application of specific directional forces during sliding door frame assembly. This makes assembly easier in the case of sliding door systems based on solid frames because the only activity which a door frame assembler will have to perform after the self-positioning of the profiles will be substantially the bolting of the sliding door frame to the top and bottom trolleys. After the sliding door leaf assembly, the bottom trolley casing does not protrude from the door leaf frame contour. The only bottom trolley element which protrudes from the sliding door frame profile is a small fragment of the trolley carrying system - wheel.

[0010] The furniture sliding door bottom trolley may have an option with a track system, with the structure enabling the vertical adjustment of the door leaf, an option with a track system which, owing to a mechanism used in it, keeps the bottom wheel in track even if the sliding door frame is lifted during opening or closing, or an option combining the features referred to in the previous sentence.

Furniture sliding door top guide

[0011] The main structural element (in addition to the guide system) of the top guide is the casing made of tongued arms. The top guide horizontal arm is extended and that, along with its embossment, ensures the stability of the structural joint of the sliding door frame. The tongued elements of the (left and right) top guides match the longitudinal cuts in the door leaf frame profiles. It is possible to make cuts in dedicated sliding door frame profiles because they are made of a solid material (there are no hollows inside the profiles, as is the case with profiles used in steel and aluminium systems) which is subject to carpenter's treatment consisting in grooving. Top guide casings have holes made on both arms and designed for fixing the trolley to profiles with screws. Those holes have a shape enabling the screw head to be concealed so that the screw head plane is flush with the hardware surface plane.

[0012] The guide shape is designed in such a way that, owing to the appropriate shape of the pocket, the tongues of the casing fill the sliding door frame thus creating, together with that door frame, a compact and rigid structure. During the assembly of the door leaf, by putting the guide casing in the longitudinal cuts in the top part of the vertical profiles and of the horizontal door frame profiles and by

applying specific directional forces, the position of the profiles in relation to each other is fixed. This means that the top guide self-positions the profiles in relation to each other. By self-positioning, as in the case of the bottom trolley, the applicant understands that the final position of the profiles making the frame is forced upon the application of specific directional forces during sliding door frame assembly. This makes assembly easier in the case of sliding door systems based on solid frames because the only activity which a door frame assembler will have to perform after the self-positioning of the profiles will be substantially the bolting of the sliding door frame to the top guides and bottom trolleys.

V. Substantiation of invention integrity

[0013] The furniture sliding door bottom trolley and top guide are inventions based on one invention idea using common structural elements of the trolley and guide casings i.e. arms and tongues, which are characterised by the possibility of using trolleys and guides also for making the structure of the sliding door frame. The second feature confirming invention integrity is the self-positioning of the sliding door frame profiles, which is a common property for the bottom trolley and top guide.

Drawing figures:

[0014] The subject matter of this invention is presented on the basis of the example of the construction in the attached drawings, in which the various figures illustrate the following:

Figure 1. Internal view of the sliding door bottom trolley

Figure 2. External view of the sliding door bottom trolley

Figure 3. View of the sliding door top guide

Example for the use of the invention:

[0015] Connecting custom-cut profiles and hardware elements in sliding door leaves following the previous measurement of a wall recess. The use of a 4 mm mirror as filling elements. As a result, we obtain a custom-made three-door front of a recessed oak-wood frame wardrobe with sliding doors, where the bottom trolley is both carrying and structural element of the sliding door leaf frame, and the top guide performs the guiding and structural door frame function. Such a leaf will not fall out of the track during wardrobe opening or closing, and the doors keeps the vertical alignment owing to appropriate positions predetermined for the bottom wheels and top guides in the track system.

Claims

1. The sliding door bottom trolley constituting a steel section, which fulfils the function of the trolley casing, has assembly holes (3) and a carrying system (4), which is **characterised in that** the trolley casing is made of two arms (1) situated at 90° against each other and of tongues (2) for the longitudinal cuts in the sliding door frame profiles; owing to that the casing is a structural element of the sliding door frame.
2. Pursuant to claim 1, the sliding door bottom trolley is **characterised in that** the arms (1) and tongues (2) of the trolley casing have such a shape and bends that, upon the application of the specified directional forces during the sliding door frame assembly, the arms and tongues force the final position of the profiles of the sliding door frame against each other.
3. Pursuant to claim 1 or 2, the sliding door bottom trolley is **characterised in that** the carrying system of the bottom trolley enables the vertical adjustment of the door leaf position.
4. Pursuant to claim 1 or 2, the sliding door bottom trolley is **characterised in that** the track system of the bottom trolley has a mechanism keeping the bottom wheel in track despite the lifting of the various sliding door corners during opening or closing of the sliding door leaf.
5. Pursuant to claim 1 or 2, the sliding door bottom trolley is **characterised in that** the carrying system of the bottom trolley enables the vertical adjustment of the door leaf and has a mechanism keeping the bottom wheel in track despite the lifting of the various sliding door corners during opening or closing of the sliding door leaf.
6. The sliding door top guide constituting a steel section, which fulfils the function of the trolley casing, has assembly holes (3) and a guide system (4), which is **characterised in that** the trolley casing is made of two arms (1) situated at 90° against each other and of tongues (2) for longitudinal cuts of the sliding door frame profiles; owing to that the casing is a structural element of the sliding door frame.
7. Pursuant to claim 6, the sliding door top guide is **characterised in that** the arms (1) and tongues (2) of the guide casing have such a shape and bends that, upon the application of the specified directional forces during the sliding door frame assembly, the arms and tongues force the final position of the profiles of the sliding door frame against each other.

FIG. 1

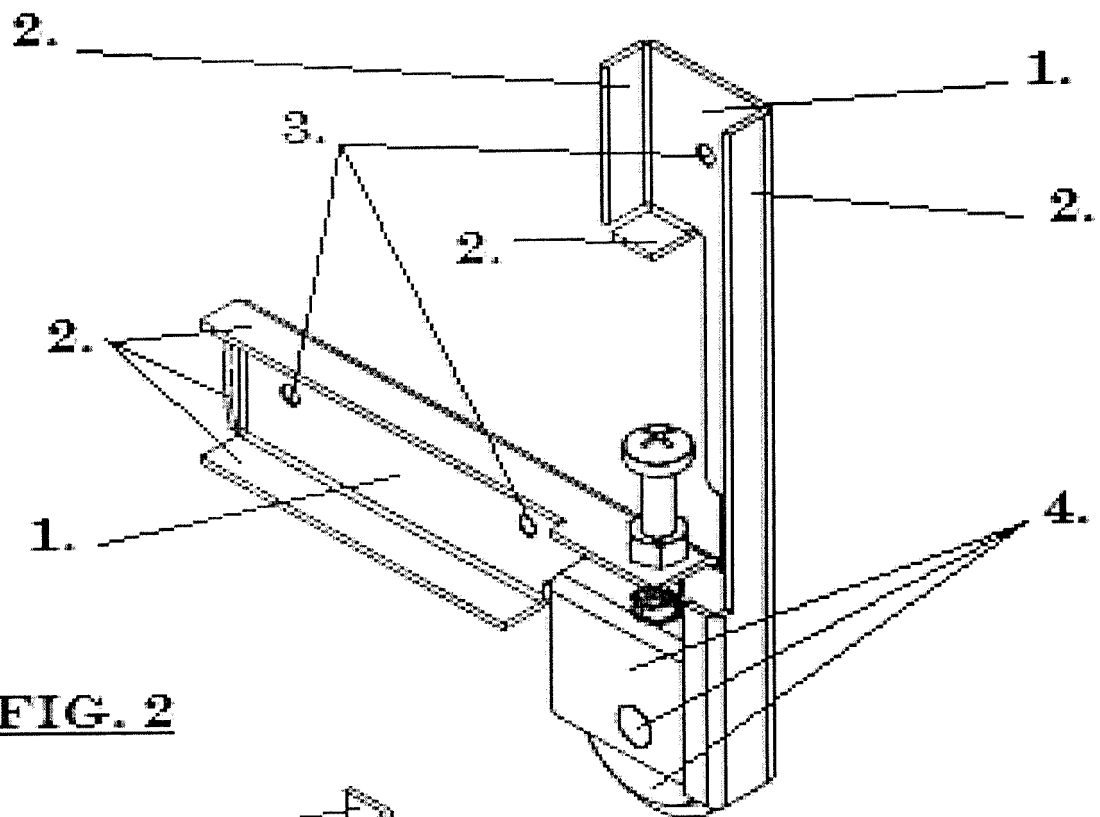


FIG. 2

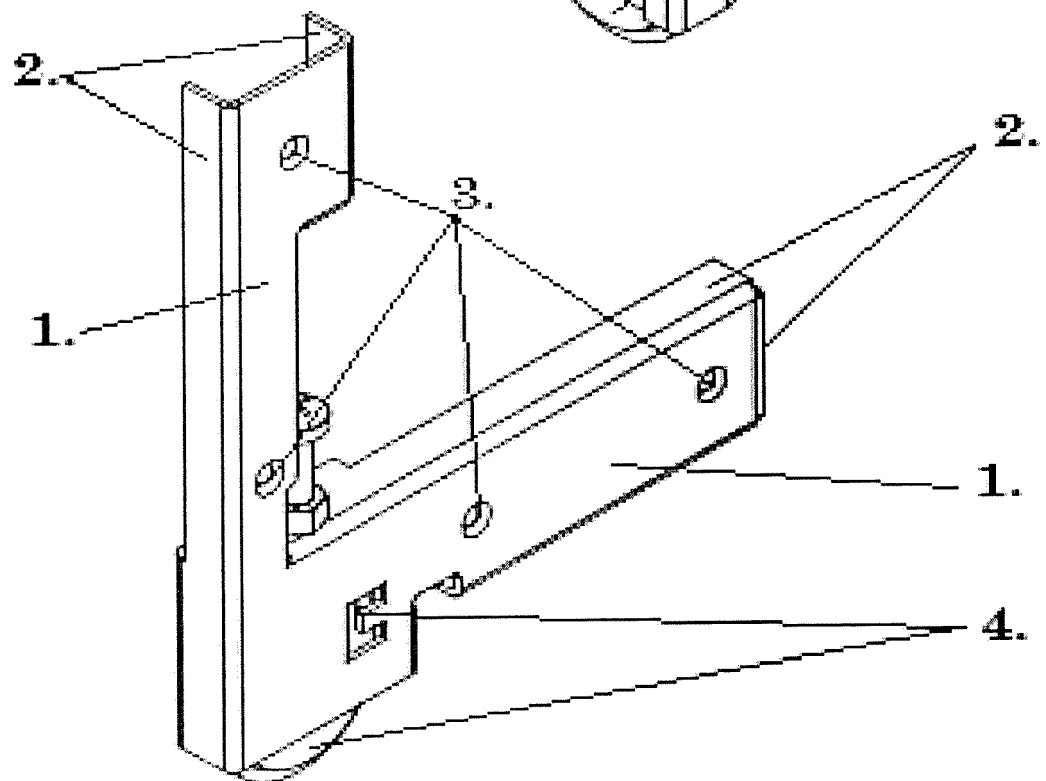
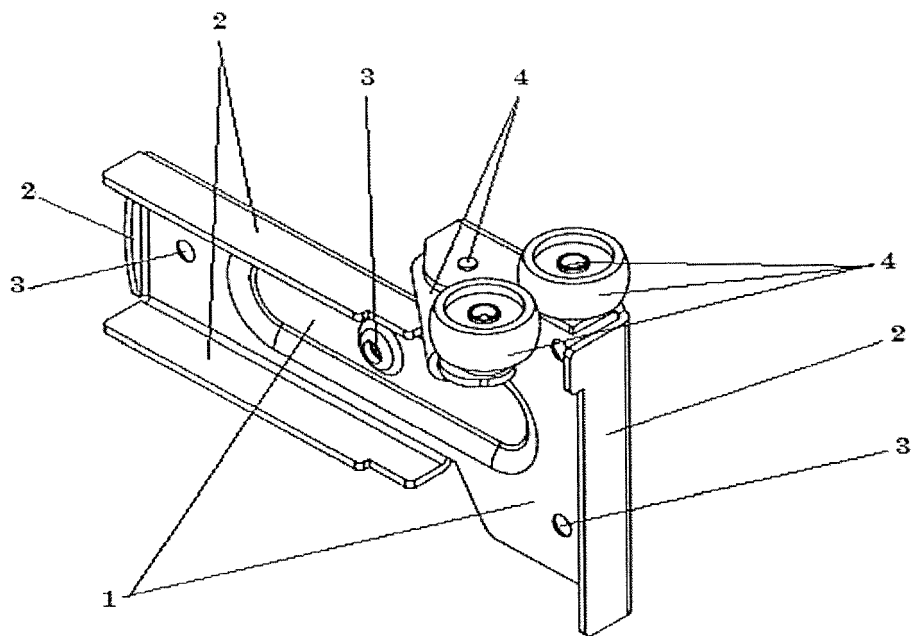


FIG. 3





EUROPEAN SEARCH REPORT

Application Number
EP 18 46 0002

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			TECHNICAL FIELDS SEARCHED (IPC)
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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 25 May 2018	Examiner Witasse-Moreau, C
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			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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25-05-2018

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82